11 Drainage, Flooding and Water Resources

11.1 INTRODUCTION

11.1.1 This Chapter assesses the effect of the Proposed Development on drainage, flooding and water resources. In particular, it considers the potential effects on surface and foul drainage systems, potable water demand, water bodies and flood risk on-site, in the vicinity of and downstream of the Site during the site preparation, earthworks and construction and operational stages of the Proposed Development.

11.1.2 Potentially significant effects to groundwater and degradation to surface water quality due to chemical contamination are addressed within **Chapter 10 – Ground Conditions, Hydrogeology and Contamination**.

11.1.3 This Chapter is supported by three main documents prepared by WSP; a Land Quality Desk Study (**Appendix 10.1**), a Flood Risk Assessment (FRA) (**Appendix 11.1**) and a Drainage Strategy (**Appendix 11.2**). In addition, third party consultants have completed ground investigation works and these are summarised in the WSP Land Quality Desk Study.

11.1.4 This Chapter (and its associated figures and appendices) is not intended to be read as a stand alone assessment and reference should be made to the Front End of this **ES** along with **Chapter 16 - Cumulative Effects / Residual Impacts**.

11.2 LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

11.2.1 The applicable legislative framework is summarised as follows:

- *Water Resources Act 1991* (**Ref 11.1**) - This Act sets out the regulatory controls and restrictions that provide protection to the water environment through controls on abstraction, impounding and discharges as well as identifying water quality and drought provisions;
- *Water Industry Act, 1991* (**Ref 11.2**) - This Act consolidates enactments relating to the supply of water and the provision of sewerage services;
- *Land Drainage Act 1991* (**Ref 11.3**) - This Act consolidates enactments relating to internal drainage boards and the functions of these boards and of local authorities in relation to land drainage. Internal Drainage Boards (IDB) exercise a general supervision over all matters relating to the drainage of land within their district and they have powers to perform duties imposed on them within the Act;
- *Land Drainage Act 1994* (**Ref 11.4**) - This Act adds new environmental duties to the *Land Drainage Act 1991*. It places a duty on the IDB and local authorities to further the conservation and enhancement of natural beauty and the conservation of flora, fauna and geological or physiographical features of special interest; and to take into account any effect which the proposals would have on the beauty or amenity of any rural or urban area or on any such flora, fauna or features;
- *Environment Act 1995* (**Ref 11.5**) - This Act established basic terms of reference for the Environment Agency (EA). The principal aim of the EA is to protect or enhance the environment. The EA also exercises a general supervision over all matters relating to flood defence. The Act provides the EA with a duty to take action as it considers

necessary to conserve, redistribute or otherwise augment water resources in England and Wales and to secure the proper use of water resources in England and Wales;

- *Water Act 2003* (**Ref 11.6**) - This Act amends the *Water Resources Act 1991* and the *Water Industry Act 1991* to formalise the Government's commitment to the sustainable management and use of water resources;
- *The Water Environment (Water Framework Directive) (England & Wales) Regulations, 2003* (**Ref 11.7**) – These regulations establish a framework for protecting the water environment, with the aim of achieving chemical and ecological water quality targets by 2015; and
- *Building Regulations (Part G), draft amendments May 2009* (**Ref 11.8**) - Changes have been made to these regulations to include targets for reducing water consumption.

Planning Policy

11.2.2 Planning policy at the national, regional, county and local level is discussed in **Chapter 5 - Relevant Policy**. A summary of the scheme's compliance with legislation and planning policy is included in Section 11.6 of this Chapter.

11.2.3 The National Planning Policy Framework (NPPF) was adopted in March 2012 **(Ref: 11.21)** replaces all previous Planning Policy Statements and technical notes, however, as the policy is in its infancy and remains untested, this chapter will provide further context by referring to the previous PPS documents where further clarity is required. In relation to flooding, the NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. However, the policy then discusses that where development is necessary the approach should be to make it safe without increasing flood risk elsewhere. The Local Plans should be supported by Strategic Flood Risk Assessment. Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change.

11.2.4 The following Planning Policy Statements were reviewed and referenced in the development of the proposed application and while these have subsequently been replaced by the NPPF they are referenced accordingly

- *PPS 1 – Delivering Sustainable Development (2005)* (**Ref 11.9**) confirms that good planning should deliver the right development in the right place and time, and protect the environment. A supplement to PPS1 (2007) requires that planning should help shape new homes, jobs and infrastructure to be resilient to climate change (e.g. changes in flood risk);
- *PPS 23 – Planning and Pollution Control (2004)* (**Ref 11.10**). Annex 1 *'Pollution Control, Air and Water Quality'* and Annex 2 *'Development on Land Affected by Contamination'* set out policies for pollution control to be followed at all stages of planning; and
- *PPS 25 – Development and Flood Risk (March 2010)* (**Ref 11.11**) ensures that the Government's policies on avoiding flood risk and accommodating the effects of climate change in relation to drainage are implemented in the planning process. This includes the requirement for the preparation of an FRA for all significant developments over 1 hectare in size.

11.2.1 Relevant regional policies are contained within the Regional Spatial Strategies (*May 2008*) (**Ref 11.12**). The Regional Spatial Strategies (RSS) have recently been reinstated as part of the statutory development plan following a legal challenge to the Government's initial decision to revoke RSS. However, it is noted that the RSS is undergoing a period of review.

11.2.2 Relevant local policies are contained within the Barnsley Unitary Development Plan, adopted 2000 (**Ref 11.13**) and include the following:

- *The Unitary Development Plan (UDP)* is the statutory development plan for the borough along with the Barnsley Education Sites Development Plan Document.
- It considers how much development is required in the borough, where it is best located and how it should be designed and contains planning policies on a wide range of matters including, housing, the environment, transport, leisure and economic and community uses. The UDP will eventually be replaced by the Local Development Framework (LDF).

11.2.3 Barnsley Local Development Framework, Core Strategy, Adopted, September 2011 (Ref 11.14); *the policies* relevant to flood risk include the following:

- CSP 3 Sustainable Drainage Systems (SuDS) which states that:
  - All development will be expected to use Sustainable drainage systems (SuDS). Only in exceptional circumstances, where it can be demonstrated that all types of SuDS are impractical, will other drainage management systems be permitted;
  - Planning applications must include an assessment to show that SuDS will work and be maintained. Measures should be taken to avoid water contamination and safeguard groundwater supply; and,
  - Developers will be required to contribute to the maintenance of SuDS.
- CSP 4 Flood Risk which states that the extent and impact of flooding will be reduced by:
  - Not permitting new development where it would be at an unacceptable risk of flooding or would give rise to flooding elsewhere;
  - Requiring developers with proposals in Flood Zones 2 and 3 to provide evidence of the sequential test;
  - Requiring site-specific Flood Risk Assessments (FRAs) for proposals over 1 hectare in Flood Zone 1 and all development proposals in Flood Zones 2 and 3;
  - Requiring proposals over 1000 m2 floor space or 0.4 hectares in Flood Zone 1 to demonstrate how the proposal will make a positive contribution to reducing or managing flood risk;
  - Requiring all development proposals on Brownfield sites to reduce surface water run-off by at least 30% and development on Greenfield sites to maintain or reduce existing run-off rates;
  - Requiring development proposals to use Sustainable Urban Drainage Systems (SuDS) in accordance with policy CSP 3;
  - Not culverting or building over watercourses and encouraging the removal of existing culverts wherever practicable;
  - Using flood resilient design in areas of high flood risk.

Guidance

11.2.4 The following Pollution Prevention Guidelines (PPG) have been issued by the EA that are considered to be relevant to this assessment:

- EA, pre 2007. *PPG1 'General Guide to the Prevention of Pollution'* (**Ref 11.15**);
- EA, October 2007. *PPG5 'Works or Maintenance in or Near Water'* (**Ref 11.16**);
- EA, pre 2007. *PPG6 'Working at Construction and Demolition Sites'* (**Ref 11.17**); and
- EA, March 2009. *PPG21 'Incident Response Planning'* (**Ref 11.18**).

11.2.5 Other guidance documents considered to be relevant to this assessment include the following:

- CIRIA 697, 2007: *The SuDS Manual* (**Ref 11.9**). This document provides best practice guidance on the planning, design, construction, operation and maintenance of Sustainable Drainage Systems (SUDS) to facilitate their effective implementation within developments; and
- EA, 2009. *Flood Risk Standing Advice for England* (**Ref 11.20**). This advice reflects the policy contained in PPS25 and provides standard information on whether a development is suitable with regards to flood risk.

11.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

11.3.1 The scope of this Chapter includes a review of the available baseline information on the Site setting with specific regards to current drainage, flooding and water resource conditions.

11.3.2 Site Preparation, Earthworks and Construction Phase (including Demolition)

- Increase in risk of physical contaminants (i.e. sedimentation) on the adjacent and on-site drainage channels, surface water sewers and ultimately the River Dearne from surface water run-off and dewatering activities;
- Increase in risk of surface water and drainage flooding on construction workers and construction activities;
- Increase in risk of fluvial flooding on construction workers; and
- Increase in risk of groundwater flooding on construction workers and construction activities (e.g. basement and foundation construction).

11.3.3 Operational Phase

- Increase in risk of physical contaminants (i.e. sedimentation) on the adjacent and on-site drains and ultimately the River Dearne from surface water run-off and site activities;
- Increase in foul drainage (and associated potential increase in flood risk) and associated demand on sewage network;
- Increase in, or change in patterns of, surface water drainage and associated flood risk;
- Increase in risk of fluvial flooding on future populations and third parties;
- Increase in risk of groundwater flooding; and
- Increase in demand on potable water supply.

11.3.4 Potentially significant effects to groundwater and degradation to surface water quality due to chemical contamination are addressed within **Chapter 10 – Ground Conditions, Hydrogeology and Contamination.**

Extent of the Study Area

11.3.5 The study area for water resources, flooding and drainage encompasses the Site and sensitive receptors within the influence of the Site including the River Dearne water body. The catchment area for foul water drainage and water supply is also considered within the study area.

Consultation

11.3.6 The relevant correspondence is presented in the FRA provided in **Appendix 11.2** and is summarised below.

11.3.7 Yorkshire Water have confirmed that the sewers that currently cross the Site will need to be diverted and that they would need to undertake a diversionary works feasibility assessment.

11.3.8 The EA has been consulted throughout the preparation of this Chapter and supporting appendices. The EA has confirmed that as the River Dearne is classed as a main river, any development with 8 m from the top of bank will require consent from them.

11.3.9 BMBC have been consulted throughout the preparation of this Chapter.

Method of Baseline Data Collation

11.3.10 This Chapter comprises a desk study which draws on the relevant findings of a number of documents. The most pertinent documents are as follows and other sources of desk study information are referenced throughout this Chapter where relevant:

- WSPE, September 2011, *Land Quality Desk Study. Old Mill Lane.* (**Appendix 10.1**);
- WSP, October 2011, *Flood Risk Assessment* (**Appendix 11.2**); and
- WSPE, October 2011, *Drainage Strategy, Old Mill Lane.* (**Appendix 11.3**).

11.3.11 Site walkovers were undertaken at the Site in September 2011 and August 2011. Information collected on the visits is utilised in the assessments below.

Assessment Modelling

11.3.12 The information contained in the baseline and mitigation techniques sections in the remainder of this Chapter was obtained from the sources referenced above and throughout the Chapter. The impact sections were based on professional judgement following review of the information available.

Significance Criteria

11.3.13 The assessments of potential effects as a result of the Proposed Development have taken into account both the site preparation, earthworks and construction and operational phases. The significance level attributed to each effect has been assessed based on the magnitude of change due to the development proposals, and the sensitivity of the affected receptor/receiving environment to change, as well as a number of other factors that are outlined in more detail in **Chapter 2 - Approach to the EIA.** Magnitude of change and the sensitivity of the affected receptor/receiving environment are both assessed on a scale of high, medium, low and negligible (as shown in **Chapter 2 - Approach to the EIA**).

Effect Significance

11.3.14 The following terms have been used to define the significance of the effects identified:

- **Major effect**: where the Proposed Development could be expected to have a very significant effect (either positive or negative) on drainage, flooding and water resources;
- **Moderate effect**: where the Proposed Development could be expected to have a noticeable effect (either positive or negative) on drainage, flooding and water resources;
- **Minor effect**: where the Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) on drainage, flooding and water resources; and
- **Negligible**: where no discernible effect is expected as a result of the Proposed Development on drainage, flooding and water resources.

11.3.15 With regard to the duration of the effects, in the context of this assessment '*short term*' is defined as less than 6 months; '*medium term*' as more than 6 months but less than 10 years and 'long term' is more than 10 years.

11.4 BASELINE CONDITIONS

Topography and Surface Cover

11.4.1 The Site is divided into the north and south by the River Dearne. Site levels generally slope down towards the River Dearne. The north of the River Dearne is impermeable, whilst the south of the River is currently hardstanding.

11.4.2 To the south of the river, levels range from approximately 50 m AOD adjacent to Twibell Street in the south to approximately 44 m AOD along the side of the River Dearne.

11.4.3 To the north of the river existing ground levels are approximately 44 to 45 m AOD.

11.4.4 The Site currently comprises an existing retail park containing existing retail warehouses (including Comet, MFI, Howdens and Powerhouse) as well as a depot/cash and carry. A decommissioned gas holder is also present on the Site to the south of the River Dearne. To the north of the river, the Site comprises a demolished depot site and an area of open space.

11.4.5 There is a rough vegetated area and tree lined corridor alongside both sides of the River Dearne.

Geology and Hydrogeology

11.4.6 British Geological Survey (BGS) geological map Sheet 87 1:50,000 scale **(Ref 11.22)** indicates that the Site is underlain by Alluvium deposits (Clay and Silt) in the vicinity of the River Dearne. The superficial deposits are shown to be underlain by the Carboniferous Coal Measures.

11.4.7 Several coal seams are identified to outcrop to the east of the Site including the Two Foot, Abdy, and Top Beamshaw Coal seams. The Low Beamshaw seam is identified to outcrop beneath the Site trending northwest to south east. Two faults are shown; one to the north and one to the south of the Site. Both faults trend in a northwest to southeast direction. The southern fault is shown to down throw to the north and the northern fault is shown to down throw to the south, which indicates that the Site is located on a down thrown block.

11.4.8 The EA classify the underlying Alluvium and Coal Measures at the Site as Secondary (A) Aquifers (permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers).

11.4.9 The Site is not located within a groundwater Source Protection Zone as defined by the EA and no active groundwater abstractions are identified within 1 km of the Site.

11.4.10 The previous reports for the northern area of the Site confirm that the groundwater flow direction is toward the River Dearne and is expected to be in continuity with the river. Shallow perched groundwater also exists on the northern area of the Site, anticipated to be held within the Alluvium deposits. At this stage limited information is available for the southern part of the Site and it is anticipated that the groundwater flow direction will be towards the River Dearne.

11.4.11 The current aquifer quantitative quality and chemical quality beneath the Site is classified as 'poor' by the EA under their Water Framework Directive River Basin Management Plans and is predicted to remain as such until at least 2015.

11.4.12 Further information on the geology and hydrogeology for the Site is provided in **Chapter 10 – Ground Conditions, Hydrogeology and Contamination.**

Surface Water Features

11.4.13 The Site is located within the catchment of the River Dearne which flows in an easterly direction through the Site. The EA classifies the River Dearne as Chemical Quality 'Good' and Ecological Quality 'Moderate' and the same quality is predicted for 2015. The flow rate is <0.62 cumecs approximately 208m east of the Site in 2000.

11.4.14 Two surface water abstractions are located within 500m of the Site. One is located upstream licensed to Yorkshire water for an unspecified use, the other is located downstream for make-up / top up water.

11.4.15 Dearne Valley Park Local Nature Reserve is located adjacent to the eastern boundary of the Site adjacent to the river. The reserve has primarily been designated for its woodland, grassland and pond habitats. It is assumed that the reserve will have a low sensitivity to river quality. No internationally or nationally designated sites are present within 2km of the Site.

11.4.16 There are two culverted watercourses within the Site boundary, one to the south of the river and the other to the north. These ultimately discharge to the River Dearne.

11.4.17 The Fleets is located approximately 0.2 km northwest (up gradient) of the Site and is an artificial lake which historically supplied water to the local mills.

Surface Water Drainage

11.4.18 The majority of the Site is currently impermeable. It is assumed that the existing hard standing areas drain into the private drainage onsite which discharges into public sewer network and / or culverted watercourses within the Site boundary which ultimately drain into the River Dearne. This will be confirmed at detailed design stage following completion of a CCTV survey.

11.4.19 WSP have obtained record drawings from Yorkshire Water which indicate the following public surface water sewers south of the river within the Site boundary (**Appendix 11.3**):

- 450 mm diameter surface water sewer flowing west to east along Twibell Street and then north towards the River Dearne along the eastern boundary of the Site; and,
- 1200 mm surface water sewer connecting into the culverted watercourse.

11.4.20 It is estimated that, using a rainfall intensity of 50mm/hr, the maximum surface water runoff rate from the entire Site is currently 700 l/s and the existing runoff from the southern portion of the Site alone is approximately 420 l/s.

Foul Water Drainage

11.4.21 WSP have obtained record drawings from Yorkshire Water for the Site (**Appendix 11.3**).The drawings indicate the following public sewers and combined sewers south of the river within the Site boundary and are recorded in the FRA:

- 225 mm combined sewer flowing from west to east along Twibell Street;
- 300 mm combined sewer flowing north along the eastern boundary of the Site and connecting into the 750 mm combined sewer running west to east;
- Combined sewer overflow adjacent to the A61 road bridge;
- Combined sewer overflow to the west of the gas holder; and,
- 300 mm combined public sewer flowing south along the A61. This increases in size to 750 mm and then 1200 mm and flows from west to east across the Site. After the Combined Sewer Overflow (CSO), the size increases from 375 mm to 750 mm diameter.

11.4.22 The current foul dry weather flows have been estimated at 0.8l/s and it is assumed that the foul drainage drains by gravity. The current foul drainage system is presented on **Appendix 11.3**.

Flood Risk

11.4.23 Information presented in this section is primarily sourced from the **FRA (Appendix 11.2).**

Risk of Surface Water and Foul Drainage Flooding

11.4.24 There is potential for overland flow paths for floodwater emanating from existing developed areas to pose a possible degree of flood risk to the Site.

11.4.25 The EA has provided a copy of the Flood Map for Surface Water (2010), which provides a general indication of areas that may be at risk of surface water flooding. It takes broad account of underground drainage and typical storms which are likely to cause flooding. These maps indicate that small areas are susceptible to surface water flooding during a 1 in 200 year storm.

11.4.26 The surrounding roads have associated surface water drains that will help to minimise surface water flooding. Any flows resulting from surcharging of the drainage or sewer system during extreme rainfall events are unlikely to impact the Proposed Development due to the topography of the land. In the event that surcharging did occur, it is considered that this would be short term, relatively shallow in depth and would pass through the Site following the natural topography.

11.4.27 Management of the adopted storm/foul water sewer network is the responsibility of Yorkshire Water. They have confirmed that no properties in the vicinity have records of sewer flooding events and no reported incidents of sewer flooding in the area on the Yorkshire Water Operations Database. In addition, BMBC, has confirmed that there are no records of flooding from the culverted watercourses that cross the Site.

11.4.28 The EA website indicates that only the river channel that flows through the Site is located in a reservoir flood risk area. The Reservoir Flood Map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst case scenario and is only intended as a guide.

11.4.29 Flood risk from the culverted watercourses is considered to be low as there are no open sections in the immediate vicinity of the Site and Barnsley Council are unaware of any flooding issues associated with them.

11.4.30 Considering all of the available information at this stage, the risk of flooding from surface water and foul drainage is considered to be low to medium. However, residual risk still remains for extreme rainfall events.

Risk of Fluvial Flooding

11.4.31 The proposed development site is located in Flood Zones 1, 2 and 3 on the EA Flood Zone Map and within the Strategic Flood Risk Assessment (2010). The Flood Zone Map also indicates a flood storage area within the Site boundary.

11.4.32 Flood Zone 1 is land designated as having less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). Flood Zone 2 is land designated as having between 1 in 1000 and 1 in 100 annual probability of river flooding (between 0.1% and a 1%) or between a 1 in 1000 year and 1 in 200 year annual probability of flooding from the sea (between 0.1% and 0.5 %) in any year. Flood Zone 3 is land designated as having a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

11.4.33 The EA has confirmed that there are no formal flood defences or structures in the immediate area that contributes towards reducing flood risk. However, the EA Flood Zone Map indicates that there is a flood storage area upstream of the Site and also within the Site boundary.

11.4.34 According to information provided by the EA (presented in the **FRA**), The EA have confirmed that they do not have any historical flood records for the Site. Areas upstream and downstream of the Site were affected during a flood event which occurred in June 2007.

11.4.35 The EA has supplied modelling results for the River Dearne from two hydraulic modelling studies. The results from the 2010 model are more recent and are higher than those predicted from the 2004 model, the results from the 2010 hydraulic model have been used to consider fluvial flood risk in the **FRA** as it represents a worst case scenario. The actual flood levels through the Site are expected to be lower due to the hydraulic gradient of the river.

11.4.36 The **FRA** plots the 2010 model results onto the topographic survey to determine flood zones and this shows that the area of Flood Zone 3 (i.e. the Site area within the 1 in 100 year flood outline), is less than that indicated on the EA Flood Zone Map. It also shows that the flood storage indicated to the north of the river, is far less extensive.

11.4.37 The Level 1 Strategic Flood Risk Assessment (SFRA)(2010) (information obtained from the **FRA**) includes a series of flood risk maps and shows the following:

- Fluvial flood extent and depth maps that show the potential scale of flood inundation during overtopping of different standards of flood defence during a range of flood events. These indicate that parts of the Site could be inundated up to 1 m depth;
- Climate change maps that show fluvial flood extent and depths from Main Rivers and extent and depths variations, for an undefended floodplain with a 1% (1 in 100 year) fluvial flood flow plus a 20% increase in volume of flood flows. This allows for the effects of climate change over the next 100 years. These indicate that parts of the Site could be inundated up to 1 m depth; and,

- Areas naturally vulnerable to surface water flooding, which provide an indication of surface water flood extent and variation in depths for particular geographical areas, resulting from a 1% (1 in 100 year) rainfall event; and assuming a 10% (1 in 10 year) rainfall event theoretically being 'lost' due to the sewer capacity. These indicate that only a very small area of the Site would potentially be affected by pluvial flooding during a 100 year rainstorm with depths up to 0.5m.

11.4.38 Based on the available information, it is considered that fluvial flood risk is low to medium for the majority of the Site but is high in areas immediately adjacent to the River Dearne.

Risk of Groundwater Flooding

11.4.39 The EA has confirmed that they have no information relating to groundwater levels of groundwater flooding in the area.

11.4.40 The British Geological Survey Groundwater Flooding Susceptibility Map indicates that the southern area of the Site has a 'high' susceptibility to flooding from groundwater, as shown in the FRA. The groundwater flooding susceptibility data shows the degree to which areas are susceptible to groundwater flooding on the basis of geological and hydrogeological conditions. It does not show the likelihood of groundwater flooding occurring, i.e. it is a hazard not risk-based dataset.

11.4.41 Based on the available data, it is considered by WSP that the risk of groundwater flooding to the Site is low. However, for completeness this effect has been considered in this Chapter.

Water Supply

11.4.42 The existing warehouse properties on-site are connected to the mains water supply provided by Yorkshire Water. Although the current water usage volume is unknown it is anticipated to be typical of retail / commercial land use.

11.4.43 In *Water Resources in England and Wales – Current State and Future Pressures* (**Ref 11.23**) the EA advises which areas of the UK they consider to be seriously water stressed by assessing where current and future household demand for water is a high proportion of the available freshwater resources. The Site is located in an area classified as 'Serious' water stress.

11.4.44 The Water Act, 2003 (**Ref 11.6**) requires water companies to produce '*Water Resources Management Plans*' which provide a realistic strategic plan for managing water resources and indicate how a water company intends to maintain the balance between supply and demand for water over the next 25 years. Much of the information provided in this section was obtained from the following document:

- Yorkshire Water, December 2009, *Water Resources Management Plan (WRMP)*. (**Ref 11.24**).

11.4.45 Yorkshire Water supply approximately 1.9 Million households and 131,000 businesses. Yorkshire Water state that the area will remain in surplus through to 2034/2035, these predictions are based on the economic climate and the integration of new pipelines. A pipeline is to be constructed to connect the East Ground Water Zone to the Grid Surface Water Zone in 2011. The site is located within the grid surface water zone.

11.4.46 The water supply for this region is principally sourced from reservoirs located in the Pennines. Yorkshire water operated over 100 reservoirs with a total capacity of 160,432 Ml. In addition, Yorkshire Water also has an

agreement to abstract 21,550 Ml per year from the Derwent Valley Reservoirs in Derbyshire. Approximately 45% of water supply is from reservoirs, 25% from boreholes and 30% from Rivers (**Ref 11.25**).

11.4.47 The Catchment Abstraction Management Strategy (CAMS) document for The Don and Rother Catchment (**Ref 11.26**) for the area states that there are 350 current surface water and groundwater abstraction licenses in the catchment area, the greatest use of abstracted water is for industry (excluding public water supplies abstraction).

11.4.48 The CAMS document shows that the Site is located in an area where the water resource availability is 'Over Licensed'. This is defined as areas where the 'current actual abstraction is resulting in no water available at low flows. If existing licences were used to their full allocation they would have potential to cause unacceptable environmental impact at low flows. Water may be available at high flows with appropriate restrictions'.

Future Baseline

11.4.49 Should the Proposed Development not proceed, land uses remained as they are currently and current routine maintenance of water utilities services is continued; it is considered likely that the future baseline conditions in relation to drainage, flooding and potable water demand would remain relatively unchanged at the Site.

11.4.50 In the longer term, the risk of flooding at the Site may increase with the effects of climate change due to increased frequency of extreme rainfall events.

11.5 ASSESSMENT OF EFFECTS, MITIGATION AND RESIDUAL EFFECTS

Site Preparation, Earthworks and Construction Phase (Including Demolition)

Increase in risk of physical contaminants (i.e. sedimentation) on the adjacent and on-site drainage channels, surface water sewers and ultimately the River Dearne from surface water run-off and dewatering activities.

11.5.1 Key potential surface water receptors include the adjacent River Dearne and adjacent/on-site surface water drains and culverts. Surface water at the Site currently drains to the two on-site drainage culverts to the north and south of the River Dearne. The surface water culverts ultimately discharge to the River Dearne.

11.5.2 The River Dearne is considered to be the principal surface water receptor. Current chemical water quality in the River Dearne is 'Good' and one non-potable surface water abstraction is located within 500m down gradient of the Site. Although the Dearne Valley Park Local Nature Reserve is located on the eastern boundary its designation is not thought to be dependent on river water quality. No internationally or nationally designated sites are present within 2km of the Site. Therefore, the sensitivity of the River Dearne is considered to be medium.

11.5.3 During the site preparation, earthworks and construction phase of the Proposed Development there will be a number of activities which could reduce surface water quality with respect to physical contaminants. These are likely to include and are not limited to the following:

- Demolition of existing buildings/structures (including internal/external stripping) and associated site clearance;
- Breaking out of existing ground slabs;
- Processing of aggregates from demolition rubble and arisings for reuse or removal from site (including crushing and screening);
- Materials handling, storage, stockpiling, spillage and disposal;
- Earthworks involving manipulation of ground levels and reengineering of existing made ground as necessary;

- Excavation and foundation construction within the Site and site preparation;
- Installation of temporary and permanent infrastructure and roads and haul routes;
- Construction of proposed buildings;
- Construction of drainage runs and utilities duct runs;
- Formation of public spaces, public realm and associated restoration and landscaping; and
- Movement and use of static and mobile plant/construction vehicles.

11.5.4 The demolition and construction activities may lead to the increased disturbance and mobilisation of physical contaminants (i.e. dust, sediments, and mud). In particular during periods of heavy rainfall, vehicle movements resulting in damage to soil structure may generate increased sedimentation within surface run-off. In addition, during periods of dry, windy weather wind blown dusts generated by the demolition of buildings and excavation of soils have the potential to directly reduce the quality of surface water features.

11.5.5 Dewatering of excavations may be required (for example during the construction of foundations), dependent on groundwater elevations. There is the potential for the dewatered groundwater to contain sediments.

11.5.6 These activities may result in sediments directly (e.g. wind-blown) or indirectly (e.g. via surface water runoff) entering surface water features, impacting on the physical quality of the surface water receptors on-site and in the surrounding area.

11.5.7 This has the potential to also subsequently impact the chemical and biological quality of surface water receptors. The biological quality could be impacted indirectly through sediment smothering feeding and breeding grounds and physically altering the habitat. The potential impacts on surface water quality from an increase in chemical contaminants are assessed in **Chapter 10 – Ground Conditions, Hydrogeology and Contamination.**

11.5.8 The sensitivity of surface water receptors in the vicinity (in particular the River Dearne) to physical contaminants is medium and the magnitude of change, prior to mitigation, is medium. Hence, there is likely to be a direct, temporary, medium-term effect on surface water receptors of **moderate negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.9 Prior to the commencement of the site preparation, earthworks and construction phases, site run-off will be controlled to mitigate both flood risk and sediment loading. At this time the proposed drainage strategy for the construction stage of the Proposed Development has not been finalised. It is understood that this will be addressed during the detailed design stage.

11.5.10 It is assumed that site run-off will be collected and directed through the drainage system and attenuated on-site prior to discharge ensuring the protection of water quality in receiving waterbodies from an increased sediment load. The surface water runoff will be restricted in line with EA and BMBC guidelines.

11.5.11 A variety of good environmental site practices will be implemented to avoid or minimise effects at the source. Such measures will include, but are not limited to, the following:

- Working areas shall be clearly defined to ensure the disturbance of soils is minimised, where possible;
- Haul routes and accesses shall be clearly defined to minimise the risk of accidents; and

- Implementation of a phased temporary drainage network in line with construction phasing to prevent sediment laden surface run-off from leaving the Site or entering surface water such as drainage channels or the River Dearne. Measures may include:

  The cleaning of vehicle wheels prior to leaving site;

  Controlled and covered waste storage areas;

  Dust suppression (i.e. damping down);

  Provision of environmental awareness training for site workers;

  Adopting the EA Pollution Prevention Guidelines (outlined below); and

  Installation of systems such as silt traps including adequate maintenance and monitoring of these to ensure effectiveness, particularly after adverse weather conditions.

11.5.12 The position and extent of working areas shall reflect the sensitivity of surrounding areas and works being carried out. The contractor shall appraise the suitability of such working areas in this respect as part of working method statements.

11.5.13 Should dewatering be required, abstraction and discharge licences will be sought from the EA under the terms of the Water Resources Act 1991. Attenuation of dewatered groundwater will be undertaken to allow sediments to settle out of suspension before discharge to surface water features or drainage features.

11.5.14 The type and configuration of the drainage systems during construction would be subject to the proposed phasing and areas of development. However consideration will be given to utilising the areas for permanent drainage and SUDS strategy features for run-off control during construction (**Appendix 11.3**).

11.5.15 Where necessary, all site works will be undertaken in accordance with the EA's Pollution Prevention Guidelines, in particular:

- PPG1 *'General Guide to the Prevention of Water Pollution';*
- PPG5 *'Works in, near or Liable to Affect Watercourses';* and
- PPG6 *'Working at Construction and Demolition Sites'.*

11.5.16 Earthworks and construction activities will also be undertaken in accordance with CIRIA guidance *'C532 – Control of Pollution from Construction Sites'* (**Ref 11.27**). All site works and ground works will be undertaken in accordance with the Considerate Contractors Scheme to help ensure a well-managed operation which minimises environmental risks.

11.5.17 Best practice recommendations for the prevention of contamination will be outlined in more detail in a Construction Environment Management Plan (CEMP) or equivalent, which will be developed and agreed with the appropriate regulators, prior to site preparation, earthworks or construction commencing.

Residual Effects

11.5.18 The sensitivity of surface water receptors in the vicinity to physical contaminants is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect on surface water receptors following the implementation of mitigation measures.

Increase in risk of surface water and drainage flooding on construction workers and construction activities

11.5.19 Surface water and drainage flooding, especially after extreme rainfall events, has the potential to harm construction workers on-site if it is received in large volumes, particularly if they are working in excavations which have the potential to fill with water. Small parts of the Site may be inundated with up to 0.5m of water according to the SFRA during a 100 year rainstorm.

11.5.20 Any overland flow that did flow into or out of the Site would currently follow the line of least resistance and follow natural topography which is likely to change during site preparation, earthworks and construction works.

11.5.21 During the overall site preparation, earthworks and construction phase, the extent of hardstanding surface cover is likely to decrease and the proportion of bare soil will increase during the earthworks stage. This is therefore likely to result in an increased rate of rainfall infiltration and a decreased volume of surface water run-off.

11.5.22 As there is no hardstanding present within the northern part of the Site currently, the permeability/rate of infiltration in the soils in this area will vary and runoff will potentially increase during the site preparation, earthworks and construction phase.

11.5.23 The risk of flooding from the on-site culverts is considered to be negligible, and any flows resulting from surcharging of other sections of the drainage or sewer system during extreme rainfall events are likely to be short term, relatively shallow in depth and should pass through the Site following the natural topography.

11.5.24 The sensitivity of construction workers and construction activities to surface water and drainage flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is medium. Therefore, there is likely to be a direct, temporary, medium-term effect on construction workers and construction activities of **moderate to major negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.25 Prior to the commencement of each construction phase, site surface run-off will be controlled to mitigate flood risks as discussed in the sediment loading section above. At this time, the proposed drainage strategy for the site preparation, earthworks and construction stage of the Proposed Development has not been developed in detail. It is understood that this will be addressed during the detailed design stage.

11.5.26 Consideration of the design of site levels during construction should also mitigate against the risk of surface water and drainage flooding.

Residual Effects

11.5.27 Providing that the construction phase drainage strategy is adequately prepared, the sensitivity of construction workers and construction activities to surface water and drainage flooding at the Site is high and the magnitude of change should this occur, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect on construction workers and construction activities following the implementation of mitigation measures.

Increase in risk of fluvial flooding on construction workers

11.5.28 The Site lies within Flood Zones 1 (low risk), 2 (medium risk) and 3 (high risk). The SFRA indicates that parts of the Site could be inundated up to 1 m depth. The EA have confirmed that they do not have any historical flood records for the Site. However, areas upstream and downstream of the Site were affected during a flood event which occurred in June 2007.

11.5.29 Should fluvial flooding occur, the consequences to construction workers would be similar to those identified in the surface water flooding section above, with particular regard to excavations potentially filling with water.

11.5.30 The sensitivity of construction workers to fluvial flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is medium. Therefore, there is likely to be a direct, temporary, medium-term effect on construction workers of **moderate to major negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.31 Demolition and construction workers on-site will be made aware of risks during the site preparation, earthworks and construction phases and contingency and evacuation plans for any risk will be prepared and the information provided to all workers on-site. Early warning systems will also be put in place to enable evacuation of areas at risk.

Residual Effects

11.5.32 The sensitivity of construction workers to fluvial flooding at the Site is high and the magnitude of change should this occur, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect to construction workers following the implementation of mitigation measures.

Increase in risk of groundwater flooding on construction workers and construction activities (e.g. foundation construction).

11.5.33 The previous reports for the northern area of the Site confirm that groundwater flow direction is toward the River Dearne and is expected to be in continuity with the River. Groundwater levels at the Site are potentially shallow and perched in nature within the Alluvial deposits as described within the ground investigation data summarised in **Appendix 10.1.**

11.5.34 Ground excavations are proposed, in particular for foundation construction and service corridors. Therefore groundwater has the potential to ingress ground excavations at the Site creating health and safety risks to construction workers if they are required to work within the excavations.

11.5.35 The sensitivity of construction workers to groundwater flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is medium. Therefore, there is likely to be a direct, temporary, medium-term effect on construction workers of **moderate to major negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.36 A supplementary intrusive ground investigation will be undertaken prior to commencement of the site preparation, earthworks and construction phase during which boreholes will be installed for the purpose of establishing groundwater levels and groundwater flow direction.

11.5.37 Groundwater levels will be monitored during all excavations. Construction workers will be not be permitted or expected to enter excavations at risk of groundwater flooding.

11.5.38 Dewatering measures will be employed if necessary. Should dewatering be required, abstraction and discharge licences will be sought from the EA under the terms of the Water Resources Act 1991.

Residual Effects

11.5.39 The sensitivity of construction workers to groundwater flooding at the Site is high and the magnitude of change should this occur, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect to construction workers following the implementation of mitigation measures.

Operational Phase

Increase in risk of physical contaminants (i.e. sedimentation) on the adjacent and on-site drains and ultimately the River Dearne from surface water run-off and site activities.

11.5.40 As discussed in the site preparation, earthworks and construction phase section above, the key potential surface water receptors in the vicinity of the Site include the River Dearne and adjacent/on-site surface water drains and culverts. Adjacent and on-site surface water drains and culverts ultimately discharge to the River Dearne.

11.5.41 Current chemical water quality in the River Dearne is 'Good' and one non-potable surface water abstraction is located within 500m down gradient of the Site. No internationally or nationally designated sites are present within 2km of the Site. Therefore, the sensitivity of the River Dearne is considered to be medium.

11.5.42 During the operational phase the potential for sediment entrainment in surface water run-off is anticipated to decrease from that anticipated in the site preparation, earthworks and construction phase. As it will be a controlled amenity / retail area, there is anticipated to be a low volume of physical contaminants (sediment) which could potentially be entrained in surface water run-off over hardstanding and landscaping areas and discharged to surface water receptors, reducing the physical, chemical and biological quality.

11.5.43 The sensitivity of surface water receptors in the vicinity to physical contaminants is medium and the magnitude of change, prior to mitigation, is low. Therefore, there is likely to be a direct, permanent, long-term effect on surface water receptors of **minor negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.44 Although the proposed drainage strategy has not yet been finalised, surface water will be collected on-site within a new drainage system. The majority of the surface water will be collected in an attenuation tank and all surface water will ultimately discharge to the existing culvert. It is anticipated that proposed pollution control measures will include trapped road and car park gullies and oil interceptors which will attenuate physical contaminants to an acceptable concentration before discharging to the culvert. These facilities will be subject to routine maintenance.

11.5.45 To mimic the existing catchment, a SUDS management train will be incorporated in series to incrementally reduce pollution (including sedimentation), flow rates and volumes.

11.5.46 Vegetation cover in areas of soft landscaping will serve to hold topsoil material in position and reduce the sediment loading in surface water draining into the River Dearne. The exact nature of the coverage of vegetation will be further defined during the detailed design stage. For further information, please refer to **Chapter 12 – Ecology and Nature Conservation.**

Residual Effects

11.5.47 The sensitivity of surface water receptors in the vicinity to physical contaminants is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect to surface water receptors following the implementation of mitigation measures.

Increase in foul drainage (and associated potential increase in flood risk) and associated demand on sewage network.

11.5.48 A drainage strategy report has been prepared by WSP which includes information regarding the foul drainage strategy for the Proposed Development.

11.5.49 Currently, foul drainage facilities in the vicinity of the Site include a 225 mm combined sewer flowing from west to east along Twibell Street; a 300 mm combined sewer flowing north along the eastern boundary of the Site and connecting into the 750 mm combined sewer running west to east; a combined sewer overflow adjacent to the A61 road bridge and a combined sewer overflow to the west of the gas holder.

11.5.50 The current foul dry weather flows have been estimated at 0.8l/s and it is assumed that the foul drainage drains by gravity. The current foul drainage system is presented on **Appendix 11.3.**

11.5.51 Yorkshire Water has confirmed that sewer diversionary works would have to be undertaken. The proposed development would include separate foul and surface water drainage systems. Yorkshire Water has confirmed that the foul drainage should discharge to the public combined sewers crossing / within the Site. Due to the topography of the Site it is envisaged that foul flows from site would drain by gravity.

11.5.52 As Yorkshire Water have suggested that once the diversion works have been completed the sewer network has the capacity for the increase in foul drainage, there is not anticipated to be an increase in risk of foul drainage flooding.

11.5.53 Therefore, the sensitivity of the foul drainage and sewerage network to increases in foul drainage from the Site is low and the magnitude of change, prior to mitigation, is negligible. Therefore, there is likely to be a **negligible** effect on the foul drainage and sewerage network (and therefore future populations and third parties through flood risk).

Mitigation

11.5.54 The detailed foul drainage system for the Site has not been finalised to date and it is understood that this will be addressed during the detailed design stage in collaboration with Yorkshire Water, and will be designed and constructed in accordance with current regulations.

11.5.55 It is anticipated that this will include measures for minimising foul drainage in combination with measures for minimising water use as discussed in a later section.

Residual Effects

11.5.56 The sensitivity of the foul drainage and sewerage network to increases in foul drainage from the Site is low and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect on the foul drainage and sewerage network (and therefore future populations and third parties through flood risk).

Increase in, or change in patterns of, surface water drainage and associated flood risk

11.5.1 Details on the proposed surface water drainage strategy are provided within the **FRA** and are utilised in this assessment. Considering all of the available information at this stage, the risk of flooding from surface water and foul drainage is currently considered to be low to medium.

11.5.2 The drainage strategy for the northern part of the Site has already incorporated drainage design within the development of the road scheme that is currently under construction. Therefore, the discussions below relate to the southern part of the Site.

11.5.3 The existing runoff for the southern portion of the Site is approximately 420l/s. Drainage strategies for new developments must also allow for an increase in rainfall intensities of 30% in line with PPS25. The EA aspires to reduce the rate of surface water discharge from new developments for any given storm event and specifies that the drainage system should be designed to control runoff for up to the 1 in 100 year rainfall event.

11.5.4 The EA has stated that there should be no increase in surface water runoff from the new development. As the existing site drains to a watercourse, surface water runoff should be attenuated to provide a 30% reduction in the final surface water discharge from the Site when compared to the existing site outflow prior to redevelopment.

11.5.5 The southern part of the Site is currently predominantly covered with hardstanding. Therefore, the typical volumes of surface run-off are likely to be similar following the Proposed Development.

11.5.6 The sensitivity of future populations and third parties to surface water flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is low to medium. Therefore, there is likely to be a direct, permanent long-term effect on future populations and third parties of **moderate negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.7 The detailed surface water drainage system for the Site has not been finalised to date and it is understood that this will be addressed during the detailed design stage in collaboration with Barnsley Council and the EA.

11.5.8 The extent of these areas and the interaction of the proposed and existing drainage systems and the existing watercourses will be modelled in detail at the detailed design stage.

11.5.9 Surface water run-off from the Proposed Development will continue to discharge into the River Dearne with a 30% reduction in line with Barnsley Council and EA requirements.

11.5.10 The attenuation storage will be provided to ensure no surface flooding for up to the 1 in 30 year return period design storm and no flooding of properties for up to the 1 in 100 year plus climate change return period design storm. Flows will be retained on site for up to the 1 in 100 plus climate change return period design storm.

11.5.11 A detailed ground investigation will be undertaken as part of the detailed design works to assess infiltration rate and where considered appropriate the EA's SUDS hierarchy shall be used to ensure that the most sustainable SUDS solutions are utilised where possible. Surface water runoff from the Proposed Development will be controlled using SUDS in order not to exacerbate any existing flood risk to Site users and third parties upstream or downstream of the Site.

11.5.12 The hierarchical approach to the SUDS system includes the following:

Prevention – use of local soakaways where layout and ground conditions permit;

Source Control – control of run-off near its source through the use of soakaways (subject to ground conditions), permeable pavements for exposed car parking areas;

Site Control – management of water local to the plot development through the use of swales, filter strips and trenches and where site conditions and layout allow attenuation basins; and,

Regional Control – the use of attenuation basins prior to restricted discharge to a local watercourse.

11.5.13 The exact configuration and nature of the SUDS and drainage systems would be determined at the detailed design stage.

11.5.14 A robust maintenance regime will be implemented to ensure future performance of all SUDS and drainage components throughout the lifetime of the development.

11.5.15 Any water discharged into drainage channels/culverts or the ground through SUDS will be uncontaminated surface water to avoid deterioration of water quality in the groundwater and surface water bodies (River Dearne). Hence oil interceptors and trapped gullies would be included within the drainage design for car parking areas to allow for sedimentation to settle out of suspension.

11.5.16 Finished site levels, where possible, will be engineered to provide positive drainage and prevent ponding. Gradients of external areas will be designed to ensure that flood waters are directed away from buildings, such that any overland flow resulting from extreme events will follow the line of least resistance and flow to the existing roads. The accumulation of standing water will therefore not occur and thus not pose a risk.

Residual Effects

11.5.17 It is considered that due to consideration of the surface water drainage risk in the design of the Proposed Development and the mitigation measures described above that the Proposed Development will result in a reduction in surface water flood risk at the Site.

11.5.18 Therefore, the sensitivity of future populations and third parties to surface water flooding at the Site is high and the magnitude of change should this occur, following mitigation, is low. Therefore, there is likely to be a direct, permanent long-term effect on future populations and third parties of **minor positive** effect on future populations and third parties following the implementation of mitigation measures.

Increase in risk of fluvial flooding on future populations and third parties

11.5.19 The River Dearne flows through the centre of the Site in an easterly direction.

11.5.20 The proposed development site is located in Flood Zones 1(<0.1% probability of flooding), 2 (between 0.1% and 1%) and 3 (between 0.1% and 0.5 %) on the EA Flood Zone Map and within the Strategic Flood Risk Assessment (2010). The Flood Zone Map also indicates a flood storage area within the Site boundary.

11.5.21 The SFRA indicates that parts of the Site could be inundated up to 1 m depth. The EA have confirmed that they do not have any historical flood records for the Site. However, areas upstream and downstream of the Site were affected during a flood event which occurred in June 2007.

11.5.22 Based on the available information, it is considered that fluvial flood risk is low to medium for the majority of the Site but is high in areas immediately adjacent to the River Dearne. The proposed masterplan layout will take account of the existing watercourses crossing the Site, including an 8 m easement from the top of the bank of the River Dearne and a 6 m easement from the culverted watercourses crossing the Site, which must be protected during the proposed works. Therefore the magnitude is considered to be medium.

11.5.23 The culvert to the north of the Site is not affected by the proposed development and BMBC has agreed that the culvert to the south can be diverted as required.

11.5.24 CSP 4 Flood Risk (**Ref 11.11**) states that the extent and impact of flooding will be reduced by not permitting new development where it would be at an unacceptable risk of flooding or would give rise to flooding elsewhere.

11.5.25 The sensitivity of future populations and third parties to fluvial flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is medium. Therefore, there is likely to be a direct, permanent long-term effect on future populations and third parties of **moderate to major negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.26 Detailed hydraulic modelling will be undertaken at the detailed design stage to prove that the flood storage area is not reduced as a result of the proposed development. Preliminary calculations indicate that compensatory flood storage is not required.

11.5.27 The levels in the vicinity of the PFS will be raised above the 1 in 100 year plus climate change flood level to allow its development. Compensatory flood storage will be provided as necessary. The EA has recommended that the finished floor level of the proposed units should be set 600 mm above the 1 in 100 year plus climate change flood level.

11.5.28 The main food superstore will be developed on 'stilts', providing flood mitigation. In addition, it is recommended that flood resilience measures be incorporated into the design of the buildings. Further information is contained in 'Improving the Flood Performance of New Buildings – Flood Resilient Construction', Department of Communities and Local Government, May 2007.

11.5.29 The site is not located within an EA flood warning area, however a detailed flood plan / evacuation plan will be developed as part of the detailed design.

11.5.30 Access to the main retail store (for both customers and service vehicles) is proposed via a new road bridge over the River Dearne from a spur to the Wickes roundabout on the new Quality Bus Corridor. This will be designed above the 1 in 100 year plus climate change flood level. In addition, a separate pedestrian access will be available directly from the A61.

Residual Effects

11.5.31 It is considered that due to consideration of the fluvial flood risk in the design of the Proposed Development and the mitigation measures described above that the Proposed Development will result in a reduction in fluvial flood risk at the Site.

11.5.32 Therefore, the sensitivity of future populations and third parties to fluvial flooding at the Site is high and the magnitude of change should this occur, following mitigation, is low. Therefore, there is likely to be a direct, permanent long-term effect on future populations and third parties of **minor positive** significance on future populations and third parties following the implementation of mitigation measures.

Increase in risk of groundwater flooding

11.5.33 The intrusive ground investigations indicate that groundwater levels at the Site are shallow. However, there is no history of groundwater flooding at the Site and there are no proposed basement structures.

11.5.34 Therefore, the sensitivity of future populations and third parties to groundwater flooding at the Site is high and the magnitude of change should this occur, prior to mitigation, is low. Therefore, there is likely to be a direct, permanent, long-term effect on future populations and third parties of **minor to moderate negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.35 Supplementary ground investigation will be undertaken at the Site during which boreholes will be installed for the purpose of establishing groundwater levels and groundwater flow direction. Further assessment will be undertaken if required at the detailed design phase.

Residual Effects

11.5.36 The sensitivity of future populations and third parties to groundwater flooding at the Site is high and the magnitude of change should this occur, following mitigation, is negligible. Therefore, there is likely to be a **negligible** effect on future populations and third parties following the implementation of mitigation measures.

Increase in demand on potable water supply.

11.5.37 It should be noted that this assessment considers impacts in relation to the availability of potable water supply only.

11.5.38 Although the current potable water usage volume is unknown. It is anticipated that as the proposed land use will be a similar retail / commercial nature that the water usage will not increase significantly.

11.5.39 The EA assess where current and future household demand for water is a high proportion of the available freshwater resource. The Site is located in an area classified as 'Serious' water stress. (**Ref 11.23**).

11.5.40 The CAMS document (**Ref: 11.25**) shows that the Site is located in an area where the water resource availability is 'Over Licensed'.

11.5.41 Over the next 25 years the rise in population, new housing, shrinking household sizes and business growth are likely to increase water demand. However, agricultural and industrial demand is considered likely to decrease which coupled with climate. Yorkshire Water predicts that the area will remain in surplus through to 2034/35 due to the economic climate and the integration of two areas by a new pipeline to be constructed to connect the East Ground Water Zone to the Grid Surface Water Zone in 2011 (**Ref 11.24**). After this date the situation will be reassessed and a new WRMP will be undertaken to ensure that potable water demand is met in the supply area.

11.5.42 Although Yorkshire Water has not directly confirmed that they can manage the extra water demand that the Proposed Development will generate, they predict that there will be a surplus of water in the area through to 2035. Therefore, the sensitivity of water resources in the vicinity is medium and the magnitude of change, prior to mitigation, is low. Hence, there is likely to be a direct, permanent, long-term effect on water resources of **minor negative** significance prior to the implementation of mitigation measures.

Mitigation

11.5.43 Although site specific water saving measures have not been determined in detail yet, they are likely to include the following:

- Water saving fittings such as dual flush toilets and aerated taps and shower heads in the residential and public toilets;
- Rain water harvesting for the public toilets;
- Green roofs; and
- Leak detection and proximity auto water shut off will be installed in the retail units to comply with BREEAM requirements.

Residual Effects

11.5.44 The sensitivity of water resources in the vicinity is medium and the magnitude of change, following mitigation, is negligible. Therefore, there is likely to be a direct, permanent, long-term effect on water resources of **negligible** significance following the implementation of mitigation measures.

Monitoring and Follow Up

11.5.45 A CEMP for the control and management of potential risks at the Site will be developed for each phase and implemented by individual contractors for the preparatory and construction stages of the development. Each CEMP will incorporate the mitigation measures recommended above to reduce the significance and, where possible, eliminate the identified effects.

11.5.46 The CEMP will be a live document setting out the construction management system to be adopted on-site. Detailed risk assessments will be produced for all operations from which a safe system of work shall be developed. Contractors will be required to monitor this process and develop assessments and working methods appropriate to changes in work activities.

11.5.47 The temporary construction phase surface water drainage and the finer details of the operational phase surface water and foul drainage systems are to be designed during the detailed design stage encompassing measures discussed in the sections above, particularly including measures for minimising volumes and preventing contamination of sensitive waterbodies. Silt traps utilised in the drainage system in the construction phase should be routinely monitored to ensure effectiveness.

11.5.48 Groundwater elevations and flow direction and the potential for specific SUDS techniques will be determined during the proposed intrusive investigations.

Limitations and Assumptions

11.5.49 Outline designs for the surface water drainage strategy during the construction and operational phases have been utilised in the above assessments. This Chapter supports an outline application with no confirmed detailed surface water drainage design that seeks to establish the principle of the scheme. Assumptions have been made in the assessment sections above on drainage and potable water design and capacity. Following the detailed design phases, should the design details vary in a manner that compromises the assessments, further assessment will be provided.

Table 11.1: Summary of Effects Table for Drainage, Flooding and Water Resources

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Site Preparation, Earthworks and Construction Phase (Including Demolition)													
Increase in risk of *physical* contaminants (i.e. sedimentation) on the adjacent and on-site drainage channels, surface water sewers and ultimately the River Dearne from surface water run-off and dewatering activities.	Moderate	Negative	T	D	MT	▫ Design of *temporary* drainage system ▫ Good environmental site practices. ▫ Contractors to prepare Construction Environment Management Plans (CEMPs). ▫ Adoption of Relevant EA PPGs. BMBC guidance.	Negligible	N/A	N/A	N/A	N/A	PPS 23 – Planning and Pollution Control CSP 3 - SUDS	Water Act (2003) Water Environment (Water Framework Directive) Regulations (2003) Environment Act (1995) Land Drainage Act (1991)
Increase in risk of surface water and drainage flooding on construction workers and construction activities.	Moderate to Major	Negative	T	D	MT	▫ Collection, attenuation and subsequent discharge of surface water through a temporary drainage system ▫ Consideration of site levels	Negligible	N/A	N/A	N/A	N/A	PPS 25 – Development and Flood Risk CPS 4 – Flood Risk	Water Act (2003) Water Environment (WFD) Regulations (2003) Environment Act (1995) Land Drainage Act (1991)

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		(Major; Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
Increase in risk of fluvial flooding on construction workers.	Moderate to Major	Negative	T	D	MT	▫ Contingency and evacuation plans ▫ Awareness of risk for site workers ▫ Early warning system	Negligible	N/A	N/A	N/A	N/A	PPS 25 CPS 4	Water Act (2003) Water Environment (WFD) Regulations (2003) Environment Act (1995)
Increase in risk of groundwater flooding on construction workers and construction activities (e.g. foundation construction).	Moderate to Major	Negative	T	D	MT	▫ Intrusive investigation to determine groundwater elevations ▫ Monitor groundwater elevations during excavations ▫ Employ dewatering systems if necessary	Negligible	N/A	N/A	N/A	N/A	PPS 25 CPS 4 – Flood Risk	Water Act (2003) Water Environment (WFD) Regulations (2003) Environment Act (1995)
Operational Phase													
Increase in risk of physical contaminants (i.e. sedimentation) on the adjacent and on-site drains and ultimately the River Dearne	Minor	Negative	P	D	LT	▫ Collection, attenuation and subsequent discharge of surface water through the	Negligible	N/A	N/A	N/A	N/A	PPS 23 CPS 3	Water Act (2003) Water Environment (WFD) Regulations (2003)

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
from surface water run-off and site activities.						drainage system ▫ Vegetation cover to reduce sediment loading							Environment Act (1995) Land Drainage Act (1991)
Increase in foul drainage (and associated potential increase in flood risk) and associated demand on sewage network.	Negligible	N/A	N/A	N/A	N/A	▫ The proposed foul drainage strategy to be agreed with YW and designed in accordance with regulations. ▫ Implementation of water efficiency measures to reduce foul drainage	Negligible	N/A	N/A	N/A	N/A	PPS 1 – Delivering Sustainable Development CPS 4	Water Act (2003)
Increase in, or change in patterns of, surface water drainage and associated flood risk.	Minor to Moderate	Negative	P	D	LT	▫ Collection, attenuation and subsequent discharge of surface water through the drainage system ▫ Development designs to prevent accumulation of standing water	Minor	Positive	P	D	LT	PPS 25 CPS 4	Water Act (2003) Water Environment (WFD) Regulations (2003) Environment Act (1995) Land Drainage Act 1991
Increase in risk of fluvial flooding on	Moderate	Negative	P	D	LT	▫ Completion of hydraulic	Minor	Positive	P	D	LT	PPS 25	Water Act (2003)

Description of Likely Significant Effects	Significance of Effects					Summary of Mitigation / Enhancement Measures	Significance of Residual Effects					Relevant Policy	Relevant Legislation
	(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		(Major, Moderate, Minor, Negligible)	Positive / Negative	(P/T)	(D/I)	ST/MT/LT)		
future populations and third parties.						modelling. ▫ Design of the food store development on stilts. ▫ Standoffs apply. ▫ Levels of the PFS will be raised.						CPS 4	Water Environment (WFD) Regulations (2003) Environment Act (1995)
Increase in risk of groundwater flooding.	Minor to Moderate	Negative	P	D	LT	▫ Intrusive investigation to determine groundwater elevations	Negligible	N/A	N/A	N/A	N/A	PPS 25 CPS 4	Water Act (2003) Water Environment (WFD) Regulations (2003) Environment Act (1995)
Increase in demand on potable water supply.	Minor	Negative	P	D	LT	▫ Anticipated resource saving methods in development	Negligible	N/A	N/A	N/A	N/A	PPS1	Water Act (2003)

Key to table:

P/T = Permanent or Temporary, D/I = Direct or Indirect, ST/MT/LT = Short Term, Medium Term or Long Term

N/A = Not Applicable

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Old Mill Lane, Barnsley
Flood Risk Assessment
Peel Holdings Limited

June 2012

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Appendix D	Site Specific Flood Risk Calculations

Executive Summary

This report provides an assessment, in accordance with NPPF, of the potential increase in flood risk to and caused by a proposed retail foodstore development to the east of Old Mill Lane and to the north of Twibell Street, Barnsley. For those elements that potentially increase flood risk, mitigation measures are suggested.

The Environment Agency Flood Zone Map and Strategic Flood Risk Assessment (2010) locate the site within Flood Zones 1 (low risk), 2 (medium risk) and 3 (high risk).

Comparison of modelled flood levels provided by the Environment Agency to the topographic survey of the site indicates that the extent of Flood Zone 3 is less than that shown on the Environment Agency Flood Zone Map.

It is considered that the probability of the site flooding from fluvial sources is low to high and from surface water is low to medium. Flood risk from all other sources is considered to be low.

Details of the existing and proposed drainage is contained within the Drainage Strategy Report (WSP, 2011).

Finished site levels should be engineered to provide positive drainage and prevent ponding. Gradients of external areas, where possible, should be designed to fall away from buildings, such that any overland flow resulting from extreme events would be channeled away from the entrances. The accumulation of standing water would therefore not occur and thus not pose a risk to the development.

Detailed design of site levels should also mitigate against the risk of any highways, surface water or sewer flooding in the vicinity of the site.

Preliminary calculations have been undertaken based on the 1 in 100 year plus climate change 'worst case' predicted flood level, the masterplan layout and recent topographic survey data. These preliminary calculations show that compensatory flood storage is not required. Detailed 2D hydraulic modelling will be undertaken at the detailed design stage.

The Environment Agency have recommended that the finished floor level should be set 600 mm above the 1 in 100 year plus climate change flood level.

The main food superstore will be developed on 'stilts', providing flood mitigation. In addition, it is recommended that flood resilience measures be incorporated into the design of the buildings. Further information is contained in 'Improving the Flood Performance of New Buildings – Flood Resilient Construction', Department of Communities and Local Government, May 2007 and www.ciria.org.

The site is not located within an Environment Agency flood warning area, however a detailed flood plan / evacuation plan will be developed as part of the detailed design.

Access to the main retail store (for both customers and service vehicles) is proposed via a new road bridge over the River Dearne from a spur to the Wickes roundabout on the new Quality Bus Corridor. This will be designed above the 1 in 100 year plus climate change flood level. In addition, a separate pedestrian access will be available directly from the A61.

The proposed development should not increase flood risk to the site or to other land providing that the suggested mitigation measures are implemented.

1 Introduction

1.1 APPOINTMENT AND BRIEF

1.1.1 Peel Holdings Limited commissioned WSP to provide a Flood Risk Assessment for a proposed retail foodstore development to the east of Old Mill Lane and to the north of Twibell Street, Barnsley.

1.2 OBJECTIVE OF THE STUDY

The objective of this study was to undertake a Flood Risk Assessment in accordance with NPPF.

1.2.1 This study assesses:

- Flood risk to the site and the proposed development; and
- Any impact of flood risk to other land as a result of the development proposals.

1.2.2 Where required, flood risk mitigation measures have been proposed.

1.2.3 This document reports on the flooding issues associated with the proposed development and has been prepared as supplementary documentation to support a planning application.

1.3 STUDY METHODOLOGY

1.3.1 The appraisal process comprised a desk study, data research and consultation with regulatory bodies and third parties.

1.3.2 A site visit was undertaken in August 2011 to assess the general topography of the area and to identify the flood risk features that may affect the site.

1.3.3 A list of documents referred to in relation to the site and their sources is given in Appendix A1.

1.3.4 This report is a holistic risk based assessment of potential flooding from possible sources, including fluvial, tidal, groundwater and surface water runoff. It also identifies and examines the residual flood risk to the proposed development and third party land.

1.3.5 Whilst completing the assessment, consideration has been given to the Development and Flood Risk Practice Guide" (December 2009) and "Flood Risk Assessment Guidance for New Development, Phase 2, R & D Technical Report FD2320/TR2" (2005).

1.3.6 In accordance with paragraph 2.45–2.57 of the Practice Guide, relevant stakeholders were consulted. A list of consultees is given in Appendix A2.

1.4 LIMITATIONS

1.4.1 A search of the Council's planning portal website for other publicly available Flood Risk Assessments for sites in the immediate vicinity was undertaken once at the start of drafting this report. Continual monitoring of the planning portal has not taken place.

1.4.2 This report is based on the interpretation and assessment of data provided by third parties. WSP cannot be held responsible for the accuracy of the third party data and the conclusions and findings of this report may change if the data is amended or updated after the date of consultation.

2 Existing Site

2.1 SITE LOCATION

2.1.1 The site is located in Barnsley, South Yorkshire, approximately 0.7 km northeast of Barnsley Railway Station.

2.1.2 An approximate postcode for the site is S71 1DL and OS grid reference is SE351072.

2.1.3 A site location plan can be found in Appendix B1 of this report.

2.2 SITE DESCRIPTION

2.2.1 Table 2.1 (below) describes the general site characteristics.

2.2.2 A topographic survey of the site is located within Appendix B2 of this report.

Table 2.1: Characteristics of the Site

Area		The site occupies an area of approximately 6 ha.
General Topography		Site levels generally slope down towards the River Dearne. South of the river, levels range from approximately 50 m AOD adjacent to Twibell Street in the south to approximately 44 m AOD along the River Dearne. North of the river existing ground levels are approximately 44 to 45 m AOD.
Existing Surfacing		The site is currently a mixture of buildings, hardstanding and landscaped areas.
Current Use		The site currently comprises an existing retail park containing existing retail warehouses (including Comet, MFI, Howdens and Powerhouse) as well as a depot/cash and carry. A decommissioned gas holder is also present on the site. To the north of the river, the site comprises a cleared depot site and an area of open space.
Boundaries	**North**	Retail Unit.
	East	Greenfield Areas.
	South	Twibell Street.
	West	Old Mill Lane.

2.2.3 Barnsley Council is currently constructing the new link road (quality bus corridor) connecting Burton Road and Old Mill Lane from which access to the new retail development will be taken.

2.3 EXISTING WATERBODIES

2.3.1 The River Dearne flows in an easterly direction through the site.

2.3.2 In addition, there are two culverted watercourses within the site boundary, one to the south of the river and the other to the north.

2.3.3 The Fleets is located approximately 0.2 km northwest of the site. This is an artificial lake that supplied water to the local mills.

2.4 EXISTING DRAINAGE

2.4.1 Details of existing drainage is contained within the Drainage Strategy Report (WSP, 2011).

2.5 EXISTING FLOOD DEFENCES

2.5.1 The Environment Agency have confirmed that there are no formal flood defences or structures in the immediate area that contributes towards reducing flood risk. However, the Environment Agency Flood Zone Map indicates that there is a flood storage area upstream of the site and also within the site boundary.

2.6 GEOLOGY AND HYDROGEOLOGY

2.6.1 Aquifer designation has been obtained from the Environment Agency Website. The bedrock is classified as a Secondary A Aquifer. These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases form an important source of base flow to rivers

2.6.2 The Environment Agency have defined Source Protection Zones (SPZs) for 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones (inner, outer and total catchment) and a fourth zone of special interest. The site is not located within a Groundwater Source Protection Zone.

2.7 HISTORICAL LAND USES

2.7.1 The earliest historical map reviewed (1852) indicates that the site was not developed. By the late 1800's the Old Mill Gasworks was located on site.

2.7.2 The Barnsley Canal was located to the south of the site which closed in the 1950's.

2.8 HISTORICAL FLOOD RECORDS

2.8.1 Table 2.2 summarises the historical flood records obtained through consultation and liaison with the various bodies contacted as part of this study. Appendix B3 contains all consultee responses.

Table 2.2: Flood Records Summary

Information Source	Flood Records/ Details
Environment Agency	The Environment Agency have confirmed that they do not have any historical flood records for the site. Areas upstream and downstream of the site were affected during the June 2007 flood event.
Yorkshire Water	Yorkshire Water have confirmed that there are no properties in the vicinity of the site on the DG5 (sewer flooding) Register and that there are no reported incidents of sewer flooding in the area on the Yorkshire Water Operations Database.
Barnsley Council	Barnsley Council have confirmed that there are no records of flooding from the culverted watercourses that cross the site.
Barnsley Council Strategic Flood Risk Assessment (2010)	The SFRA lists a number of fluvial flood events from the River Dearne: 2007 Major Flooding in Dearne Valley 2000 Major Flooding in Dearne Valley 1947 Major Flooding in Dearne Valley 1909 Flooding Dearne valley at Bolton-on-Dearne 1886 Major flooding in Dearne Valley 1883 Flooding in Barnsley, River Dearne 1875 Flooding in Dearne Valley 1861 Bursting of Barnsley Canal near Royston 1846 Major flooding in Barnsley, River Dearne 1832 Major flooding in Barnsley, River Dearne 1807 Flooding in Dearne Valley The SFRA shows that the site was not affected during the flood events in 1947, 1982, 2000 or 2007, but it is not known whether any of the earlier events affected the site.

2.8.2 The Chronology of British Hydrological Events website was used to research historical flood events in the area (Ref: www.dundee.ac.uk/ geography/cbhe). Four flood records for Barnsley are recorded in the 1800's.

2.9 FLOOD MAPPING

ENVIRONMENT AGENCY MAPPING

Flood Zone Map

2.9.1 The Environment Agency Flood Zone Map locates the site within Flood Zones 1 (low risk), 2 (medium risk) and 3 (high risk) including a flood storage area.

2.9.2 Flood Zone 1 is land designated as having less than a 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

2.9.3 Flood Zone 2 is land designated as having between 1 in 1000 and 1 in 100 annual probability of river flooding (between 0.1% and a 1%) or between a 1 in 1000 year and 1 in 200 year annual probability of flooding from the sea (between 0.1% and 0.5 %) in any year.

2.9.4 Flood Zone 3 is land designated as having a 1 in 100 or greater annual probability of river flooding (>1%) in any year.

2.9.5 Flood zone designation ignores the presence of any flood defences and only considers flooding from fluvial and tidal sources.

Surface Water Flood Map

2.9.6 The Environment Agency have provided a copy of the Flood Map for Surface Water (2010), which provides a general indication of areas that may be at risk of surface water flooding. It takes broad account of underground drainage and typical storms which are likely to cause flooding. These maps indicate that small areas are susceptible to surface water flooding during a 1 in 200 year storm.

Reservoir Flood Map

2.9.7 The Environment Agency Website indicates that only the river channel that flows through the site is located in a reservoir flood risk area.

2.9.8 The Reservoir Flood Map shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst case scenario and is only intended as a guide.

NaFra Mapping

2.9.9 The Environment Agency National Flood Risk Assessment Mapping (NaFRA) indicates that the risk of flooding ranges from significant to low.

STRATEGIC FLOOD RISK ASSESSMENT MAPPING

2.9.10 The purpose of the Level 1 Strategic Flood Risk Assessment (2010) was to identify and analyse current and future broad scale flooding issues for proposed development allocation sites/areas in Barnsley Metropolitan Borough Council and provide support for further assessment and sequential testing of proposed development allocations.

2.9.11 The Strategic Flood Risk Assessment (2010) locates the site within Flood Zones 1, 2 and 3. It also includes:

- Fluvial flood extent and depth maps that show the potential scale of flood inundation during overtopping of different standards of flood defence during a range of flood events. These indicate that parts of the site could be inundated up to 1 m depth;
- Climate change maps that show fluvial flood extent and depths from Main Rivers and extent and depths variations, for a undefended floodplain with a 1% (1 in 100 year) fluvial flood flow plus a 20% increase in volume of flood flows. This

allows for the effects of climate change over the next 100 years. These indicate that parts of the site could be inundated up to 1 m depth;

- Areas naturally vulnerable to surface water flooding, which provide an indication of surface water flood extent and variation in depths for particular geographical areas, resulting from a 1% (1 in 100 year) rainfall event; and assuming a 10% (1 in 10 year) rainfall event theoretically being 'lost' due to the sewer capacity. These indicate that only a very small area of the site would potentially be affected by pluvial flooding during a 100 year rainstorm with depths up to 0.5 m.

BRITISH GEOLOGICAL SURVEY FLOOD DATA

2.9.12 The British Geological Survey Geological Indicators of Flooding Map (Appendix B4) indicates that the northern area of the site lies within an area vulnerable to flooding from inland sources.

2.9.13 The British Geological Survey Groundwater Flooding Susceptibility Map indicates that the southern area of the site has a 'high' susceptibility to flooding from groundwater (Appendix B4).

RISK MANAGEMENT SOLUTIONS FLOOD MAPPING DATA

2.9.14 Risk Management Solutions flood mapping data (Appendix B4) indicates that the site is in an area that is potentially susceptible to pluvial flooding for 1 in 75 year, 1 in 100 year and 1 in 1000 year storm event.

2.10 SITE WALKOVER SURVEY

2.10.1 A site walkover was undertaken in August 2011 to assess the site layout and general topography of the land. At the time of the site visit, the weather was dry and there was no evidence of any recent flooding.

2.10.2 The area of the site located to the north of the river could not be accessed due to the construction of the new road.

3 Proposed Development - Description and Location

3.1 Q1A PART 1 - DESCRIPTION – WHAT TYPE OF DEVELOPMENT IS PROPOSED AND WHERE WILL IT BE LOCATED WITHIN THE OVERALL SITE?

3.1.1 The scheme comprises a retail led development primarily consisting of a new-build large format superstore with associated car paring and servicing on the site to the south of the River Dearne. Access to the store (for both customers and service vehicles) is proposed via a new road bridge over the river from a spur to the Wickes roundabout on the new Quality Bus Corridor (Appendix C1).

3.1.2 A petrol filling station linked to the foodstore is proposed to the north of the river. Access to the PFS will be taken from the new link road (Quality Bus Corridor).

3.1.3 A small retail unit (574 sqm) is proposed to the south of the river (and the north of the foodstore). This is intended as a kiosk for leisure/recreation associated with the river corridor.

3.1.4 A third retail unit of 1,961 sqm with associated parking and service access is proposed to the north of the river (and the new link road). This unit comprises a reconfiguration of extant planning permission for a retail warehouse (obtained by National Grid). Service and customer access for this unit is to be taken from the Wickes arm of the new roundabout provided as part of the quality bus corridor (as a minor amendment to the original site layout to align the development more effectively to the Quality Bus Corridor).

3.1.5 Landscaping is proposed along the river in order to improve the river corridor and create a community park. As such the development will bring significant improvements to the river corridor and improving connectivity and amenity access along the Dearne Valley.

3.2 Q1A PART 2 - IS THE PROPOSED DEVELOPMENT NEW, EXTENSION OR CHANGE OF USE?

3.2.1 The proposals are for a new development on a previously developed site.

3.3 Q1B WHAT IS ITS VULNERABILITY CLASSIFICATION?

3.3.1 Table 2 of the Technical Guidance to the National Planning Policy Framework (2012) classes different types of development depending upon their vulnerability. It classes retail developments as 'less' vulnerable' and the PFS as 'highly vulnerable'.

3.3.2 Table 3 of the Technical Guidance to the National Planning Policy Framework (2012) shows that 'less vulnerable' land uses are appropriate development in Flood Zones 1, 2 and 3a. Highly vulnerable uses are appropriate within Flood Zone 1 and within Flood Zone 2 subject to the exceptions test being passed.

3.4 Q1C IS THE PROPOSED DEVELOPMENT CONSISTENT WITH THE LOCAL DEVELOPMENT DOCUMENTS?

Barnsley Unitary Development Plan

3.4.1 The Unitary Development Plan (UDP) is the statutory development plan for the borough along with the Barnsley Education Sites Development Plan Document.

3.4.2 It considers how much development is required in the borough, where it is best located and how it should be designed and contains planning policies on a wide range of matters including, housing, the environment, transport, leisure and economic and community uses. The UDP will eventually be replaced by the Local Development Framework (LDF).

3.4.3 In addition to the UDP, Barnsley Council have published Flood Risk and Development UDP Supplementary Planning Guidance 29 (2003) which provides information for potential development in flood risk areas.

Barnsley Local Development Framework, Core Strategy, Publication (February 2010)

3.4.4 Under the terms of the Planning and Compulsory Purchase Act 2004 each council is required to prepare a Local Development Framework (LDF) to replace its existing UDP.

3.4.5 In the Core Strategy, policies relevant to flood risk include:

CSP 3 Sustainable Drainage Systems (SuDS)

- All development will be expected to use Sustainable drainage systems (SuDS). Only in exceptional circumstances, where it can be demonstrated that all types of SuDS are impractical, will other drainage management systems be permitted;
- Planning applications must include an assessment to show that SuDS will work and be maintained. Measures should be taken to avoid water contamination and safeguard groundwater supply;
- Developers will be required to contribute to the maintenance of SuDS.

CSP 4 Flood Risk

3.4.6 The extent and impact of flooding will be reduced by:

- Not permitting new development where it would be at an unacceptable risk of flooding or would give rise to flooding elsewhere;
- Requiring developers with proposals in Flood Zones 2 and 3 to provide evidence of the sequential test;
- Requiring site-specific Flood Risk Assessments (FRAs) for proposals over 1 hectare in Flood Zone 1 and all development proposals in Flood Zones 2 and 3;
- Requiring proposals over 1000 m^2 floor space or 0.4 hectares in Flood Zone 1 to demonstrate how the proposal will make a positive contribution to reducing or managing flood risk;
- Requiring all development proposals on Brownfield sites to reduce surface water run-off by at least 30% and development on Greenfield sites to maintain or reduce existing run-off rates;

- Requiring development proposals to use Sustainable Urban Drainage Systems (SuDS) in accordance with policy CSP 3;
- Not culverting or building over watercourses and encouraging the removal of existing culverts wherever practicable;
- Using flood resilient design in areas of high flood risk.

Barnsley Strategic Flood Risk Assessment (JBA, September 2010)

3.4.7 The purpose of the Level 1 Strategic Flood Risk Assessment (SFRA) was to identify and analyse current and future broad scale flooding issues for proposed development allocation sites/areas in Barnsley Metropolitan Borough Council and provide support for further assessment and sequential testing of proposed development allocations.

3.4.8 The key objectives of the SFRA were to:

- Provide strategic flood risk guidance and advice to planners and developers to help them better understand flood risk and planning related issues, both generally and for specific locations across the study area;
- Investigate and identify the extent and severity of flood risk to the area. This assessment will help councils/Local Planning Authorities (LPAs) to strike an appropriate balance of various sustainable development drivers and factors whilst wherever possible, sequentially steering development away from areas at highest risk;
- Help LPAs to identify specific locations where further and more detailed flood risk data and assessment work is required as part of a Level 2 SFRA, prior to the allocation of specific developments;
- Provide data and guidance in the application of the Sequential and Exception Tests for LPAs to assess specific development sites;
- Supplement current policy guidelines by providing guidance on flood risk assessment requirements and a risk based approach to development considerations. This is to help ensure that areas allocated for development can be developed in a safe and sustainable manner and is aimed at both councils and developers;
- Contribute to the council's Strategic Environmental Assessment (SEA) and LDF. The SEA will be used to inform the council's Sustainability Appraisal (SA), which will aid the selection of suitable land allocations; and
- Be used as a reference document to which all parties involved in planning and flood risk can reliably turn to for initial advice.

Barnsley Water Cycle Study and Surface Water Management Plan

3.4.9 Barnsley Council have confirmed that they do not currently have a Water Cycle Study or Surface Water Management Plan.

3.5 Q1D - PLEASE PROVIDE EVIDENCE THAT THE SEQUENTIAL TEST AND WHERE NECESSARY THE EXCEPTIONS TEST HAS BEEN APPLIED IN THE SELECTION OF THIS SITE FOR THIS TYPE OF DEVELOPMENT

3.5.1 The NPPF requires developers to carry out sequential testing to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate for the type of development or land use proposed.

3.5.2 The Sequential Test, within NPPF, aims to steer all new developments to areas at the lowest risk of flooding and ensure that the development type proposed is appropriate by reference to the flood risk.

3.5.3 The Sequential Test requires that land for future development must first be sought within Flood Zone 1 (low risk).

3.5.4 A separate Sequential Test report has been written to accompany this planning application.

4 Definition of the Flood Hazard

4.1 Q2A - WHAT SOURCES OF FLOODING COULD AFFECT THE SITE?

SOURCE	LIKELIHOOD
Fluvial	Low to high
Tidal	Negligible
Groundwater	Low
Sewer	Low
Surface Water	Low to medium
Other: Reservoir	Low

4.2 FLUVIAL FLOOD RISK

4.2.1 The proposed development site is located in Flood Zones 1, 2 and 3 on the Environment Agency Flood Zone Map and within the Strategic Flood Risk Assessment (2010). The Flood Zone Map also indicates a flood storage area within the site boundary.

4.2.2 The Environment Agency have supplied modelling results for the River Dearne from two hydraulic modelling studies:

- The River Don Catchment Flood Model (JBA, 2004) provides modelled flood levels through the site;
- The River Dearne Flood Risk Mapping Study (Halcrow, 2010) provides modelled flood levels for the A61 road bridge, upstream of the site.

4.2.3 Results from both modelling studies are summarised below:

2010 Dearne Model (Halcrow) - A61 Road Bridge (Label DEA00001U)	
Return Period	**Flood Level (m AOD)**
25	43.85
100	44.52
100 + climate change	44.85
1000	46.11

2004 River Don Model (JBA) – Node Point 23278	
Return Period	**Flood Level (m AOD)**
25	43.21
100	43.53
100 + climate change	Not available
1000	Not available

4.2.4 As the results from the 2010 model are more recent and are higher than those predicted from the 2004 model, the results from the 2010 hydraulic model have been used to consider fluvial flood risk in this FRA as it represents a worst case scenario. Actual flood levels through the site are expected to be lower due to the hydraulic gradient of the river.

The 2010 model results have been plotted onto the topographic survey to determine flood zones and this is in Appendix D1. This shows that the area of Flood Zone 3 (i.e. the site area within the 1 in 100 year flood outline), is less than that indicated on the Environment Agency Flood Zone Map. It also shows that the flood storage indicated to the north of the river, is far less extensive.

4.2.5 The SFRA (2010) includes a series of flood risk maps:

- The fluvial flood extent and depth maps show the potential scale of flood inundation during overtopping of different standards of flood defence during a range of flood events (they do not include the impact of a breach or failure of defences);
- Climate change maps show fluvial flood extent and depths from Main Rivers and extent and depths variations, for an undefended floodplain with a 1% (1 in 100 year) fluvial flood flow plus a 20% increase in volume of flood flows. This allows for the effects of climate change over the next 100 years.

4.2.6 The maps indicate the flowing:

SFRA Fluvial flood extent and depth maps			
Map	**Description**	**Flood Depth**	**Flood extent**
S2Q100 (Map D)	1% (1:100y) flood event assuming no flood defences exist	Parts of the site could be inundated up to 1 m depth. Areas immediate adjacent to the River Dearne indicate depths of >1.5 m.	North of the river, the majority of the site is flooded. South of the river, flooding is restricted to the northern areas.
S2Q1000 (Map E)	0.1% (1:1000y) flood event assuming no flood defences	Parts of the site could be inundated up to 1 m depth. Areas immediate adjacent to the River Dearne indicate depths of >1.5 m.	North of the river, the majority of the site is flooded. South of the river, flooding is restricted to the northern areas.
S2Q100 + climate change (Map H)	1% (1:100y) flood event assuming no flood defences exist plus a 20% increase in volume of flood flows.	Parts of the site could be inundated up to 1 m depth. Areas immediate adjacent to the River Dearne indicate depths of >1.5 m.	North of the river, the majority of the site is flooded. South of the river, flooding is restricted to the northern areas.

4.2.7 Flood risk from the culverted watercourses is considered to be low as there are no open sections in the immediate vicinity of the site and Barnsley Council are unaware of any flooding issues associated with them. Details of how the culverted watercourses will be accommodated within the scheme are contained within Section 8 of this report.

4.2.8 Based on the available information, it is considered that fluvial flood risk is low to medium for the majority of the site but is high in areas immediately adjacent to the River Dearne.

4.3 TIDAL FLOOD RISK

4.3.1 The proposed development is located away from the coast at an elevation above 44 m AOD.

4.3.2 Based on the available information, it is considered that tidal flood risk is negligible.

4.4 GROUNDWATER FLOODING

4.4.1 The Strategic Flood Risk Assessment (2010) states that "groundwater flooding is caused by the emergence of water originating from underground from either point or diffuse locations. The occurrence of groundwater flooding is usually very local and governed by the local geology. Unlike flooding from rivers and the sea, groundwater flooding does not generally pose a significant risk to life, but is more associated with significant damage to property, with flooding persisting over a number of weeks for some types of groundwater flooding. Groundwater flooding is a significant but localised issue that has attracted an increasing amount of public concern in recent years. Groundwater flooding can also exacerbate fluvial flooding in certain circumstances and arises from:

- Natural exceptional rises in groundwater level;
- Reactivating springs and short lived watercourses (often referred to as 'clearwater' flooding);
- Rising groundwater (rebound) following reductions in historic abstraction;
- Mine water recovering to natural levels following cessation of pumping; and
- Local shallow drainage/flooding problems unrelated to deep groundwater responses."

4.4.2 The SFRA also states that "groundwater flooding has been the focus of one of the key projects under Defra's Making Space for Water programme and the outputs are available on the Defra website. Staff at the Coal Authority were consulted with respect to the possibility of flooding caused by the re-emergence of minewaters from the formerly very important South Yorkshire mining region following the cessation of minewater pumping. These discussions indicated that the Coal Authority have a comprehensive network of groundwater monitoring boreholes across South Yorkshire and by working in partnership with the Environment Agency and other local coal mining interests are developing a strategic forward plan to manage minewater levels to minimise the risk of re-emerging minewaters causing

both flooding and/or initiating water quality problems in the major Sherwood Sandstone water resource aquifer".

4.4.3 The Environment Agency have confirmed that they have no information relating to groundwater levels of ground water flooding in the area.

4.4.4 The British Geological Survey Groundwater Flooding Susceptibility Map indicates that the southern area of the site has a 'high' susceptibility to flooding from groundwater (Appendix B4). The groundwater flooding susceptibility data shows the degree to which areas are susceptible to groundwater flooding on the basis of geological and hydrogeological conditions. It does not show the likelihood of groundwater flooding occurring, i.e. it is a hazard not risk-based dataset.

4.4.5 Based on the available data, it is considered that the risk of groundwater flooding to the site is low.

4.5 SURCHARGED SEWER FLOODING

4.5.1 Yorkshire Water have confirmed that there are no properties in the vicinity of the site on the DG5 (sewer flooding) Register and that there are no reported incidents of sewer flooding in the area on the Yorkshire Water Operations Database.

4.5.2 As part of the SFRA, Yorkshire Water provided data on internal and external flooding from their databases. It states that "in the Yorkshire Water managed and maintained system, the incidence of external sewer flooding is not widespread or particular frequent. Those areas that appear to be more prone to external sewer flooding are parts of Stairfoot, Lunwood, Elsecar, Goldthorpe, Darton, Higham, Silkstone Common, Smithies and Darfield". The site is not located within one of these areas.

4.5.3 Based on the available information, the risk from sewer flooding is considered to be low.

4.6 SURFACE WATER FLOODING

4.6.1 The SFRA states that "the topography of the Barnsley Metropolitan Borough Council area, especially in and around a number of the built-up areas make them potentially prone to flooding caused by direct rainfall due to the amount of impermeable surfaces and the lack of sufficient sewer capacity".

4.6.2 The SFRA contains maps that show areas that are naturally vulnerable to surface water flooding, which provide an indication of surface water flood extent and variation in depths for particular geographical areas, resulting from a 1% (1 in 100 year) rainfall event; and assuming a 10% (1 in 10 year) rainfall event theoretically being 'lost' due to the sewer capacity. The modelling technique includes the presence of flood defences and how water may pond behind these defences.

4.6.3 The SFRA indicates that only a very small area of the site would potentially be affected by pluvial flooding during a 100 year rainstorm with depths upto 0.5 m.

4.6.4 The Environment Agency have provided a copy of the Flood Map for Surface Water (2010) which provides a general indication of areas that may be at risk of surface water flooding. It takes broad account of underground drainage and typical storms which are likely to cause flooding. These maps indicate that small areas are susceptible to surface water flooding during a 1 in 200 year storm.

4.6.5 Risk Management Solutions (RMS) flooding data has been obtained which is a modelled dataset that uses land height, predicted rainfall and other factors to predict flooding from rivers and surface water flooding during a 75 (1.3%), 100 (1%) and 1000 (0.1%) year storm. Risk Management Solutions flood mapping data (Appendix B4) indicates that the site is in an area that is potentially susceptible to pluvial flooding for 1 in 75 year, 1 in 100 year and 1 in 1000 year storm event.

4.6.6 Considering all of the available information, the risk of flooding from surface water is considered to be low to medium. However, residual risk still remains for extreme rainfall events.

4.7 FLOODING FROM OTHER SOURCES

4.7.1 Non-natural or artificial sources of flooding can include reservoirs, lakes, canals etc. The potential effects of flood risk management infrastructure and other structures also needs to be considered.

4.7.2 The disused Barnsley Canal is located to the south of the site and is maintained by Barnsley Council. Flood risk from this disused canal is considered to be low.

4.7.3 Following the June 2007 floods and the incident at Ulley reservoir, Sir Michael Pitt was asked by the government to carry out a review of the emergency services' response. He called for reservoir flood maps to be made available to the public and to local emergency planners to allow them to respond quickly to a reservoir flood.

4.7.4 As a result reservoir flood maps have been created for 2007 reservoirs in England and Wales. These maps show the possibility of flooding from large raised reservoirs that hold at least 25,000 cubic meters of water above natural ground level. The maps show the largest area that might flood if a reservoir were to fail in a credible worst case scenario.

4.7.5 The Environment Agency Website indicates that only the river is located in a reservoir flood risk area, however, due to the safety measures and maintenance regimes in place, the risk from reservoir flooding is considered to be low.

4.7.6 Culvert Blockage is considered to be low as there are no open sections in the vicinity of the site.

4.7.7 No further sources have been identified.

4.8 Q2C - WHAT ARE THE EXISTING SURFACE WATER DRAINAGE ARRANGEMENTS FOR THE SITE?

4.8.1 Details are contained within the Drainage Strategy Report (WSP, 2011).

5 Probability

5.1 Q3A – WHICH FLOOD ZONE IS THE SITE WITHIN?

5.1.1 Inspection of the Environment Agency Flood Zone Map indicates that the proposed development site is located in Flood Zones 1 (low risk), 2 (medium risk) *and* 3 (High risk) including a flood storage area.

5.2 Q3B- IF THERE IS A STRATEGIC FLOOD RISK ASSESSMENT COVERING THIS SITE WHAT DOES IT SHOW?

5.2.1 The Strategic Flood Risk Assessment (2010) locates the site within Flood Zones 1, 2 and 3. It also includes:

- Fluvial flood extent and depth maps that show the potential scale of flood inundation during overtopping of different standards of flood defence during a range of flood events. These indicate that parts of the site could be inundated up to 1 m depth;
- Climate change maps that show fluvial flood extent and depths from Main Rivers and extent and depths variations, for an undefended floodplain with a 1% (1 in 100 year) fluvial flood flow plus a 20% increase in volume of flood flows. This allows for the effects of climate change over the next 100 years. These indicate that parts of the site could be inundated up to 1 m depth;
- Areas naturally vulnerable to surface water flooding, which provide an indication of surface water flood extent and variation in depths for particular geographical areas, resulting from a 1% (1 in 100 year) rainfall event; and assuming a 10% (1 in 10 year) rainfall event theoretically being 'lost' due to the sewer capacity. These indicate that only a very small area of the site would potentially be affected by pluvial flooding during a 100 year rainstorm with depths up to 0.5 m.

5.3 Q3C – WHAT IS THE PROBABILITY OF THE SITE FLOODING TAKING INTO ACCOUNT THE CONTENTS OF THE SFRA AND OF ANY FURTHER SITE SPECIFIC ASSESSMENT?

5.3.1 It is considered that the probability of the site flooding from fluvial sources is low to high and from surface water is low to medium. Flood risk from all other sources is considered to be low.

5.4 EXISTING FLOOD MITIGATION MEASURES

5.4.1 The Environment Agency have confirmed that there are no formal flood defences in the immediate vicinity of the site.

5.5 Q3D – WHAT ARE THE EXISTING RATES AND VOLUMES OF RUN-OFF GENERATED BY THE SITE

5.5.1 Details are contained within the Drainage Strategy Report (WSP, 2011).

6 Climate Change

6.1 DEVELOPMENT LIFESPAN

6.1.1 Based on a typical lifespan for this type of development of 100 years the contingency allowances for climate change set out in Tables B1 and B2 of NPPF applicable to this site up to 2115 are:

- 30% increase in peak rainfall intensity;
- 20% increase in peak river flow.

6.2 Q 4A - HOW IS FLOOD RISK LIKELY TO BE AFFECTED BY CLIMATE CHANGE?

6.2.1 Flood risk is likely to increase with climate change. However, the flood risk management measures described in Section 8 make an allowance for this.

6.2.2 As described in Section 4.2 of the report, the SFRA includes climate change maps which show fluvial flood extent and depths from Main Rivers and extent and depths variations, for a undefended floodplain with a 1% (1 in 100 year) fluvial flood flow plus a 20% increase in volume of flood flows. This allows for the effects of climate change over the next 100 years. Fluvial flood extent and depth is not greatly increased with climate change.

7 Detailed Development Proposals

7.1 Q5A - DEVELOPMENT LAYOUT PROPOSALS AND DRAWINGS

7.1.1 The scheme comprises a retail led development primarily consisting of a new-build large format superstore with associated car paring and servicing on the site to the south of the River Dearne. Access to the store (for both customers and service vehicles) is via a proposed new road bridge over the river from a spur to the Wickes roundabout on the new Quality Bus Corridor.

7.1.2 A petrol filling station linked to the foodstore is proposed to the north of the river. Access to the PFS will be taken from the new link road (Quality Bus Corridor).

7.1.3 A small retail unit (574 sqm) is proposed to the south of the river (and the north of the foodstore). This is intended as a kiosk for leisure/recreation associated with the river corridor.

7.1.4 A third retail unit of 1,961 sqm with associated parking and service access is proposed to the north of the river (and the new link road). This unit comprises a reconfiguration of extant planning permission for a retail warehouse (obtained by National Grid). Service and customer access for this unit is to be taken from the Wickes arm of the new roundabout provided as part of the quality bus corridor (as a minor amendment to the original site layout to align the development more effectively to the Quality Bus Corridor).

7.1.5 Landscaping is proposed along the river in order to improve the river corridor and create a community park. As such the development will bring significant improvements to the river corridor and improving connectivity and amenity access along the Dearne Valley.

7.1.6 The land use and vulnerability for the proposed development is established in Section 3 above.

7.2 Q5B – DEMONSTRATE HOW LAND USES MOST SENSITIVE TO FLOOD DAMAGE HAVE BEEN PLACED IN AREAS WITHIN THE SITE THAT ARE AT LEAST RISK OF FLOODING

7.2.1 The proposed superstore is located to the south of the River Dearne and will be elevated on stilts with car parking beneath.

7.3 FOUL WATER FLOWS FROM THE DEVELOPMENT

7.3.1 Details are contained within the Drainage Strategy Report (WSP, 2011).

8 Flood Risk Management Measures

8.1 Q6A - HOW WILL THE SITE BE PROTECTED FROM FLOODING, INCLUDING THE POTENTIAL IMPACTS OF CLIMATE CHANGE, OVER THE DEVELOPMENT'S LIFETIME?

SURFACE WATER DRAINAGE STRATEGY

8.1.1 The Environment Agency have stated that there should be no increase in surface water runoff from the new development. If the existing site is shown to drain to a watercourse, then surface water runoff should be attenuated to provide a 30% reduction in the final surface water discharge from the site when compared to the existing site outflow prior to redevelopment. However, if the site does not drain to a watercourse or public sewer at present, then flows must be attenuated to a maximum of 5 l/s/ha, equivalent to the greenfield runoff rate.

8.1.2 Details of the proposed surface water drainage strategy is contained within the Drainage Strategy Report (WSP, 2011).

COMPENSATORY FLOOD STORAGE

8.1.3 Initial compensatory flood storage calculations have been undertaken based on the latest masterplan and using the 'worst case' predicted 1 in 100 year plus climate change flood level from the Environment Agency and recent topographic survey information.

8.1.4 With careful consideration of levels, compensatory flood storage can be achieved on site. Detailed hydraulic modelling will be undertaken at the detailed design stage to prove that no additional flood storage is taken up as a result of the proposed development. Refer to Appendix E1 for initial calculations.

SITE LAYOUT

8.1.5 The final masterplan layout should take account of the areas susceptible to surface water flooding.

8.1.6 The proposed masterplan layout should take account of the existing watercourses crossing the site, including the associated easements:

- As the site is next to the River Dearne which is designated as Main River the Water Resources Act 1991 and the Yorkshire Land Drainage Byelaws 1980 apply. Briefly, these state that there shall be no development (including tipping, fencing, etc.) within 8 metres of the top of the bank without the prior written consent of the Environment Agency;
- Barnsley Council have stated that the culverted watercourses crossing the site must be protected during the proposed works. The exact location of the apparatus should be determined on site prior to commencement of any works. A 6 metre easement will be required for any watercourses crossing the site.

8.1.7 To accommodate the development to the south of the river, Barnsley Council have agreed in principle that the culverted watercourse can be diverted subject to satisfactory surveys being undertaken at the detailed design stage.

8.1.8 The culvert to the north of the site is not affected by the proposed development.

SITE LEVELS

8.1.9 Finished site levels should be engineered to provide positive drainage and prevent ponding. Gradients of external areas, where possible, should be designed to fall away from buildings, such that any overland flow resulting from extreme events would be channelled away from the entrances. The accumulation of standing water would therefore not occur and thus not pose a risk to the development.

8.1.10 Detailed design of site levels should also mitigate against the risk of any highways, surface water or sewer flooding in the vicinity of the site.

8.1.11 The levels in the vicinity of the PFS will be raised above the 1 in 100 year plus climate change flood level to allow its development. Compensatory flood storage will be provided as necessary.

FINISHED FLOOR LEVELS

8.1.12 The Environment Agency have recommended that the finished floor level of the proposed units should be set 600 mm above the 1 in 100 year plus climate change flood level.

8.1.13 The food superstore will be developed on 'stilts', providing retail floorspace on the first floor with car parking beneath.

FLOOD RESILIENCE

8.1.14 It is recommended that flood resilience measures be incorporated into the design of the buildings. Further information is contained in 'Improving the Flood Performance of New Buildings – Flood Resilient Construction', Department of Communities and Local Government, May 2007 and www.ciria.org.

ENVIRONMENT AGENCY FLOOD WARNING

8.1.15 The site is not located within an Environment Agency flood warning area.

ACCESS AND EGRESS

8.1.16 Access to the main retail store (for both customers and service vehicles) is via a proposed new road bridge over the River Dearne from a spur in the Wickes roundabout on the new Quality Bus Corridor.

8.1.17 The Environment Agency Flood Zone Map indicates that the proposed access route may pass through Flood Zone 3 / flood storage area and the Environment Agency have stated that:

- If roads are allowed in a floodplain, they would suggest a road at ground level of suitable construction that does not wash away in an event. Ideally, they would not want it raised as that would take up flood storage, however, that would have access and egress issues;

- If it was raised, it would need to be above the 1 in 100 year flood level, compensatory storage agreed and a flood risk assessment provided to show that it does not impede flows behind;
- If a bridge was constructed, the Environment Agency would prefer a clear span bridge rather than any pier in the channel with the deck soffit at 1 in 100 year plus climate change flood level with a minimum 600 mm freeboard, taking into account erosion and scour protection.

8.1.18 It is proposed that the bridge will be constructed above the 1 in 100 year plus climate change flood level to allow safe access and egress from the site. In addition, a separate pedestrian access is proposed direct from the A61. Detailed hydraulic modelling will be undertaken at the detailed design stage to prove that the proposed bridge structure does not increase flood risk or impede flood flows.

FLOOD PLAN

8.1.19 It is recommended that signs are erected around the site and within the buildings detailing the flood emergency planning procedures. In addition, it is recommended that the occupiers of the site develop a flood plan to enable staff to follow set procedures and to give clear instructions to site users should flooding occur.

OTHER INFORMATION

8.1.20 The responsibility for general maintenance and repair of the watercourse and its banks rests with the riparian owner.

9 Offsite Impacts

9.1 Q7A - HOW WILL YOU ENSURE THAT YOUR PROPOSED DEVELOPMENT AND THE MEASURES TO PROTECT YOUR SITE FROM FLOODING WILL NOT INCREASE FLOOD RISK ELSEWHERE?

9.1.1 Surface water discharge will be restricted in line with the Environment Agency's requirements and attenuation storage provided on site for up to the 1 in 100 year storm event plus an allowance for climate change (further details are contained within the Drainage Strategy report (WSP, 2011).

9.2 Q7B – HOW WILL YOU PREVENT RUN-OFF FROM THE COMPLETED DEVELOPMENT CAUSING IMPACT ELSEWHERE

9.2.1 Details are contained within the Drainage Strategy report (WSP, 2011).

10 Residual Risks

10.1 Q8A - WHAT FLOOD-RELATED RISKS REMAIN AFTER YOU HAVE IMPLEMENTED THE MEASURES TO PROTECT THE SITE FROM FLOODING?

10.1.1 Residual risks will be managed through the design and layout of the proposed development.

10.1.2 Finished site levels should be engineered to provide positive drainage and prevent ponding. Gradients of external areas, where possible, should be designed to fall away from buildings, such that any overland flow resulting from extreme events would be channelled away from the entrances. The accumulation of standing water would therefore not occur and thus not pose a risk.

10.2 Q8B – HOW, AND BY WHOM, WILL THESE RISKS BE MANAGED OVER THE LIFETIME OF THE DEVELOPMENT?

10.2.1 The proposed development will have a separate surface and foul water drainages system installed. It is envisaged that the foul water system would be adopted by Yorkshire Water.

11 Conclusions

11.1.1 This report provides an assessment, in accordance with NPPF, of the potential increase in flood risk to and caused by a proposed retail foodstore development to the east of Old Mill Lane and to the north of Twibell Street, Barnsley. For those elements that potentially increase flood risk, mitigation measures are suggested.

11.1.2 The Environment Agency Flood Zone Map and Strategic Flood Risk Assessment (2010) locate the site within Flood Zones 1 (low risk), 2 (medium risk) and 3 (high risk).

11.1.3 Comparison of modelled flood levels provided by the Environment Agency to the topographic survey of the site indicates that the extent of Flood Zone 3 is less than that shown on the Environment Agency Flood Zone Map.

11.1.4 It is considered that the probability of the site flooding from fluvial sources is low to high and from surface water is low to medium. Flood risk from all other sources is considered to be low.

11.1.5 Details of the existing and proposed drainage is contained within the Drainage Strategy Report (WSP, 2011).

11.1.6 Finished site levels should be engineered to provide positive drainage and prevent ponding. Gradients of external areas, where possible, should be designed to fall away from buildings, such that any overland flow resulting from extreme events would be channeled away from the entrances. The accumulation of standing water would therefore not occur and thus not pose a risk to the development.

11.1.7 Detailed design of site levels should also mitigate against the risk of any highways, surface water or sewer flooding in the vicinity of the site.

11.1.8 Preliminary calculations have been undertaken based on the 1 in 100 year plus climate change 'worst case' predicted flood level, the masterplan layout and recent topographic survey data. These preliminary calculations show that compensatory flood storage is not required. Detailed 2D hydraulic modelling will be undertaken at the detailed design stage.

11.1.9 The Environment Agency have recommended that the finished floor level should be set 600 mm above the 1 in 100 year plus climate change flood level.

11.1.10 The main food superstore will be developed on 'stilts', providing flood mitigation. In addition, it is recommended that flood resilience measures be incorporated into the design of the buildings. Further information is contained in 'Improving the Flood Performance of New Buildings – Flood Resilient Construction', Department of Communities and Local Government, May 2007 and www.ciria.org.

11.1.11 The site is not located within an Environment Agency flood warning area, however a detailed flood plan / evacuation plan will be developed as part of the detailed design.

11.1.12 Access to the main retail store (for both customers and service vehicles) is proposed via a new road bridge over the River Dearne from a spur to the Wickes roundabout on the new Quality Bus Corridor. This will be designed above the 1 in 100 year plus climate change flood level. In addition, a separate pedestrian access will be available directly from the A61.

11.1.13 The proposed development should not increase flood risk to the site or to other land providing that the suggested mitigation measures are implemented.

Appendices, Figures & Tables

Appendix A Introduction

Appendix A1 Documents referred to for Data

Document	Website address
Environment Agency Flood Risk Map	http://www.environment-agency.gov.uk/
Environment Agency Groundwater Vulnerability	http://www.environment-agency.gov.uk/
Chronology of British Hydrological Events	http://www.dundee.ac.uk/ geography/cbhe
Barnsley Unitary Development Plan	http://www.barnsley.gov.uk/planning-local-plans
Barnsley Local Development Framework	http://www.barnsley.gov.uk/pid856
Barnsley Core Strategy	http://www.barnsley.gov.uk/core-strategy-publication
Barnsley Strategic Flood Risk Assessment	http://www.barnsley.gov.uk/0xac16000b_0x00485bbd
Barnsley Flood Risk and Development Guidance	http://www.barnsley.gov.uk/29floodpdf

Appendix A2 List of Consultees

Consultee	Office	Response received at time of drafting report Y/N
Environment Agency	Phoenix House, Leeds	Y
Internal Drainage Board	Dove and Dearne	N
Water Company	Yorkshire Water	Y
Local Authority	Barnsley Council	Y
Local Planning Authority	Barnsley Council	Y
Highways	Barnsley Council	N

Appendix B Existing Site

Appendix B1 Site Location Plan



WSP

TITLE

OLD MILL LANE, BARNSLEY

FIGURE NO

SITE LOCATION PLAN

Appendix B2 Topographic Survey

Appendix B3 Consultation Responses

Hamilton, Sarah

From: Joy , Matthew <MatthewJoy@barnsley.gov.uk> on behalf of Planningpolicy <Planningpolicy@barnsley.gov.uk>
Sent: 19 July 2011 13:31
To: Hamilton, Sarah
Subject: RE: Flood Risk Enquiry - Old Mill Lane

Sarah

In answer to your query the Council has a Strategic Flood Risk Assessment but, does not have a Surface Water Management Plan or a Water Cycle Study.

The relevant UDP Policies are ES4 and ES5. SPG 29 Flood Risk and Development is also applicable.

However, the LDF Core Strategy has been found sound by the Inspector following examination, and although it will not be adopted until September 2011, its policies carry significant weight and will supersede the UDP policies. I therefore draw your attention to LDF Core Strategy policies CSP 3 and CSP 4.

Regards
Matthew Joy
Planning Policy

From: Hamilton, Sarah [mailto:Sarah.Hamilton@WSPGroup.com]
Sent: 12 July 2011 14:29
To: Planningpolicy
Subject: Flood Risk Enquiry - Old Mill Lane

Dear Barnsley Council,

WSP has been commissioned to undertake a Flood Risk Assessment for a site off Old Mill Lane, Barnsley. Current plans are to redevelop the site as a large foodstore and associated petrol station together with 2 smaller retail units.

Please can you inform me whether you have any of the following:

- Strategic Flood Risk Assessment;
- Surface Water Management Plan;
- Water Cycle Study;
- Any policies that relate to flood risk / drainage within the LDF or UDP;
- Any supplementary guidance in relation to flood risk / drainage;
- Whether any of the above will become available in the near future.

Many thanks and kind regards,

Sarah

Sarah Hamilton
Senior Engineer, Property & Development

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Fax: +44(0)113 395 6201
Website: www.wspgroup.co.uk

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Hamilton, Sarah

From: Atkins , Wayne <WayneAtkins@barnsley.gov.uk>
Sent: 16 August 2011 09:57
To: Hamilton, Sarah
Cc: Bell , Derek
Subject: RE: Old Mill Lane, Barnsley
Attachments: Old Mill Lane.pdf

Sarah

The attached PDF shows the approximate location of culverted watercourses crossing your site which must be protected during your works. The exact location of the apparatus should be determined on site prior to commencement of any works. A 6 metre easement will be required for any watercourses crossing the site.

It is believed a colony of Bats roosts within the culvert coming from a northerly direction therefore an ecological survey will be required.

Records of public sewers in the area are held by Yorkshire Water who should be consulted.

There are no records of flooding from the culvereted watercourses shown on the attached plan. Please consult Yorkshire Water regarding flooding from Public sewers and the Environment Agency regarding flooding from the River Dearne.

I assume the site is to discharge to the River Dearne, therefore please consult the Environment Agency regarding discharge rates.

The Council has a generic Corporate Flood Plan for the management of internal services in response to flooding events but has no specific flood plan for this site.

For information regarding emergency arrangements and guidelines available for development sites within potential flood risk areas please speak to the Environment Agency as this area is partly within the Environment Agency designated flood zone for the River Dearne.

Regards

Wayne Atkins
Senior Engineer - Drainage, Policy and Programming
Barnsley Metropolitan Borough Council
Highways and Engineering
Network Management
Westgate Plaza 1
PO Box 603
S70 9FA
Telephone: 01226 772182
Fax: 01226 772196
E-mail: wayneatkins@barnsley.gov.uk

From: Bell , Derek
Sent: 12 August 2011 14:12
To: Atkins , Wayne
Subject: FW: Old Mill Lane, Barnsley

Wayne,

Haven't you dealt with this one already ...??

Cheers ~ Derek

From: Hamilton, Sarah [mailto:Sarah.Hamilton@WSPGroup.com]
Sent: 12 August 2011 13:41
To: Bell , Derek
Subject: Old Mill Lane, Barnsley

Hi Derek,

I have been passed on your contact details by Rob McCarthy.

WSP has been commissioned to undertake a Flood Risk Assessment for a site off Old Mill Lane, Barnsley. Current plans are to redevelop the site as a large foodstore and associated petrol station together with 2 smaller retail units.

Please can you inform me of the following:

- Whether you have any plans of culverted watercourses / drainage in the immediate vicinity of the site;
- Whether you have any historic flooding records in the vicinity of the site (either from watercourses, drainage or highways);
- Whether you have any specific policies in relation to drainage from new developments;
- Whether the Council already has an existing Flood Plan that incorporates emergency procedures for the site if it were to flood?
- What emergency arrangements you would expect to be in place in terms of flooding at this site e.g. flood warning, signage, flood plan for the proposed store;
- Whether you have any guidelines available for development sites within potential flood risk areas.

Any advice would be greatly appreciated.

Kind regards,

Sarah

Sarah Hamilton
Senior Engineer, Property & Development

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Fax: +44(0)113 395 6201
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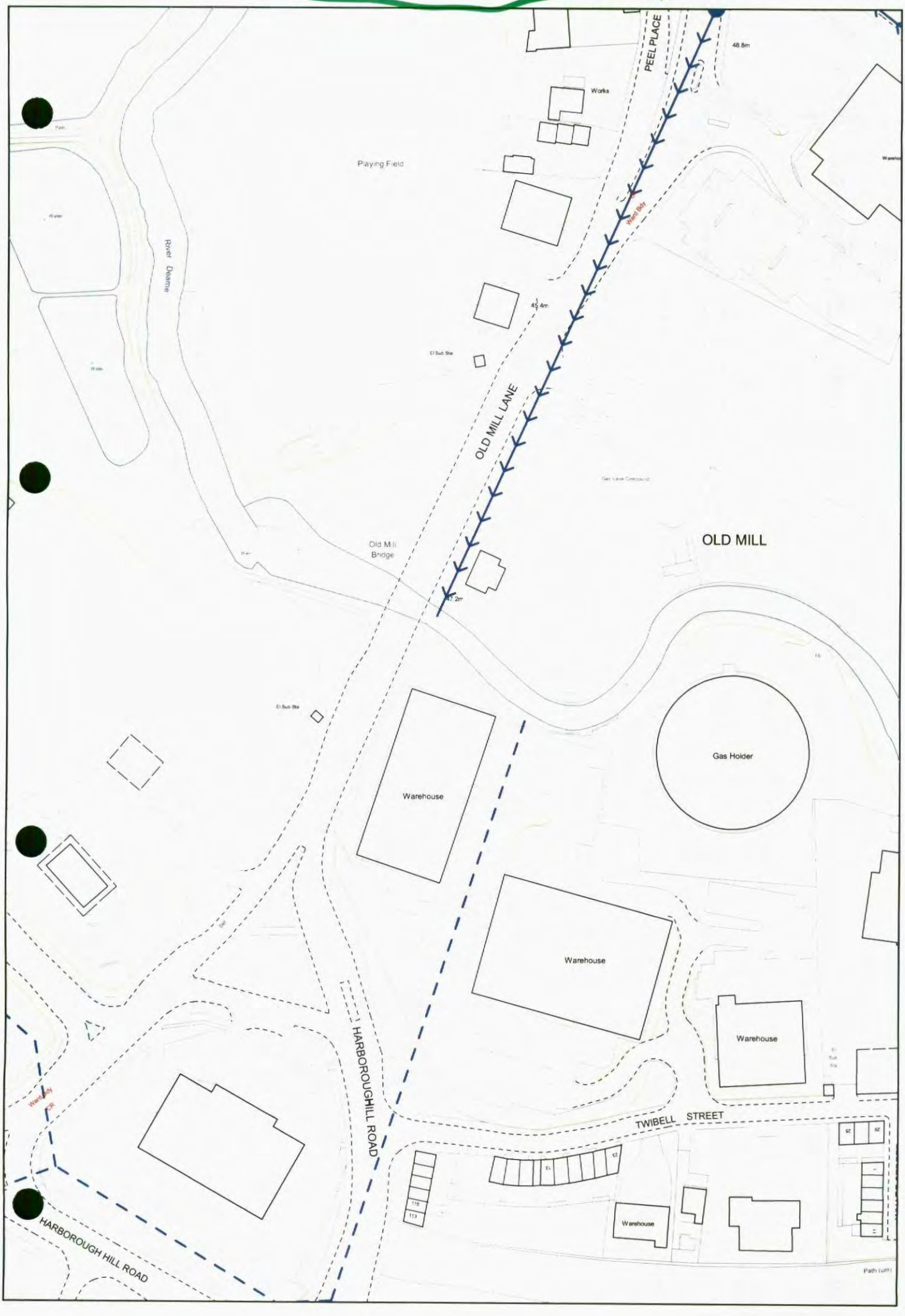
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Warehouse
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TWIBELL STREET
HARBOROUGH HILL ROAD

creating a better place

Environment Agency

Sarah Hamilton
WSP Group
Three White Rose Office Park
Millshaw Park Lane
Leeds
LS11 0DL

Our ref: RFI/2011/17472
Your ref:

Date: 4 July 2011

RECEIVED

Dear Sarah

Provision of Product 4 for Old Mill Lane, Barnsley

Thank you for your request of 10 June 2011 to use Environment Agency data, Product 4, in the development of the above site. The information is attached.

If you have requested this information to help inform a development proposal, then you should note the detail in the attached advisory text on the use of Environment Agency Information for Flood Risk Assessments / Flood Consequence Assessments.

Supporting Information

Flood Zone

- *Please can you confirm what flood zone the site lies within?*
- *Whether or not the flood zones will be updated in the near future.*

Please see the enclosed extract from the Flood Map.

The Flood Map provides information on flooding from rivers and the sea for England and Wales. The Flood Map also has information on flood defences and the areas benefiting from those flood defences.

The Flood Map shows the following:

1. Flood Zone 3 (dark blue area on the enclosed map): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences
   - For flooding from rivers the map indicates the extent of a flood with a 1% (1 in 100) chance of happening each year;
   - For flooding from the sea the map shows the extent of a flood with a 0.5% (1 in 200) chance of happening each year.

sa/lh/e/std

2. Flood Zone 2 (light blue area): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences.

- Indicates the extent of a flood with a 0.1% (1 in 1000) chance of happening each year.

3. Flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.

4. Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would flood.

The Rights & Responsibilities of a Riverside Owner

The owner of property adjacent to a watercourse is usually deemed to be the riparian owner and, as such, has both riparian rights and responsibilities with regard to the watercourse within their ownership.

The responsibility for general maintenance and repair of the watercourse and its banks rests with the riparian owner. For more information on Rights and Responsibilities of a riverside owner, you can visit our website at: www.environment-agency.gov.uk and click on 'Flood', 'How can I be prepared?, 'Guidance for riverside property owners' and download the 'Living on the Edge' booklet.

Alternatively type the following address into your web browser:
http://www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx

Flood Zones

Under Planning Policy Statement 25 Development and Flood Risk (PPS25) land is divided into three zones with regard to flood risk.

Zone 1, little or no risk, this is land outside the 1 in 1000 year flood plain, land deemed to be safe from flooding in the event of a flood with a 0.1% probability of occurring in any one year.

Zone 2, medium risk; land between the 1 in 1000 and 1 in 100 year fluvial (1 in 200 year tidal) flood plain. Between 0.1% and 1.0% (0.5%) probability of occurring in any one year.

Zone 3, high risk, land within the 1 in 100 year fluvial (1 in 200 year tidal) flood plain, at risk in the event of a flood with a 1.0% (0.5%) probability of occurring in any in year.

These zones do not take account of any flood defences that may exist as these could be overtopped or breached by a more severe flood event than designed for or maintained against.

Site Assessment;

From the supplied plan the site lies within flood zones 1, 2 & 3 on the Environment Agency Flood Map. The attached map confirms this.

Surface Water

There should be no increase in surface water runoff from the new development.PPS25 recognises that the management of flood risk is not simply restricted to flood plains and that a catchment-wide approach should be employed.

If the existing site is shown to drain to a watercourse, then surface water runoff should be attenuated to provide a 30% reduction in the final surface water discharge from the site when compared with the existing site outflow prior to redevelopment. However, if the site does not drain to a watercourse or public sewer at present, then flows must be attenuated to a maximum of 5 l/s/ha, equivalent to the Greenfield runoff rate.

Where surface water runoff drains to a public sewer, further advice on acceptable discharge rates should be sought from the Local water Authority.

Any balancing facility should be designed to accommodate a 1 in 30 year flow from the site below ground and a 1 in 100 year flow retained within the site (including an allowance for climate change), without causing ay flooding to buildings.

There are alternatives to conventional storage for the control of surface water run-off that are favoured by the Environment Agency where ground conditions are suitable. Sustainable Urban Drainage techniques (SUDs) tackle surface water run-off problems at source using features such as soakaways, permeable pavements, grassed swales, infiltration trenches, ponds and wetlands to attenuate flood peak flows, produce water quality improvements and environmental enhancements. The Environment Agency seeks to promote the use of SUDs techniques to this site and the expects the developer of the site to submit detailed investigations such that the use of SUD's has been fully explored.

More information on SUDs can be found at: http://www.ciria.org.uk/suds/

For information on Green Roofs in particular, please visit: www.thegreenroofcentre.co.uk

Further Questions

We would prefer a clear span bridge rather than any pier in the channel with the deck soffit at 1 in 100 + climate change with a minimum 600mm freeboard. You would need to take into account erosion/scour protection.

If you wish to discuss the site with the engineer dealing with the Barnsley area Lesley Slaney can be contacted on (0113) 213 4779.

Watercourses

- *Details of any watercourses / culverted watercourses in the vicinity and who is responsible for their maintenance;*
- *Minimum set back distances from any watercourse and governing statute / byelaw.*

The watercourse in the vicinity of the site is on the outer perimeter known as the River Dearne. Classified as 'main river' therefore the Water Resources Act 1991, and the Yorkshire Land Drainage Byelaws 1980 will both apply. Briefly, these state that there shall be no development (including tipping, fencing, etc.) within 8 metres of the top of the bank, or the landward toe of a flood defence structure, without the prior written consent of the Agency. If such development is proposed, then an application with full details must be submitted for consent.

The owner of property adjacent to a watercourse is usually deemed to be the riparian owner and, as such, has both riparian rights and responsibilities with regard to the watercourse within their ownership. The responsibility for general maintenance and repair of the watercourse and its banks rests with the riparian owner.

For more information on Rights and Responsibilities of a riverside owner, you can visit our website at: www.environment-agency.gov.uk and follow the links to 'Flood' then 'Living on the Edge'.

I have attached a link to flood risk standing advice which may be of some help to you to look at for advice on what to do when submitting a planning application and for guidance http://www.environment-agency.gov.uk/research/planning/82587.aspx .

Hydraulic Modelling

- *Whether or not any hydraulic modelling would be required to accompany a PPS 25 FRA and if so, provide some guidance on the level of modelling required (e.g. 1D or 2D);*
- *Does modelling or any other evidence indicate that flood waters can come out of bank upstream / downstream from the site and flood the site by overland flow?*
- *Whether or not hydraulic modelling will be updated in the near future.*

Modelling

Due to this site being located in close proximity to the join between 2 different mapping studies (the 2010 Dearne study and the 2004 Don study which includes the lower Dearne) we have included both sets of data. Both of these studies area modelled without defences.

Flood Modelling - River Don

The River Don Catchment Flood Model was completed by Jeremy Benn Associates in May 2004. See enclosed the ISIS Hydraulic Model Summary Sheets showing modelled water levels and flows for 5 different annual probabilities and additional results for the 0.5% annual probabilities.

2010 River Dearne Flood Risk Mapping

The River Dearne Flood Risk Mapping Study was completed by Halcrow in May 2010. Please see attached table showing water levels and flows for 8 different annual probabilities as well as a location map of model nodes.

Climate Change

See attached appendix B, from the department for Communities and Local Government's PPS 25 (Planning Policy Statement), for Development and Flood Risk.

Flood Defences / Other Structures

- *Details of any flood defences in the area including standard of protection, condition, type and who is responsible for maintenance;*
- *Details of any proposals for any future flood alleviation scheme that could affect the site and if so, provide details and timescales;*
- *Details of any other man-made structures / sources of flood risk that could affect the site.*

Assets

There are no formal flood defences or structures in this area that contribute towards reducing flood risk.

LIDAR Data

Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. This technique results in the production of an accurate, cost-effective terrain model suitable for assessing flood risk and other environmental applications.

The Environment Agency owns two LIDAR systems, which are installed in a survey aircraft along with its other operational remote sensing instruments.

The aircraft is positioned and navigated using Global Positioning System (GPS) corrected to known ground reference points. The aircraft typically flies at a height of about 800 metres above ground level and a scanning mirror allows a swath width of about 600 metres to be surveyed during a flight.

To get a license for the data you will need to contact our Science Group, stating the area you are interested in (preferably an OS Grid Reference, or a map with the area outlined). There may be a charge for this data.

Low resolution Data is returned as an ASCII grid, which can easily be converted to a surface model for use in most GIS applications, and is provided in 2km x 2km tiles, at a resolution of 2m.

High resolution Data is also returned as an ASCII grid, in 0.5km x 0.5km tiles, at a resolution between 0.125 and 0.5m.

For current catalogue of coverage see: http://www.geomatics-group.co.uk/GeoCMS/order.aspx

To obtain the data and license agreement, please contact:

Environment Agency Geomatics
Phoenix House
Lower Bristol Road
Bath BA2 9ES
Tel: 01225 487658
Fax: 01225 487643

E-mail: archived-lidardata@environment-agency.gov.uk
Or visit the website at www.geomatics-group.co.uk

Previous flooding records

- *Any previous flooding records and if so dates, source, depth, extent and any further detail.*

To the best of our knowledge there is no known flood history for this site. However, in close proximity to this location we do have some flood history available (see enclosed map).

Water causing flooding can come from different places, for example from rivers or the sea; surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system); overflowing or backing up of sewers or drainage systems which have been overwhelmed or from groundwater rising up from underground aquifers.

Currently the Environment Agency can only supply flood risk data relating to the risk of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding or drainage systems that have been overwhelmed. Local Authorities and/or Water Companies may be able to provide some knowledge on the risk of flooding from sources other than rivers and the sea and we are working with these organisations to improve knowledge and understanding of surface water flooding.

Groundwater

- *Details of any groundwater levels in the vicinity of the site;*
- *Whether or not the site lies within a Groundwater Source Protection Zone;*
- *Details of any groundwater flooding issues in the area.*

We have no information relating to groundwater levels or groundwater flooding for this area.

Details of the location of Source Protection Zones and areas of Groundwater Vulnerability are available on our website under the Groundwater section of our online interactive mapping tool 'What's in your backyard' available at the following address.

http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

Information relating to how Groundwater Vulnerability and Source Protection Zones are determined is available at the following online addresses.

Source Protection Zones:
http://www.environment-agency.gov.uk/homeandleisure/37833.aspx

Groundwater Vulnerability:
http://www.environment-agency.gov.uk/homeandleisure/117020.aspx

Reservoir Flood Risk

- *Whether or not the site is located within an area susceptible to reservoir flooding, and provide a copy of the Reservoir Flood Map to confirm this.*

In respect to Reservoir flood risk, please refer to the "Risk of Flooding from Reservoirs" map on our website at the following location: http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=reservoir&layerGroups=default&lang=_e&ep=map&scale=3&x=531500&y=181500

If you require any further assistance, please refer to the contacts available on the website.

Surface Water

- *Whether or not the site is located within an area susceptible to flooding from surface water and provide a copy of the Surface Water Flood Map;*
- *Details of any restrictions associated with the drainage of surface water from the site;*
- *Whether or not the site is located within a critical drainage area.*

Flood Map for Surface Water

Our new surface water flood map and provides a general indication of areas that may be at risk of surface water flooding. It takes broad account of underground drainage and typical storms which are likely to cause flooding, but these are only typical national figures and are not appropriate everywhere. The map indicates two depths of flooding: greater than 0.1m deep, and greater than 0.3m deep.

For more information about how surface water flood risk is managed in your area, please contact your local authority.

Mitigation

- Details of minimum finished floor levels and freeboard;
- Whether or not the site lies within an EA flood warning area;
- Whether or not there is any local guidance on emergency planning in terms of flooding, such as access and egress arrangements;
- Whether or not the EA would expect a flood plan to be developed and detail the level of information required within it;
- Whether or not compensatory flood storage would be required. If so, please can you confirm that the flood volume occupied by existing buildings on site (that are to be demolished) can be used to offset the flood volume occupied by the proposed buildings;
- *Detail the level of flood resilient construction required.*

Finished Flood Levels

Setting the ground floor level above site ground level will provide a measure of protection against any flooding. Where available we would recommend that flood levels be set 600mm above the 1 in 100 year event with an allowance for climate change made.

From our records the side does not lie in an EA flood warning area.

Policy

- *Details of any EA flood risk strategy / management documents that cover the site e.g. CFMP, RBMP, SMP, FRM Strategy;*
- *Whether there is a local EA policy in terms of climate change allowances;*

Details of our flood risk strategy/management documents that cover the site such as CFMP, RBMP, SMP, FRM Strategy are all available from our website. I have attached a link to our website www.environment-agency.gov.uk .

Sequential / Exceptions Test

- *Please can you confirm that the Sequential / Exceptions Test is not required?*

Guidance on when and how to apply the Sequential and Exception Test is set out in national planning policy statement PPS25: Development and Flood Risk and its accompanying Practice Guide. These documents may be downloaded from the Communities and Local Government website using the following link

http://www.communities.gov.uk/planningandbuilding/planningsystem/planningpolicy/planningpolicystatements/ .

We would also advise you to discuss Sequential and Exception Test requirements with the relevant local planning authority.

This information is provided subject to the enclosed notice, which you should read.

If you have any queries or would like to discuss the content of this letter further please do not hesitate to contact us on the number below.

Yours sincerely

CBeech

Cheryl Beech
External Relations Team
Direct Dial 0113 2134732
Email neyorkshire@environment-agency.gov.uk

Days of work - Mon to Thurs

Environment Agency
Phoenix House
Global Avenue
Leeds LS11 8PG

Part of the Environment Agency's Yorkshire and North East Region

Encs Detailed FRA/FCA Map on disk

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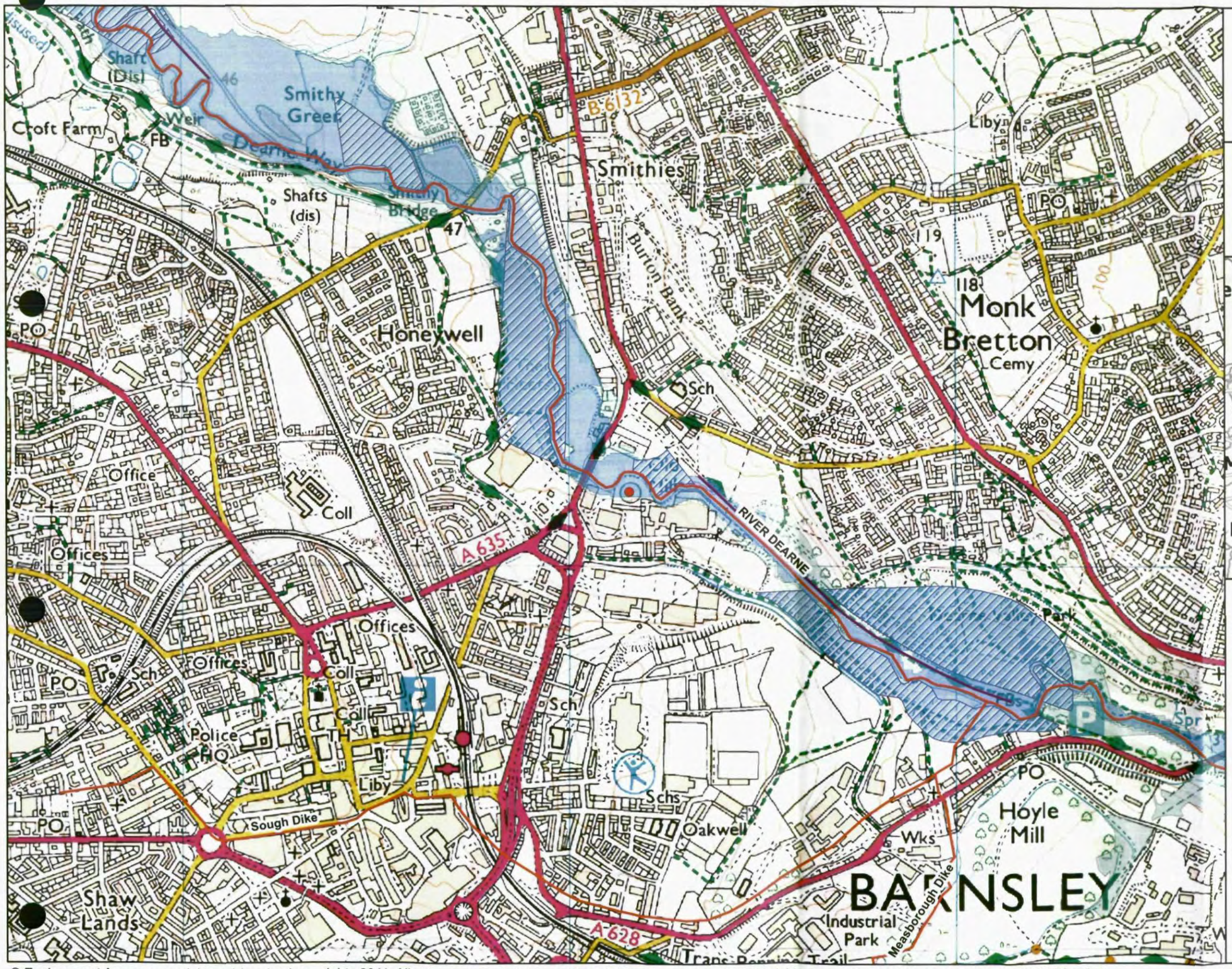
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Flood Map for Old Mill Lane, Barnsley - Date Created 23/06/2011 [Ref: 17472]



Environment Agency

www.environment-agency.gov.uk

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LEGEND

- Main River
- Flood Map Flood Defences
- Flood Zone 2 (FZ2)
- Flood Zone 3 (FZ3)
- Flood Storage Areas

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Annex B: Climate Change

B1. There is an increasing body of scientific evidence that the global climate is changing as a result of human activity. Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century. The nature of climate change at a regional level will vary: for the UK, projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long-duration rainfall of the type responsible for the 2000 floods could be expected. Sea levels will continue to rise. These kinds of changes will have implications for river flooding and also for local flash flooding. There are several indications that the climate in the UK is already changing. Central England's temperature rose by almost 1°C during the twentieth century. Heat waves have become more frequent in summer and there are now fewer frosts and winter cold spells. Winters over the last 200 years have become wetter relative to summers; a larger proportion of winter precipitation in all regions now falls on heavy rainfall days than was the case 50 years ago.

B2. To help organisations (including local authorities and regional planning bodies) to assess their vulnerability to climate change and plan appropriate adaptation strategies, the Government established the UK Climate Impacts Programme (UKCIP).[13] Scenarios of future climate change in the UK[14] were produced for the UKCIP in 2002 and published by the Department for Environment, Food and Rural Affairs (Defra). Over the next 2-3 years, this climate change scenario information will be revised, expanded and developed to better meet stakeholder needs.

B3. The companion guide supporting the PPS *Planning and Climate Change*[15] will provide guidance on how planning should secure new development and shape places resilient to the effects of climate change.

B4. The Foresight project on future flood risk reported in April 2004.[16] The project found that, using the UKCIP02 climate change projections, together with scenarios of potential economic and social changes, annual damage from flooding may rise from around £100 million to between £460 million (under the community orientated *Local Stewardship scenario*) and £2,500 million (under the more consumerist *World Markets scenario*) by 2080.

B5. Global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west. Allowances for the regional rates of relative sea level rise shown in Table B.1 should be used as a starting point for considering flooding from the sea, along with the sensitivity ranges for wave height and wind speed in Table B.2, in preparing flood risk assessments.

[13] www.ukcip.org.uk

[14] Defra, 2002. *Scenarios of future climate change in the UK* http://www.ukcip.org.uk/scenarios/ukcip02/documentation/ukcip02_scientific_report.asp

[15] see footnote 1

[16] DTI, 2004. *The Foresight Future Flooding project* www.foresight.gov.uk/Previous_Projects/Flood_and_Coastal_Defence/Reports_and_Publications/Project_Outputs/Outputs.htm

Table B.1 Recommended contingency allowances for net sea level rise

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0
South West	3.5	8.0	11.5	14.5
NW England, NE England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Notes:

1. For deriving sea levels up to 2025, the 4mm/yr, 3mm/yr and 2.5mm/yr rates (covering the three groups of administrative Regions respectively), should be applied back to the 1990 base sea level year. From 2026 to 2055, the increase in sea level in this period is derived by adding the number of years on from 2025 (to 2055), multiplied by the respective rate shown in the table. Subsequent time periods 2056-2085 and 2086-2115 are treated similarly.
2. Refer to Defra FCDPAG3 *Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, October 2006, for details of the derivation of this table. In particular, Annex A1 of this Note shows examples of how to calculate sea level rise.
3. Vertical movement of the land is incorporated in the table and does not need to be calculated separately.

B6. The rise in sea level will change the frequency of occurrence of high water levels relative to today's sea levels, assuming no change in storminess. There may also be secondary impacts such as changes in wave heights due to increased water depths, as well as possible changes in the frequency, duration and severity of storm events. A 10 per cent sensitivity allowance should be added to offshore wind speeds and wave heights by the 2080s.

B7. Extensive, low-lying coastal lands around most British estuaries are particularly susceptible to flooding. Changes to the drivers associated with coastal erosion (surges, waves, coastal sediment supply and morphology, and relative sea level rise) will affect the probability of flooding to new developments.

B8. The climate changes already seen in the UK are consistent with the UKCIP02 scenarios. This suggests that winters will become wetter over the whole of the UK, by as much as 20 per cent by the 2050s. A shift in the seasonal pattern of rainfall is also expected, with summers and autumn becoming much drier than at present. Snowfall amounts will

decrease significantly throughout the UK, but the number of rain-days and the average intensity of rainfall are expected to increase. Although average seasonal wind speeds could increase over most of the country, there is currently much less certainty regarding the potential for greater storminess and the consequences for sea surges or extreme wave activity on coasts.

B9. In making an assessment of the impacts of climate change on flooding from the land, rivers and sea as part of a flood risk assessment, the sensitivity ranges in Table B.2 may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensities, river flow, wave height and wind speed.

Table B.2 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Notes:

1. Refer to *Defra FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006*, for details of the derivation of this table.
2. For deriving peak rainfall, for example, between 2025-2055 multiply the rainfall measurement (in mm/hour) by 10 per cent and between 2055-2085 multiply the rainfall measurement by 20 per cent. So, if there is a 10mm/hour event, for the 2025-2055 period this would equate to 11mm/hour; and for the 2055/2085 period, this would equate to 12mm/hour. Other parameters in Table B.2 are treated similarly.

B10. Sensitivity testing of the Flood Map produced by the Environment Agency, using the 20 per cent from 2025 to 2115 allowance for peak flows, suggests that changes in the extent of inundation are negligible in well-defined floodplains, but can be dramatic in very flat areas. However, changes in the depth of flooding under the same allowance will reduce the return period of a given flood. This means that a site currently located within a lower risk zone (eg Zone 2 in Table D.1, Annex D) could in future be re-classified as lying within a higher risk zone (eg Zone 3). This in turn could have implications for the type of development that is appropriate according to its vulnerability to flooding (see Table D.2, Annex D). It will therefore be important that developers, their advisors and local authorities refer to the current Flood Map and the SFRA when preparing and considering proposals.

B11. Flooding in estuaries may result from the combined effects of high river flows and high sea surges. When taking account of impacts of climate change in flood risk assessments covering tidal estuaries, it will be necessary for the allowances for sea level rise in Table B.1 (see para. B5) and the allowances for peak flow, wave height and wind speed in Table B.2 (see para. B9) should be combined.[17]

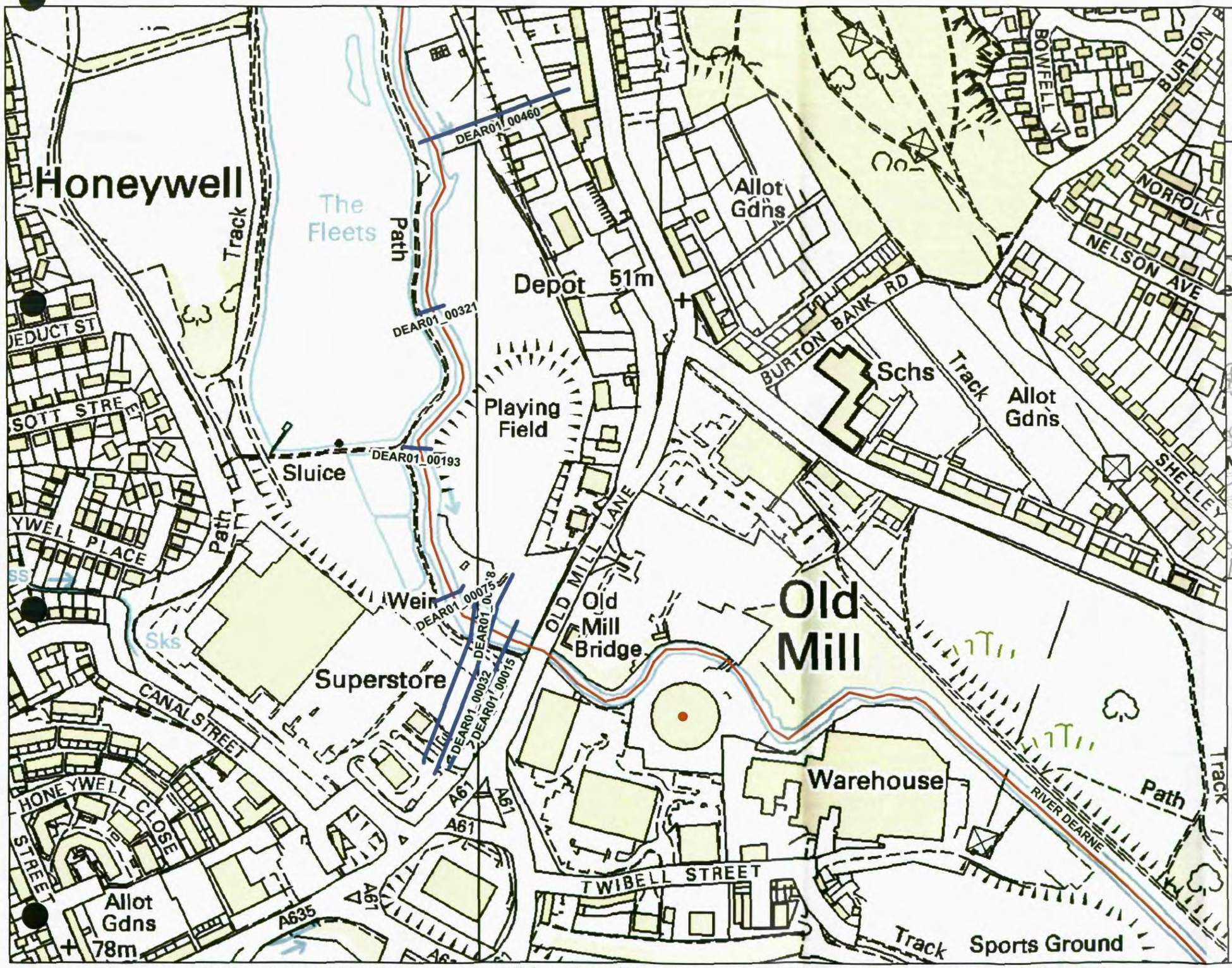
B12. Indirect impacts of climate change on land use and land management may change future flood risk. For example, changes in crop type, methods of cultivation and harvesting could affect the porosity and surface of the ground and hence the volume, speed and direction of storm run-off.

B13. Adaptation to climate change requires an integrated approach across different sectors including land use, water resources, transport, biodiversity and recreation. This integrated approach should be reflected in flood risk assessment.

B14. Knowledge and understanding of climate change is continuing to grow. The next UKCIP scenarios, due in 2008, are expected to provide more detail on regional climate changes and to express this information in probabilistic terms. Other areas where further research is in progress include climate-driven risks from groundwater and sewer flooding. The most up-to-date guidance on climate change and flooding from the Environment Agency, Defra, Communities and Local Government and the UKCIP should be considered in the preparation of Regional Flood Risk Appraisals, Strategic Flood Risk Assessments and site specific Flood Risk Assessments.

[17] Refer to Defra *FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, October 2006. Annex A2 gives details of joint probability analysis. www.defra.gov.uk/environ/fcd/pubs/pagn/climatechangeupdate.pdf

Model Cross Sections for Old Mill Lane, Barnsley - Date Created 23/06/2011 [Ref: 17472]



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LEGEND

- Main River
- ModelCrossSection-2010Dearne Model

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Location	Label	Chainage (km)	5 yr		10 yr		25 yr		50 yr		75 yr		100 yr		1000 yr		100 yr + CC	
			Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})	Max Stage (mAOD)	Max Flow (m^3s^{-1})
	DEAI0947	0.95	45.61	45.43	45.71	51.04	45.90	62.66	46.04	73.77	46.12	80.56	46.19	88.87	46.86	166.17	46.34	105.99
	DEAI0865	0.87	45.62	45.55	45.75	51.17	45.94	62.80	46.10	73.93	46.19	80.74	46.29	89.07	47.09	166.58	46.49	106.22
	DEAI0838	0.84	45.55	45.58	45.66	51.21	45.83	62.84	45.98	73.99	46.06	80.80	46.16	89.13	46.94	166.70	46.35	106.30
	DEAI0810	0.81	45.54	45.62	45.65	51.26	45.81	62.89	45.93	74.04	46.01	80.86	46.08	89.20	46.71	166.86	46.23	106.38
	DEAI0708	0.71	45.54	35.38	45.65	37.90	45.82	46.01	45.94	55.16	46.00	61.60	46.06	69.24	46.62	131.05	46.16	86.09
	DEAI0580	0.58	45.43	42.08	45.54	44.82	45.71	50.97	45.84	56.36	45.91	59.77	45.99	64.32	46.61	114.97	46.12	74.22
	DEAI0460	0.46	45.33	42.23	45.44	45.01	45.61	51.17	45.75	56.59	45.82	60.03	45.89	64.52	46.60	91.05	46.02	73.34
	DEAI0321	0.32	45.27	30.21	45.38	31.44	45.56	34.10	45.69	37.04	45.76	39.11	45.82	41.96	46.57	57.76	45.94	48.14
	DEAI0193	0.19	45.17	37.46	45.26	39.96	45.42	46.57	45.54	52.27	45.61	53.78	45.69	55.00	46.55	57.32	45.83	56.84
	DEAI0075	0.07	45.10	42.58	45.18	47.51	45.32	55.49	45.43	62.35	45.49	66.22	45.55	70.19	46.49	85.54	45.67	77.99
Barnsley Weir Gauging Station	DEAI0038U	0.05	44.94	42.73	45.03	47.82	45.16	56.18	45.27	63.50	45.33	67.85	45.39	72.50	46.45	94.71	45.52	82.23
	DEAI0038D	0.05	43.48	42.73	43.68	47.82	44.05	56.18	44.38	63.50	44.59	67.85	44.76	72.50	46.39	94.71	45.12	82.23
	DEAI0032	0.03	43.45	45.87	43.65	51.89	44.02	62.07	44.36	71.14	44.56	76.67	44.74	82.52	46.37	120.50	45.10	94.96
	DEAI0015	0.02	43.45	45.87	43.65	51.89	44.02	62.07	44.36	71.14	44.56	76.67	44.74	82.52	46.37	120.50	45.10	94.96
A61 Road Bridge	DEAI0001U	0.00	43.33	45.89	43.52	52.20	43.85	64.01	44.16	75.33	44.35	82.67	44.52	90.60	46.11	170.65	44.85	108.15
Baildon Dyke Cross-sections																		
	BAI3103	3.10	133.39	2.20	133.51	2.59	133.66	3.10	133.80	3.57	133.93	3.90	134.03	4.15	134.87	7.28	134.36	4.98
	BAI3075	3.07	133.00	2.22	133.15	2.62	133.33	3.13	133.51	3.61	133.66	3.94	133.79	4.19	134.77	7.35	134.21	5.03
	BAI3023D	3.02	131.02	2.22	131.07	2.62	131.12	3.13	131.17	3.61	131.19	3.94	131.21	4.19	131.47	7.35	131.28	5.03
	BAI2985	2.99	130.43	2.25	130.48	2.65	130.55	3.18	130.60	3.66	130.63	3.99	130.65	4.25	130.93	7.46	130.73	5.10
	BAI2820	2.82	128.33	2.39	128.42	2.82	128.53	3.37	128.61	3.89	128.69	4.24	128.73	4.51	129.05	7.92	128.85	5.42
Park Gate	BAI2719	2.72	127.31	2.47	127.42	2.91	127.54	3.49	127.64	4.03	127.70	4.39	127.75	4.67	128.40	8.21	127.93	5.61
	BAI2708	2.71	127.34	2.48	127.46	2.93	127.59	3.51	127.69	4.04	127.76	4.41	127.81	4.69	128.38	8.24	127.99	5.63
	BAI2708D	2.71	127.09	2.48	127.19	2.93	127.30	3.51	127.39	4.04	127.44	4.41	127.49	4.69	127.93	8.24	127.62	5.63
	BAI2689	2.69	126.81	2.50	126.89	2.94	126.99	3.53	127.06	4.07	127.11	4.43	127.14	4.72	127.49	8.29	127.25	5.67
	BAI2556	2.56	125.49	2.61	125.54	3.07	125.59	3.68	125.63	4.25	125.66	4.63	125.68	4.93	125.84	8.67	125.73	5.92
	BAI2556D	2.56	124.58	2.61	124.64	3.07	124.71	3.68	124.76	4.25	124.80	4.63	124.82	4.93	125.11	8.67	124.91	5.92
	BAI2485	2.49	123.07	2.67	123.12	3.14	123.18	3.77	123.22	4.35	123.25	4.74	123.28	5.05	123.51	8.87	123.34	6.06
	BAI2379	2.38	121.48	2.75	121.52	3.25	121.58	3.89	121.62	4.49	121.64	4.90	121.66	5.21	121.80	9.17	121.72	6.26
	BAI2258	2.26	120.05	2.85	120.10	3.37	120.17	4.04	120.22	4.65	120.26	5.08	120.28	5.41	120.56	9.51	120.37	6.49
	BAI2111	2.11	118.87	2.98	118.99	3.51	119.12	4.21	119.21	4.86	119.26	5.29	119.30	5.64	119.68	9.93	119.43	6.77
	BAI2011	2.01	118.75	3.06	118.88	3.61	119.02	4.33	119.12	4.99	119.17	5.44	119.21	5.80	119.59	10.21	119.34	6.96
	BAI2011D	2.01	117.90	3.06	117.96	3.61	118.03	4.33	118.09	4.99	118.12	5.44	118.15	5.80	118.44	10.21	118.24	6.96
	BAI1973	1.97	117.04	3.09	117.10	3.65	117.16	4.37	117.22	5.04	117.27	5.50	117.31	5.86	117.69	10.32	117.41	7.03
	BAI1973D	1.97	117.03	3.09	117.09	3.65	117.15	4.37	117.20	5.04	117.24	5.50	117.27	5.86	117.56	10.32	117.36	7.03
	BAI1830	1.83	115.40	3.21	115.46	3.79	115.52	4.54	115.58	5.24	115.63	5.71	115.66	6.09	115.95	10.72	115.75	7.30
	BAI1674	1.67	113.93	3.34	113.99	3.94	114.07	4.73	114.14	5.45	114.18	5.95	114.22	6.34	114.55	11.17	114.34	7.60
	BAI1557	1.56	112.92	3.44	112.97	4.06	113.03	4.86	113.07	5.61	113.10	6.12	113.13	6.52	113.38	11.50	113.20	7.83
	BAI1460	1.46	112.84	3.52	112.87	4.15	112.91	4.98	112.94	5.74	112.96	6.27	112.98	6.68	113.13	11.77	113.03	8.01
	BAI1460D	1.46	111.90	3.52	111.98	4.15	112.08	4.98	112.15	5.75	112.20	6.27	112.24	6.68	112.55	11.77	112.34	8.01
	BAI1415	1.42	111.71	3.56	111.78	4.20	111.85	5.03	111.91	5.81	111.95	6.33	111.98	6.75	112.28	11.90	112.06	8.10
	BAI1333	1.33	111.51	3.62	111.58	4.28	111.66	5.13	111.73	5.92	111.77	6.46	111.80	6.88	112.08	12.13	111.89	8.25
	BAI1333D	1.33	111.45	3.62	111.53	4.28	111.61	5.13	111.68	5.92	111.72	6.46	111.75	6.88	112.03	12.13	111.84	8.25
	BAI1317	1.32	111.40	3.64	111.48	4.29	111.56	5.15	111.62	5.94	111.66	6.48	111.69	6.90	111.97	12.17	111.78	8.28
	BAI1317D	1.32	111.05	3.64	111.14	4.29	111.22	5.15	111.29	5.94	111.33	6.48	111.35	6.90	111.65	12.17	111.44	8.28
	BAI1135	1.14	109.05	3.79	109.12	4.47	109.20	5.36	109.27	6.19	109.74	6.75	109.78	7.19	110.06	12.69	109.87	8.63
	BAI1135D	1.14	109.05	3.79	109.11	4.47	109.20	5.36	109.27	6.19	109.31	6.75	109.35	7.19	109.67	12.69	109.46	8.63
	BAI1053	1.05	107.85	3.86	107.91	4.55	107.97	5.46	108.03	6.30	108.08	6.87	108.11	7.32	108.44	12.92	108.21	8.79
	BAI0948	0.95	106.83	3.95	106.92	4.66	107.02	5.58	107.09	6.44	107.13	7.03	107.16	7.49	107.49	13.22	107.26	8.99
	BAI0824	0.83	105.59	4.05	105.66	4.78	105.72	5.73	105.78	6.61	105.83	7.22	105.86	7.69	106.16	13.57	105.96	9.23
	BAI0702	0.70	104.50	4.15	104.58	4.90	104.67	5.88	104.73	6.78	104.77	7.40	104.80	7.88	105.10	13.92	104.89	9.46
	BAI0577	0.58	103.35	4.25	103.41	5.02	103.49	6.02	103.59	6.95	103.64	7.59	103.68	8.08	104.01	14.27	103.78	9.70
	BAI0458	0.46	102.24	4.35	102.37	5.14	102.50	6.16	102.64	7.12	102.72	7.76	102.79	8.27	103.22	14.61	102.95	9.93
	BAI0458D	0.46	101.86	4.35	101.96	5.14	102.05	6.16	102.16	7.11	102.23	7.76	102.28	8.27	102.74	14.61	102.44	9.93
	BAI0344	0.35	100.53	4.45	100.60	5.25	100.68	6.30	100.76	7.27	100.81	7.93	100.85	8.45	101.13	14.94	100.94	10.15
	BAI0222	0.22	99.40	4.55	99.50	5.37	99.62	6.44	99.72	7.44	99.77	8.12	99.81	8.65	100.11	15.28	99.91	10.38
	BAI0222D	0.22	99.05	4.55	99.13	5.37	99.23	6.44	99.31	7.44	99.35	8.12	99.38	8.65	99.72	15.28	99.48	10.38
	BAI0101	0.10	98.22	4.65	98.30	5.49	98.42	6.59	98.51	7.60	98.56	8.30	98.60	8.84	98.95	15.63	98.76	10.61

2004 S105 River Don Flood Model - 200yr (0.5% AEP)

Lable	Max Stage (mAOD)
DRN01_23278u	43.75
DRN01_22430u	41.41

Environment Agency - North East Region
Re-working of the River Don Model
ISIS Hydraulic Model Summary Sheet

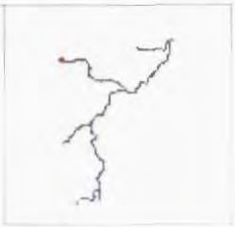
jba

Location Plan



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Cross Section References



River: DRN

Reach: 01

Chainage: 22430U

Section Type: BRIDGE, SECTION

OS NGR: SE 35676 06890

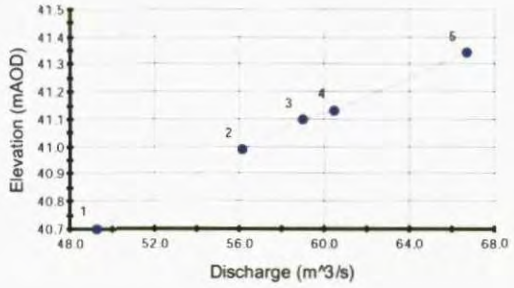
Survey Dwg Ref: N/A

Photograph Ref: DEAR_22430.JPG

Next
Section D/s: 22257
Section U/s: 23278U



Rating Curve



Number represents model profile number

Summary of Results

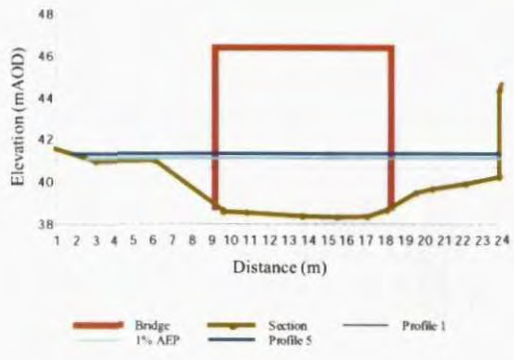
Profile No	AEP (%)	Flow (m^3/s)	Water Level (mAOD)	Velocity (m/s)
1	4.00	49.3	40.704	2.03
2	2.00	56.1	40.993	2.04
3	1.33	58.9	41.102	2.04
4	1.00	60.4	41.134	2.04
5	0.67	66.6	41.346	2.04

Level of Left Bank 41.030 mAOD

Level of Right Bank 39.520 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile



DRN: 01: CROSS SECTION NUMBER 22430U

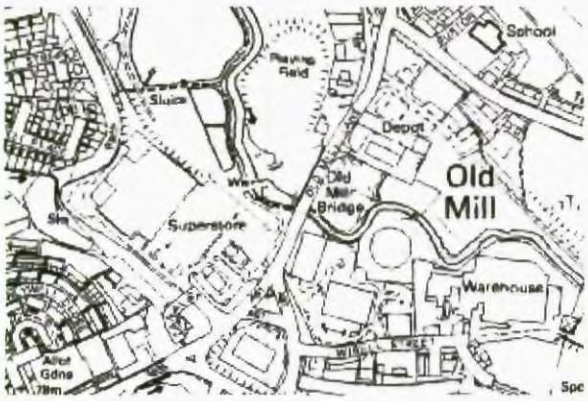
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Print Date: 21/05/2004

Environment Agency - North East Region
Re-working of the River Don Model
ISIS Hydraulic Model Summary Sheet

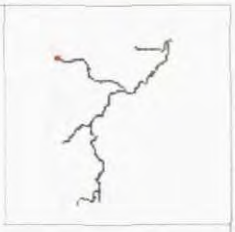
jba

Location Plan



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Cross Section References



River: DRN

Reach: 01

Chainage: 23278U

Section Type: BRIDGE, SECTION

OS NGR: SE 35035 07252

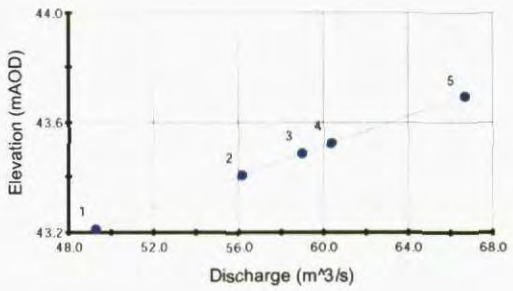
Survey Dwg Ref: N/A

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Next
Section D/s: 22430U
Section U/s: N/A



Rating Curve



Number represents model profile number

Summary of Results

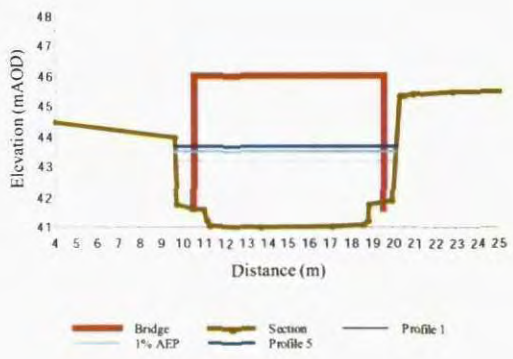
Profile No	AEP (%)	Flow (m^3/s)	Water Level (mAOD)	Velocity (m/s)
1	4.00	49.3	43.215	2.43
2	2.00	56.1	43.412	2.52
3	1.33	59.0	43.491	2.55
4	1.00	60.3	43.528	2.57
5	0.67	66.6	43.698	2.64

Level of Left Bank 43.990 mAOD

Level of Right Bank 45.350 mAOD

AEP: Annual Exceedance Probability = 1/T, where T = Return Period (Years)

Cross Section Profile

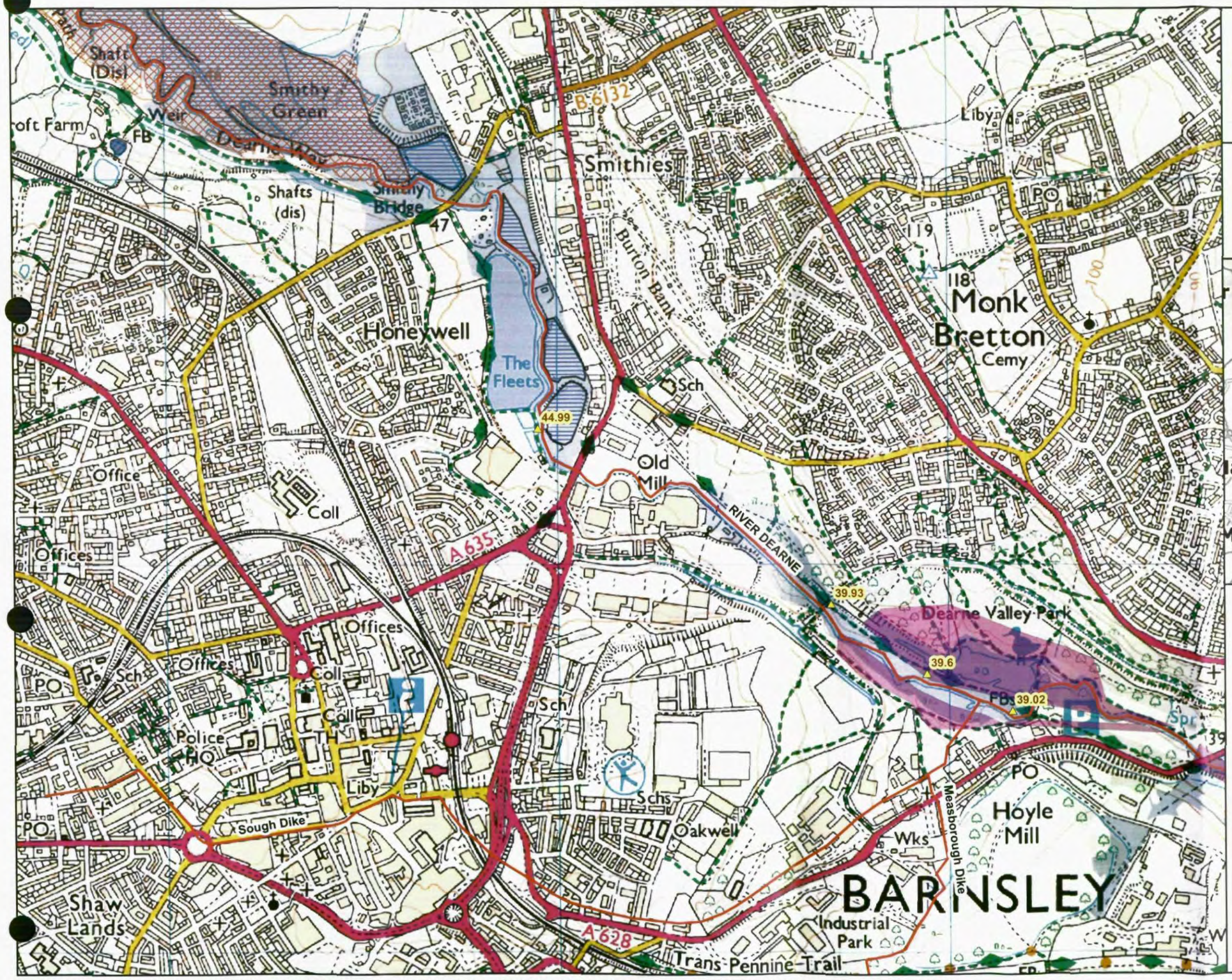


DRN: 01: CROSS SECTION NUMBER 23278U

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Flood History Map for Old Mill Lane, Barnsley - dated 22/06/2011 [Ref: 17472]





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Flood Extents

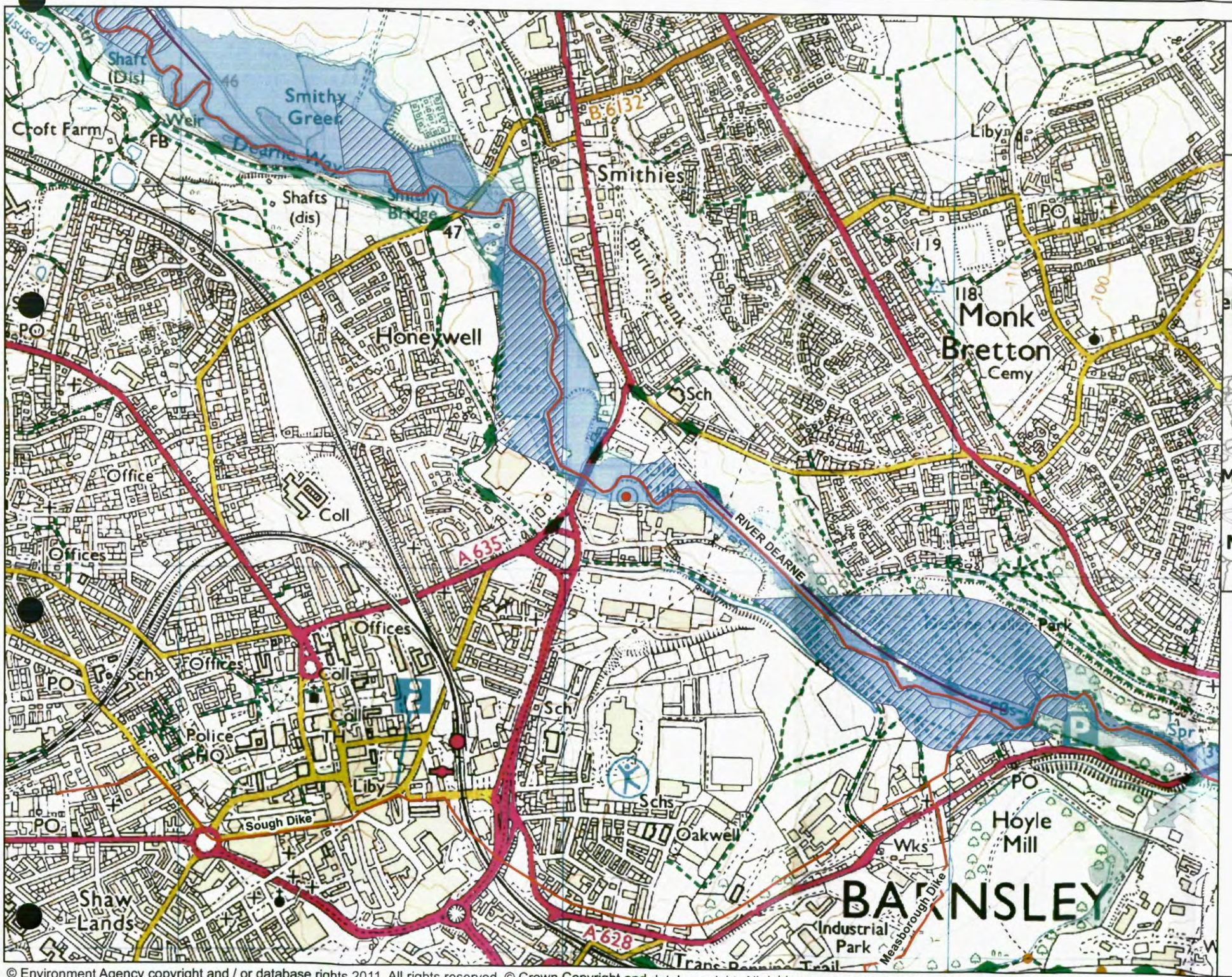
Legend

- Main River
- Autumn 2000 Flood Event Flood Level (m)
- Jan 2008 Flood Event Flood Extent DRAFT
- 2007 Flood Events Flood Extent
- 2007 Flood Event Surface Water Flood Extent
- Autumn 2000 Flood Event Flood Extent
- River Don 1947 Flood Event Flood Extent

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Flood Map for Old Mill Lane, Barnsley - Date Created 23/06/2011 [Ref: 17472]



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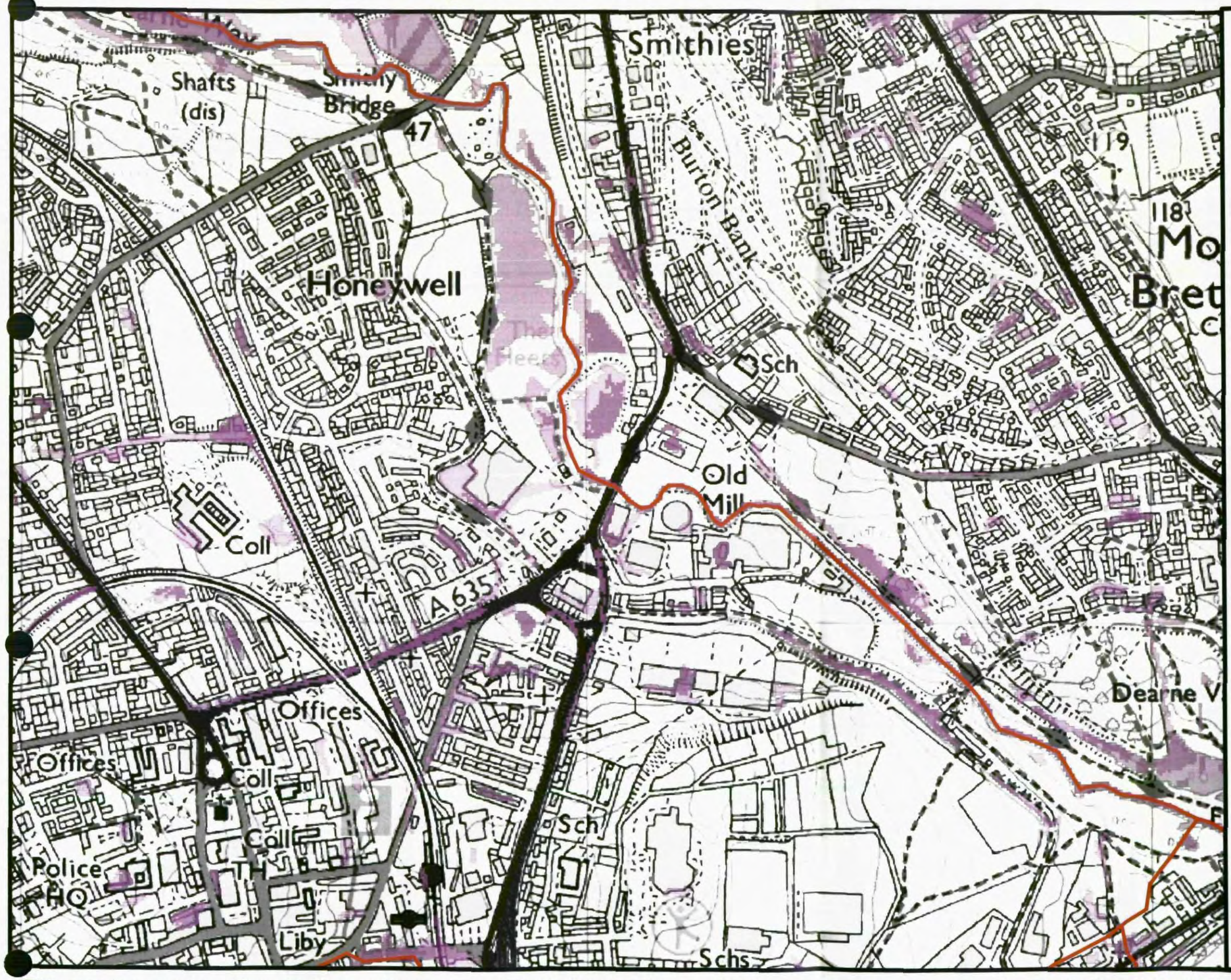
- Main River
- Flood Map Flood Defences
- Flood Zone 2 (FZ2)
- Flood Zone 3 (FZ3)
- Flood Storage Areas

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Flood Map for Surface Water

Environment Agency
Asiantaeth yr Amgylchedd



Note - this map provides a general indication of the broad areas that may be at risk of surface water flooding. It is taken from a national assessment which takes broad account of drainage and typical storms which are likely to cause flooding, but these will vary locally and are therefore not appropriate everywhere.

Important

- This information may be useful to help inform emergency & spatial planning and general awareness of surface water flood risk.
- It is not suitable for use at an individual property scale due to the method used.
- The information should not be interpreted as stating that the location you are interested in will or won't actually flood, but simply that it is in or not in an area shown at risk on the maps.
- As there are various sources of surface water information available, you should contact your local authority to ask them what surface water information best represents local conditions.

Flood depths from rainfall with a 1 in 200 chance of occuring in any given year

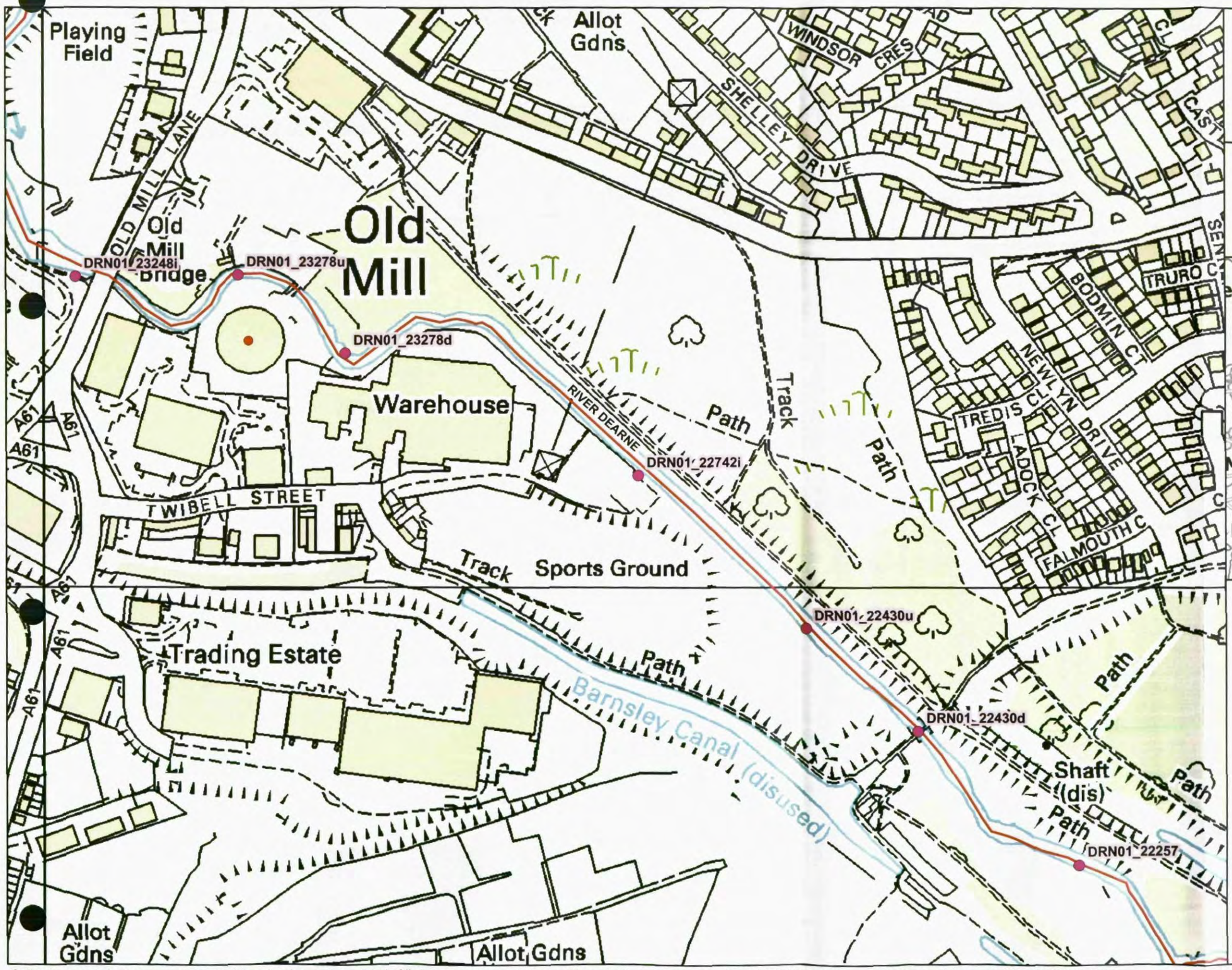
- Rivers - Main Network (NE)
- FMfSW_200yr
- FMfSW_200yr_Deep

1:10,000

Data produced 2010.

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Model Nodes (2004 Don Model) for Old Mill Lane, Barnsley - Date Created 26/08/2011 [Ref: 17472]



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- Main River
- ISIS nodes_custom_point

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Yorkshire Water Services
Developer Services
Sewerage Technical Team
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WSP Development Limited
Three White Rose Office Park
Millshaw Park Lane
LEEDS
LS11 0DL

For the attention of Ms Sarah Hamilton

Your Ref:
Our Ref: M004912

18th August 2011

Dear Madam,

Old Mill Lane, Barnsley - Pre-Planning Sewerage Enquiry - J621829

Thank you for your enquiry received 2nd August 2011. Our charge of £157.05 (plus VAT) will be added to your account with us, reference WSP041. You will receive an invoice for your account in due course. Please find enclosed a complimentary extract from the Statutory Sewer Map. This indicates the recorded position of the public sewers. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site:

There are 300 mm, 375 mm, 450 mm, 750 mm, 1200 mm diameter public combined sewers and a 450 mm diameter public surface water sewer recorded crossing/within the site.
No buildings are to be erected within 3 (three) metres of the 300/375/450 mm diameter public sewers, 5 metres of the 750 mm diameter public sewers and 6.5 (six and a half) metres of the 1200 mm diameter public sewers. Trees should not be planted within 5 (five) metres of these public sewers. It may not be acceptable to raise or lower ground levels over the sewers, nor to restrict access to the manholes on the sewers. If you wish to have these sewers diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0845 120 84 82.

There is a combined sewage overflow and an outfall to watercourse, under the control of Yorkshire Water, located near to/within the site. Vehicular access, including with large tankers, could be required at any time.

Development of the site should take place with separate systems for foul and surface water drainage. The separate system should extend to the public sewer.

Foul water domestic waste should discharge to the public combined sewers recorded crossing/within the site.

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SUDS), for example the use of soakaways and/or permeable hardstanding etc., may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SUDS in this instance from the appropriate authorities.

INVESTING IN VOLUNTEERS FOR EMPLOYERS
CUSTOMER SERVICE EXCELLENCE CSE

Where appropriate, soakaways, swales and infiltration trenches (SUDS) may be adopted as part of the public sewer network. For general conditions for the adoption of SUDS please see the attached sheet. Further information may be seen in the DEFRA publication 'Interim Code of Practice for Sustainable Drainage Systems' (ISBN 0-86017-904-4). If the developer is considering adoption of SUDS they should contact our Developer Services Team on 0845 120 84 82.

The local public sewer network does not have capacity to accept any discharge of surface water from the proposal site. The developer is advised to contact the Environment Agency/local Land Drainage Authority with a view to establishing a suitable watercourse for discharge.

It is understood that a watercourse is located within/adjacent to the site. This appears to be the obvious place for surface water disposal.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority, with regard to surface water disposal from the site.

Surface water run-off from areas of vehicular parking and/or hardstanding etc. must pass through an oil, petrol and grit interceptor/separator of adequate design before any discharge to the public sewer network. Roof water should not pass through the traditional 'stage' or full retention type of interceptor/separator.

It is imperative, however that surface water run-off from the forecourt of petrol stations, areas used for the delivery of fuel, areas used for and immediately adjacent to vehicle washing facilities and/or other similar areas where detergent is likely to be used is not discharged to any public surface water sewer network. Surface water from such areas must pass through an oil, petrol and grit interceptor/separator of adequate design before discharge to the public foul or combined sewer network. A trade effluent consent - that may be conditional and, amongst other things, place a restriction on the rate of discharge to public sewer - may be required for such discharges. The developer is advised to contact Yorkshire Water's Industrial Waste Section (telephone 0845 1242424) about any such proposal.

It is good drainage practice for any interceptor/separator to be located upstream of any on-site balancing, storage or other means of flow attenuation that may be required.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Developer Services Team (telephone 0845 120 84 82) for further information.

The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. Highway drainage, however, may be accepted under certain circumstances; for instance, if SUDS are not a viable option and there is no highway drain available and if capacity is available within the public sewer network. In this event, the developer will be required to enter into a formal agreement with Yorkshire Water Services under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

No land drainage to be connected/discharged to public sewer.

Any new connection to an existing public sewer will require the approval of Yorkshire Water. You may obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0845 120 84 82.

There are no properties in the vicinity of the site on the DG 5 (sewer flooding) Register, and there are no reported incidents of sewer flooding in the area on the YW operations database.

All the above comments are based upon the information and records available at the present time.

The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours faithfully

Developer Services Team

River Dearne

Water

(PH)

45.4m

OLD MILL LANE

BM
46.13m

Depot

Gas Valve Compound

OLD MILL

Weir

Old Mill
Bridge

Ward Bdy
CR

47.2mPH

El Sub Sta

FB

Gasholder

Warehouse

River Dearne

Dearne Valle

60.3m

Warehouse

Depot

Tanks

Warehouse

Warehouse

Warehouse

El
Sub
Sta

CANAL STREET

Ward Bdy
CR

OLD MILL LANE

HARBOROUGHHILL ROAD

TWIBELL STREET

WHARF STREET

EAMING VIEW

115
113

Sinks

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17th October 2011

Dear Madam,

Old Mill Lane, Barnsley - Pre-Planning Sewerage Enquiry - J621829

Further to your email dated 3rd October 2011:

The diversion will be conditioned at outline planning stage and undertaken during detailed design.

Yours faithfully

Developer Services Team