

# Preliminary Flood Risk Assessment

**Final Report**

**July 2011**

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## Abbreviations

Acronym	Definition
LLFA	Lead Local Flood Authority
PFRA	Preliminary Flood Risk Assessment
MBC	Metropolitan Borough Council
IDB	Internal Drainage Board
RFCC	Regional Flood and Coastal Committee
DEFRA	Department for Environment, Food and Rural Affairs
CFMP	Catchment Flood Management Plan
SFRA	Strategic Flood Risk Assessment
EA	Environment Agency
SWMP	Surface Water Management Plan
FWMA	Floods and Water Management Act
SKINT	North Sea Skills Integration and New Technologies
MARE	Managing Adaptive Responses to Changing Flood Risk

## **Executive Summary**

This report has been prepared to deliver the requirements of the Flood Risk Regulations 2009. Doncaster Metropolitan Borough Council is the Lead Local Flood Authority (LLFA) as defined under the Floods and Water Management Act 2010.

The PFRA is a preliminary high level screening exercise to identify local flood risk (both historic and future flooding) from various sources including surface water, groundwater, and ordinary watercourses.

This document and the associated data and information supplied with it, has been produced in line with the Environment Agency's Final PFRA Guidance.

The Environment Agency has used a national methodology (as set by DEFRA) to identify indicative flood risk areas across England. Doncaster MBC has no indicative flood risk areas within their boundary, and therefore will not be required to carry out the two subsequent stages of the Flood Risk Regulations which are the Flood Hazard Maps and the Flood Risk Management plans. The PFRA is reviewed every six years,

# **1 Introduction**

## **1.1 Scope**

The PFRA is being driven by two new pieces of legislation: namely The Flood Risk Regulations 2009 and the Floods and Water Management Act 2010. Under this new legislation, LLFA's of which Doncaster MBC is one, have been assigned a number of key roles and responsibilities with respect to local flood risk management.

Local Flood risk as defined in the PFRA guidance is flooding from surface run-off, groundwater and ordinary watercourses, and any interaction these have with drainage systems and other sources of flooding (main river, sea, reservoirs). Main River flooding including from the sea and reservoirs will not be addressed in this assessment, unless they do interact with surface water run-off etc.

The PFRA report will only consider flooding which are deemed to have significant consequences, although the PFRA process has provided an opportunity for us to collate all information on past and future floods, as this can be used to assist in producing Local Flood Risk Management Strategies in the future.

## **1.2 Aims and Objectives**

The PFRA is a high level screening exercise to identify and locate local flood risk. Although Doncaster MBC has no indicative flood risk areas within its boundary, which would warrant production of Flood Hazard Maps and Flood Risk Management Plans.

The aim of the PFRA is to provide an assessment of local flood risk within the study area, which will include information on past and future flooding.

Key objectives are listed below :

- Set up governance and develop partnerships
- Arrangements made for partnership and collaboration to collection and assessment of flood risk information and data.
- Systems used for data sharing, and provision for quality assurance, security and data licensing arrangements
- Methodology adopted for the PFRA process
- Assessment of past flooding events within the study area, including the significant consequences
- Assess the potential consequences of any future flood events

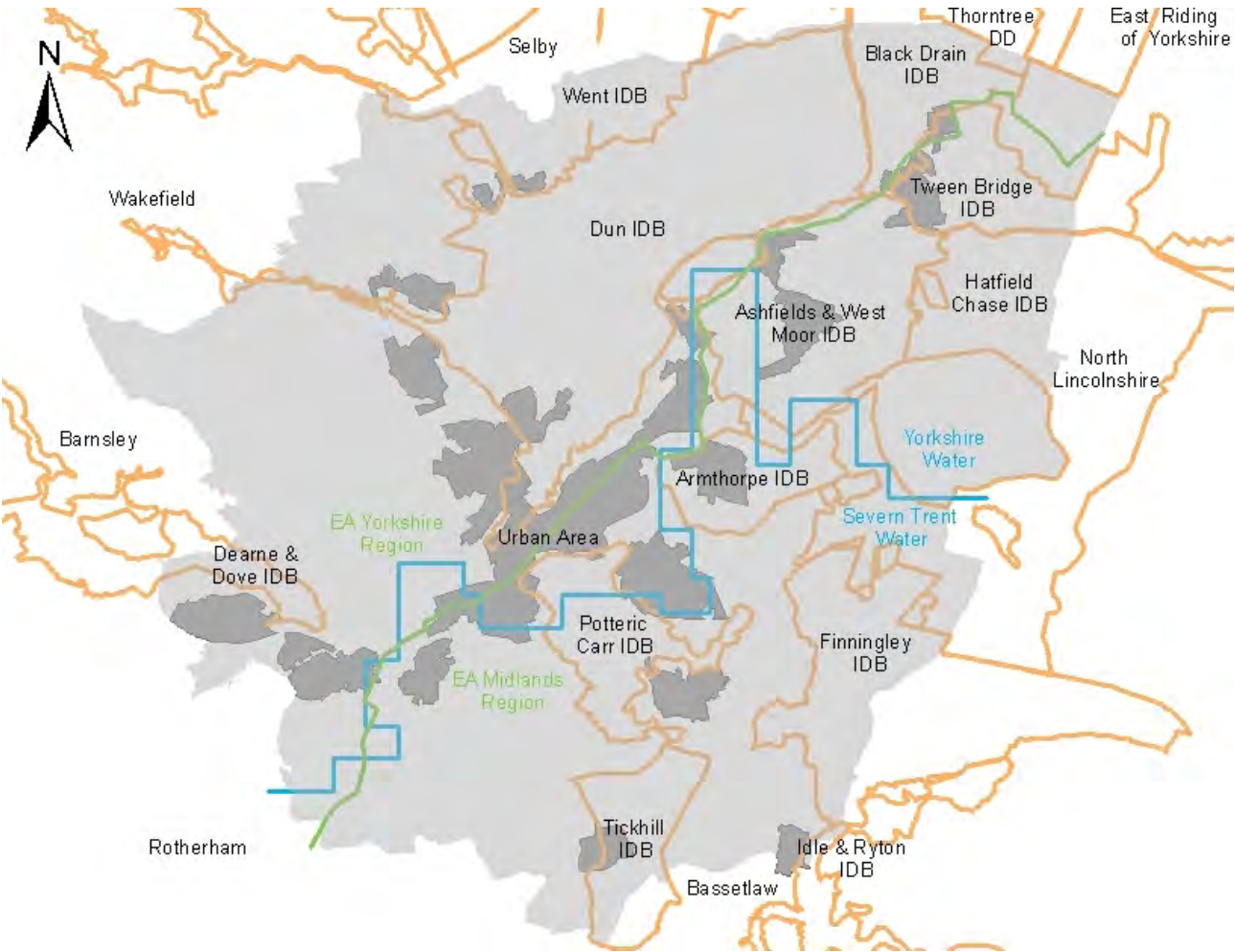
## **1.3 Study Area**

The study area for this PFRA covers the administrative boundary of Doncaster Metropolitan Borough Council. Doncaster MBC is the largest metropolitan borough in England and covers an area of approximately 56,000 hectares. Please refer to Fig 1A which indicates the area it covers.

Doncaster's topography is predominantly flat, and it relies heavily on artificial drainage systems to drain the land effectively (pump stations, dykes, etc). The study area is also covered by 11 Internal Drainage Boards, which cover around 50% of the study area. A point worth noting, is that the 11 IDB's will be merged into 2 larger IDB's, namely Danvm and Doncaster East Internal Drainage Boards. It is envisaged that the Danvm IDB merger will be implemented in April 2012 and the Doncaster East sometime in 2013.

The study area is split between the River Don and River Trent catchments. It is also served by 2 Environment Agency Regions, namely Yorkshire and Midlands. The area is also split between 3 Water Authorities, namely Yorkshire, Severn Trent and Anglian (although Anglian only serves a very small area). The area is split between two Regional Flood and Coastal Committees, which are Yorkshire RFCC and Midlands RFCC, of which we have one representative on each (although shared with other LLFA's). Doncaster is bordered by several other Local Authorities. Refer to Fig1A (next page) which indicates the various boundaries as described previously.

Fig 1A



Legend:

- Environment Agency Regional Boundary
- Water Authority Boundaries
- Internal Drainage Board Boundaries

## 2 LLFA Responsibilities

### 2.1 Introduction

The PFRA is just one of the responsibilities the LLFA's have under the Act. This section will provide an overview of the roles and responsibilities under the new legislation.

### 2.2 Flood Risk Partnerships

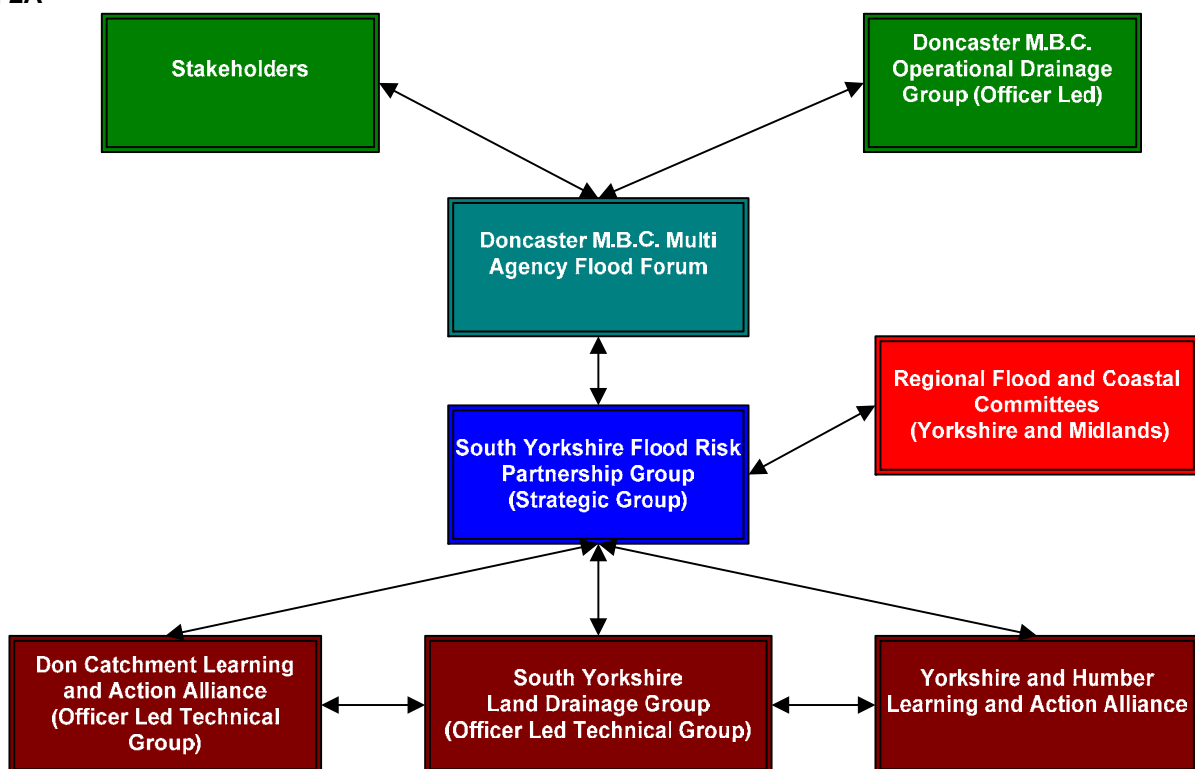
The FWMA states that the LLFA must co-operate with any other risk management authority when exercising its flood risk management functions. Under the FWMA, Doncaster MBC is responsible for leading local flood risk management within its boundary.

Following on from the floods of 2007, Doncaster MBC have already forged effective partnerships with all key stakeholders and risk management authorities within the borough, through a Multi Agency Flood Forum. At a strategic level, the South Yorkshire Flood Risk Partnership has also been formed. All other working groups, panels, forums etc feed into this partnership.

Doncaster MBC's Operational Drainage Group was formed following on from the floods of 2007. The scope of this group has changed since the implementation of the FWMA, to include the new roles and responsibilities of the Act.

Refer to Fig 2A, which gives a brief overview of the Flood Group Structure for Doncaster and South Yorkshire, and also the roles of each particular group.

Fig 2A





**Doncaster MBC Multi-Agency Flood Forum**

This group was formed after the 2007 floods, to act as a communication and discussion group which usually consists of DMBC Councillors, DMBC Officers (Emergency Planning and Drainage) Environment Agency, Yorkshire Water, Severn Trent Water, Internal Drainage Boards, South Yorkshire Fire and Rescue and South Yorkshire Police. The Group usually meets every 3-4 months.

**South Yorkshire Flood Risk Partnership Group**

This was set up by the Environment Agency following the implementation of the Floods and Water Management Act 2010, to act as a group on a strategic level for Flood Management in South Yorkshire. The group consists of a Chair (elected member), Environment Agency representatives, representatives (Assistant Director Level) from each LLFA, and also representation from the Water Authorities.

**Doncaster MBC Operational Drainage Group**

Again this group was formed after the 2007 floods, to improve communication and co-ordination between the various departments within DMBC, responsible for Flood Management and Flood Response. These consist of officers from Drainage, Emergency Planning, Planning, Environmental Health, and Neighbourhoods.

**South Yorkshire Land Drainage Group**

This is a well established group which contain Land Drainage officers from each South Yorkshire LLFA (Sheffield, Barnsley, Doncaster, Rotherham). The group acts as a communication and discussion group on an operational level. This group also feeds directly into the South Yorkshire Flood Risk Partnership Group.

**Regional Flood and Coastal Committee (Yorkshire and Midlands)**

Doncaster MBC is split into two RFCC, due to how the catchment is split. The RFCC is previously the Regional Flood and Defence Committee.

**Don Catchment Learning and Action Alliance**

This group was set up through the SKINT/MARE projects to provide a catchment wide forum and knowledge sharing group for all stakeholders within the catchment, including representatives from all catchment LLFA's, Water Authorities and the Environment Agency and any other interested or relevant stakeholders.

**Yorkshire and Humber Learning and Action Alliance**

This is a well established group which has representatives from all Yorkshire and Humber LLFA's, Water Authorities and the Environment Agency, to act as a knowledge sharing and also a development group to assist in various flood management activities throughout the Yorkshire and Humber area.

**2.3 Stakeholder Engagement**

The following stakeholders have been engaged through representation in the groups as described in section 2.2.

- Doncaster Metropolitan Borough Council
- Environment Agency
- Severn Trent Water
- Yorkshire Water
- Jeremy Benn Associates – (Dun Drainage Commissioners, Ashfield and West IDB, Dearne and Dove IDB, Hatfield Chase IDB, Potteric Carr IDB, Tween Bridge IDB, Went IDB, Black Drain IDB and Finnigley IDB)
- South Yorkshire Fire and Rescue
- South Yorkshire Police

Several departments within Doncaster MBC have been consulted and engaged during the PFRA process including Planning, Highways and Emergency Planning.

## **2.4 Public Engagement**

It was felt that members of the public would not need to be engaged at this stage of the PFRA process, but some public engagement would be required in the future when producing the Local Flood Risk Management strategy for Doncaster MBC. It is felt vital that the public be involved at the strategy stage of flood risk management, to enable them to gain acceptance of the various decisions and policies for future flood risk management. This engagement will also build on the partnership and trust Doncaster MBC already have, with the Flood Warden Groups throughout the borough.

It is worth noting that the Overview and Scrutiny Meeting for the PFRA, was open to the public.

### 3 Methodology and Data Review

#### 3.1 Introduction

The methodology for producing the PFRA is based upon the Environment Agency's Final Guidance on PFRA's, along with the guidance provided in the DEFRA Capacity Building Workshops.

#### 3.2 Methodology and Data Review

##### Data Collection

Data was collected from a number of authorities and organisations (including internally) to assist in the preparation of the PFRA. Information sharing protocols were arranged for both Water Companies (Severn Trent Water and Yorkshire Water). Data and information was also obtained from the Environment Agency from their Geo-store web portal. Other organisations that provided further data included the Internal Drainage Boards and British Waterways.

Generally we found no issues with regards to collecting data from other organisations. As with any data, it was important to interpret it and use it in the correct way for the PFRA process.

All GIS datasets received have been recorded in an information log. Due to the large amount of information received during the PFRA process, the information log is useful to keep a track on what each dataset is, what versions we have and how it should be interpreted and it's limitations.

Information shared and received was generally in either a GIS format or records of flooding incidents (spreadsheet, database etc). All information received is stored on Doncaster MBC's local server.

Table 3-1 shows all the relevant information and datasets used as part of the PFRA process

**Table 3-1**

	Dataset	Description
Environment Agency	Areas Susceptible to Surface Water Flooding	First Generation - National mapping outlining areas which are at risk from surface water flooding (3 bandings less, intermediate, more)
	Flood Maps for Surface Water	Second Generation – Datasets which include a 1/200 and 1/30 chance of surface water flooding occurring (2 bandings – greater than 0.1m in depth and greater than 0.3m in depth)
	Areas Susceptible to Groundwater Flooding	Strategic scale map in 1km grid squares indicating areas which are susceptible to groundwater flooding
	National Receptors Dataset	A national dataset of social, economic, environmental and cultural receptors (eg – National Parks, Listed Buildings, Residential Properties, Transport Infrastructure etc)
	Indicative Flood Risk Areas	Nationally identified flood risk areas, based upon DEFRA's definition of "significant"
	Historic Flood Map	Combined extents of known flooding from rivers, sea and groundwater
	Don and Trent Catchment Management Flood Plans (CFMP)	CFMP's are a high level strategic plan that provide policies for sustainable flood risk management, predominately from river and tidal flooding.
Doncaster M.B.C.	Strategic Flood Risk Assessment Level 1 (SFRA)	SFRA identifies and analyses current and future flooding issues for proposed areas of development in Doncaster.
	Historical Flooding Records	Historical records of flooding. (Majority of the records were from the 2007 flood events)
	Anecdotal information relating to past flooding	Information obtained from drainage/highway operatives and other officers in relation to past surface water flooding.

Yorkshire Water	DG5 Flooding Register	DG5 register of sewer flooding incidents
	Sewer Asset Information	Detailed GIS records of Yorkshire Water's sewer assets
Severn Trent Water	DG5 Flooding Register	DG5 register of sewer flooding incidents
	Sewer Asset Information	Detailed GIS records of Severn Trent Water's sewer assets
British Waterways	Canal Network and other Assets	Detailed GIS records of British Waterway's canal network and other assets (weir's, locks, sluices etc)
	Records of canal overtopping/breaches	Records of historical overtopping/breaches in the canal network.

### Data Limitations

At an early stage in the PFRA process, it was quickly realised that the existing flood data Doncaster MBC had was very limited and inconsistent. Historically, the recording of flood events has been carried out by numerous departments on different systems, which has led to inconsistencies in the recording of this data. This has highlighted the need for a centralised database to record flood events, which is explained further in Section 7.

The limited amount of information we had led to gaps in particular areas, which are unlikely to be accurately represented in the identification of flood risk areas.

The majority of the data we held, and the data received externally had little or no indication of how significant or what the consequences were of past flooding. This made assessing the historic flooding accurately very challenging.

### Quality Assurance, Security, Data licensing and Restrictions

The security of data is important when storing all of the information gathered for the PFRA. All data is stored on Doncaster MBC's servers which are password protected and adhere to the councils own Data Protection Policy.

Certain restrictions were placed upon sets of data received, with regards to their usage. These restrictions are listed below in Table 3-2

**Table 3-2 List of data and licensing restrictions**

Authority	Licensing and restriction details
Yorkshire Water	The information provided shall only be used for the purposes of the regulations, namely the Flood Risk Regulations 2009 and the Floods and Water Management Act 2010. No information is to be disclosed to other third parties, other than those stated in the protocol.
Severn Trent Water	The information provided is only to be used for the purposes of the Preliminary Flood Risk Assessment.
Environment Agency	The use of some data is restricted to the study area of Doncaster MBC. The use of other data is un-restricted.
British Waterways	The information provided by British Waterways for the production of PFRAs, can also be used to assist the production of the Local Flood Risk Management Strategies. The information is not to be passed onto third parties without prior consent from British Waterways.

## **4 Past Flood Risk**

### **4.1 Past Flood Events in Doncaster**

Historic flooding records were collated from the data sources as stated in Section 3. These flood events came from a range of flooding sources, and in many cases the details of the source of flooding was not known or un-recorded. The main focus with regards to sources of flooding the PFRA requires is surface run-off, groundwater and ordinary watercourses. Any flooding interaction of these sources with main rivers, sewer flooding and tidal influences was also investigated and recorded.

The records of past flooding events held by Doncaster MBC were very limited. The only recorded details the council had, were from the floods of 2007, although there have been numerous flooding incidents prior to this date, with the most significant being in Autumn 2000 and March 1947. Below is a summary of information for each flooding source

#### **Surface Water Flooding (Surface run-off)**

Surface water flooding occurs when rainfall stays on the surface of the ground and does not enter a watercourse or sewer, although there can be an interaction with watercourses and sewers. This mechanism of flooding is sometimes called pluvial flooding. Information on past surface water flooding was obtained from a number of sources predominantly DMBC Highways, Emergency Planning, Internal Drainage Boards and South Yorkshire Fire and Rescue Service. Some of the surface water flooding events was corroborated with photographs, accounts from DMBC Operational Staff and You Tube.

#### **Groundwater Flooding**

Groundwater flooding is usually very local and governed by the local geology. It usually occurs after periods of prolonged or heavy rainfall.

Groundwater flooding can arise 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
- Local shallow drainage/flooding problems unrelated to deep groundwater responses

The solid geology underlying the Doncaster Borough is split into three distinct Groups. The dominant Group is the Sherwood Sandstone which occupies the central and Eastern areas of the Borough. To the West of this Group sits the Zechstien Group which is predominantly Magnesian Limestones which are interbedded with Marls. In the far West of the Borough is the Upper Pennine Coal Measures. The geological contact between these Groups is generally trending in a North Northwest to South South-east direction.

There are several superficial deposits which overlay the bedrock. In the North of the Borough is the 25-Foot Drift of the Vale of York, which comprises of Silt and Clay with Sands. In the East of the Borough there is a deposit of lowland Peat. In the central area there is a band of Alluvium which is associated with the river Don. To the South of this there are deposits of River Gravels and Sand and Gravel. Boulder Clay is interspersed in pockets across the entire Borough. The boundaries of these deposits are highly variable. The geological plans show that there is no significant superficial deposits overlying the Coal Measures or the Magnesian Limestones.

The council has no records of any past groundwater flooding. This could be due to the historical pumping of groundwater by the Collieries which used to operate in the Doncaster Borough.

Both the Don and Trent CFMPS's which cover the study area, do not identify any specific groundwater flooding incidents, however there is always a risk of groundwater flooding in the study area.

The study area is part of the former South Yorkshire Mining region, and the Coal Authority were consulted with respect to the possibility of flooding from re-emergence of minewaters, following the cessation of mine water pumping. The Doncaster Drainage Act 1929 (several amendments thereafter) is a specific piece of

legislation which requires the Coal Authority to ensure that the Land Drainage systems affected by mining works, are maintained and remediated wherever necessary. There are several pumping stations within the study area specifically to manage this, which are predominately maintained by the Internal Drainage Boards, although the Environment Agency does maintain 5 within Doncaster itself.

For the purposes of the PFRA, there is no historic groundwater flooding records with significant consequences.

### **Ordinary Watercourse Flooding**

There are several instances of flooding from ordinary watercourses throughout Doncaster. Information on this flooding was obtained from Doncaster MBC officers, who respond to flood events and also information obtained from the Internal Drainage Boards.

### **Interaction with other types of Flooding**

The PFRA requires the LLFA to only assess flooding from surface run-off, groundwater and ordinary watercourses. However we must also assess flooding incidents that have an interaction with other drainage systems, namely sewers and main rivers. There are several instances of interactions with other types of flooding (namely fluvial), but would require detailed modelling to fully understand the complex nature on each flooding source and how they interact with each other.

## **4.2 Consequences of Flooding**

The PFRA only asks the LLFA to record detailed information on historic flooding which is deemed to have "Significant harmful Consequences". No definition was provided to LLFA's on what flooding is deemed to be significant. Therefore we have taken the following approach on what is deemed "Significant".

To be classed as "Significant" the flooding incident has to have 1 or more of the following, which is affected by the flooding.

- 5 or more Residential properties
- 2 or more Commercial properties
- 1 or more Critical Infrastructure (Eg Hospitals, Health Centres, Clinics, Surgeries, Schools, Nursing Homes, Emergency Services)
- 1 Transport Infrastructure (affected > 10 hours)

Significant can also be classed as a flooding event which registered on a national scale including the harmful consequences (human health, economic activity, and the environment) and also the level of response (formation of strategic co-ordinating group or Gold Command).

The significant threshold was challenging to determine, but following guidance from the EA and speaking to other LLFA's, it was felt that we were pitching the significant threshold at the right level.

The lack of detailed information and records on historic flooding has made it difficult to class some flooding as "Significant". A more detailed record of future flooding events will be kept by Doncaster MBC, to ensure this can inform and support the Local Flood Management Strategy and also in future PFRA cycles.

The PFRA process provided an opportunity to provide a detailed summary on all of the information available on the past floods, not just those with significant consequences. These incidents have also been recorded in the "Not Significant" spreadsheet, as it was felt that this was a suitable format to record these incidents, although this has been kept separate from the significant flooding events, which will be reported on for the purposes of the PFRA. Each individual incident for the "Significant" flood areas has also been recorded in the "Significant" spreadsheet. The Flood outlines for the significant past flooded areas have also been mapped, but the map has not been included in this report, as the flooded areas are too smaller scale to distinguish.

Fig4a below, indicates the total number of the surface water flooding incidents in June 2007, both significant and not significant.



Key:

### Legend

- Doncaster MBC Area
- SW FLOODING 2007

Notes:

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title: Figure 4a Surface Water  
Floodings Incidents June 2007

Completed By:  
Robin Geldard

Reference:  
Not Saved

Date:  
26 May 2011

Scale:  
1:121,531

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## **5 Future Flood Risk**

### **5.1 Overview of Future Flood Risk**

#### **Surface Water Flooding**

The only local information available on surface water flood risk in Doncaster is from the Strategic Flood Risk Assessment produced for Doncaster MBC in 2009. Surface Water Flood maps were produced which provide an indication the surface water flood extent and variation in depths for particular areas of interest, resulting from a 1% (1/100 year) rainfall event; and assuming a 10% (1 in 10 year) rainfall event being 'lost' due to the sewer capacity. The modelling technique includes the presence of flood defences. These maps are only indicative and were used as a guide to improve the confidence we had in the risk of future flooding for particular areas.

The Environment Agency has produced a national assessment of surface water flood risk in the form of 2 national mapping datasets. The first generation mapping, Areas Susceptible to Surface Water Flooding (ASStSWF), contains three susceptibility bandings (less, intermediate and more) for a 1/200 year rainfall event. A second generation of maps were also produced which are the Flood Maps for Surface Water (FMfSW) which contain two flood events, 1/30 year and 1/200 year with two depth's of flooding bandings (greater than 0.1m and greater than 0.3m). For the purposes of assessing future flood risk in Doncaster, the Flood Maps for Surface Water 1/200 year >0.3m deep have been used. The Flood Map for Surface Water is illustrated in Fig5a.

#### **Groundwater Flooding**

There is no local information available which provides evidence on future groundwater flood risk across the Borough. The Environment Agency provided a national dataset "Areas susceptible to Groundwater Flooding", which can be used to form a basis to assess the risk of future flooding risk from groundwater. Each square is a 1km square which indicates the percentage proportion of that square, which is susceptible to groundwater flood emergence. The EA dataset is illustrated in Fig5b.

#### **Ordinary Watercourse Flooding**

The only information available on future flood risk from rivers/watercourses is the Environment Agency's Flood Zone Maps. As these maps only show the risk of flooding from main rivers, it is difficult to assess the risk of flooding from minor/ordinary watercourses. To fully understand the flood risk from ordinary watercourses, detailed modelling would be required for that specific area.

#### **Interaction with other types of Flooding**

All of the information provided on future flood risk for surface water, groundwater and fluvial flooding stands alone, and does not take into account any interactions between them. There are some areas within the catchment which do have interactions with the various types of flooding, and to fully understand this, an integrated model would be required.

### **5.2 Locally Agreed Information**

From the PFRA Final Guidance it recommends that LLFA's should review, discuss, agree and record with all relevant risk management authorities what surface water data best represents local conditions. This is known as 'locally agreed surface water information'.

'Locally agreed surface water information' could be made up from both:

- Local information on future flooding from surface run-off for part of the LLFA (such as a village/town or an IDB Area etc.)
- One of the national datasets provided by the Environment Agency (for the remainder of the LLFA)

The only information available other than the national datasets is the surface water flooding information produced for the Strategic Flood Risk Assessments as described above. This data has been compared against the national dataset (Flood Maps for Surface Water 1/200 >0.3m depth). The two sets of data were found to be reasonably comparable, although the data from the SFRA is interpreted from maps at 1:50,000 scale, which makes it difficult to compare one set of data against another.

As there is no other local information on future flooding available, the 'locally agreed surface water information' will be the Environment Agency's 'Flood Maps for Surface Water' dataset, which is deemed to be the most accurate and appropriate information available. This dataset is illustrated in Fig5A.

### 5.3 Possible Consequences of Future Flooding

The Environment Agency has used the Flood Maps for Surface Water 1/200 year >0.3m depth and the National Receptors Database to identify a number of areas across the country that exceed a set threshold, as indicated below.

- > 200 people
- >20 businesses
- 1 critical service

This assessment was carried out based upon 1km<sup>2</sup> National grid squares which exceed the above criteria. These areas are illustrated in Fig 5c.

The potential consequences on key flood risk indicators have been assessed by the Environment Agency. This information has been included in Annex 2 of the Preliminary Assessment spreadsheet.

There are other potential areas of future surface water flooding within Doncaster, which are not located within the 1km<sup>2</sup> grid squares, as the potential consequences will be below the set threshold. These areas can be assessed and incorporated into Doncaster's Local Flood Risk Management Strategy.

The method for counting properties within the areas of future flooding is the "Simple GIS" method using property points.

### 5.4 Effect of Climate Change and Long Term Developments

#### Section 1 - Common to all River Basin Districts

There is clear scientific evidence that global climate change is happening now. It cannot be ignored.

Over the past century around the UK we have seen sea level rise and more of our winter rain falling in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation, however the broad trends are in line with projections from climate models.

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions means some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080's.

We have enough confidence in large scale climate models to say that we must plan for change. There is more uncertainty at a local scale but model results can still help us plan to adapt. For example we understand rain storms may become more intense even if we can't be sure about exactly where or when. By the 2080's, the latest UK climate projections (UKCP09) are that there could be around three as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance, or rarer) could increase by 40%.

#### Key Projections for Humber Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050's relative to the recent past are

- Winter precipitation increases of around 12% (very likely to be between 2 and 26%)
- Precipitation on the wettest day in winter up by around 12% (very likely to be more than 24%)
- Relative sea level at Grimsby very likely to be up between 10 and 41cm from 1990 levels (not including extra potential rises from polar ice sheet loss)
- Peak river flows in a typical catchment likely to increase between 8 and 14%

#### Implications for Flood Risk

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability.

Wetter winters and more of this rain falling in wet spells may increase river flooding. More intense rainfall causes more surface run-off, increasing flooding and erosion. In turn, this may increase **pressure on drains**,

sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected.

Drainage systems in the district have been modified to manage water levels and could help in adapting to some impacts of future climate on flooding, but may also need to be managed differently. Rising sea or river levels may also increase local flood risk inland or away from major rivers, because of interactions with drains, sewers and smaller watercourses. Even small rises in sea level could add to very high tides so as to affect places a long way inland.

Where appropriate, we need local studies to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help us adapt to climate change and manage the risk of damaging floods in future.

#### Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can prepare by understanding our current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is key to achieving long term sustainable benefits.

Although the broad climate change picture is clear, we have to make local decisions on uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

#### Long Term Developments

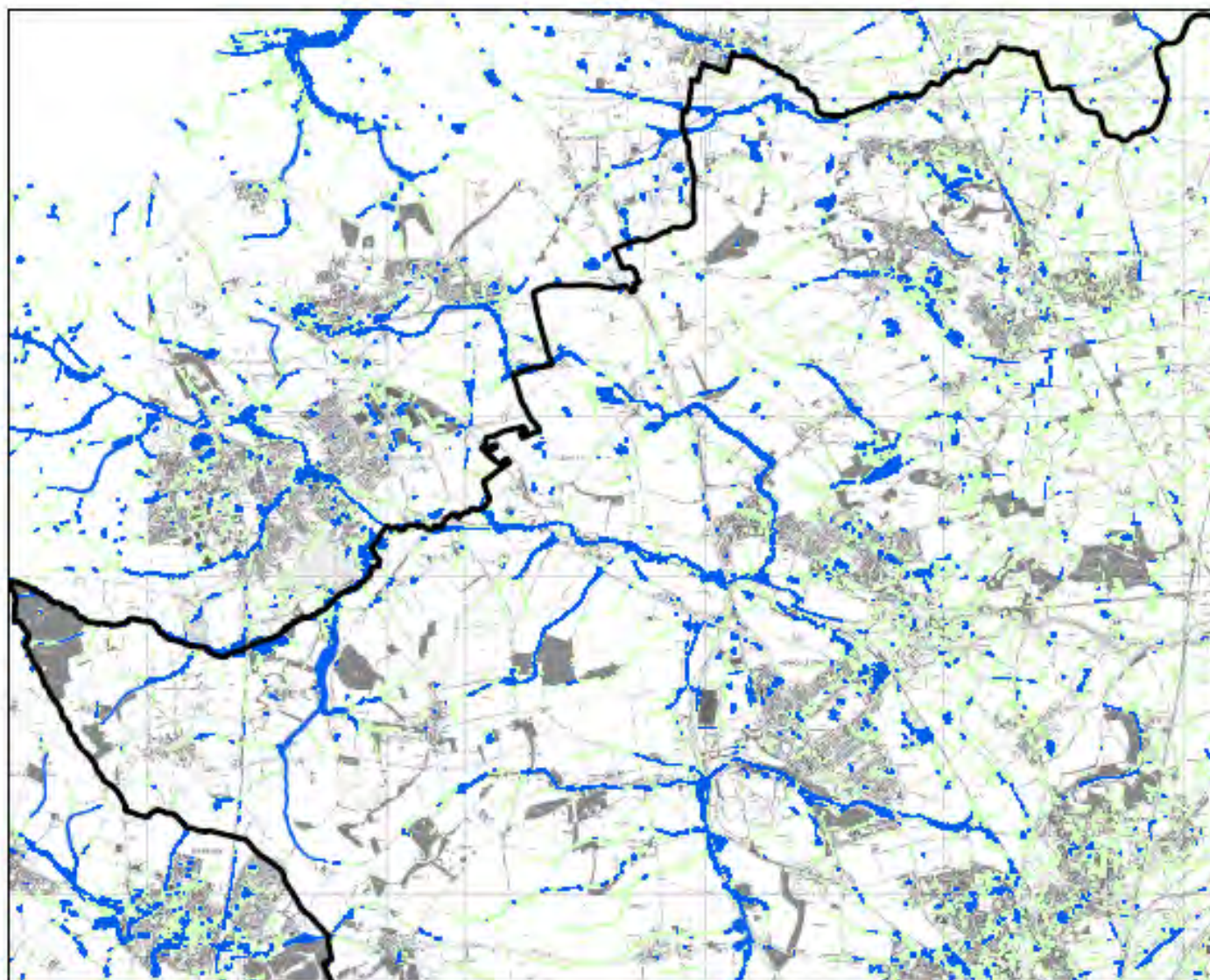
It is possible that long term developments might affect the occurrence and significance of flooding. However current planning policy aims to prevent new development from increasing flood risk.

In England, Planning Policy Statement (PPS25) on development and flood risk aims to “ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.”

Adherence to government policy ensures that new development does not increase local flood risk. However, in exceptional circumstances the Local Planning Authority may accept that flood risk can be increased contrary to Government Policy, usually because of the wider benefits of a new or proposed major development. Any exceptions would not be expected to increase risk to levels which are “significant” (in terms of the Government criteria).




Doncaster’s Local Development Framework (LDF) will inform decisions on planning applications and a range of implementation plans. The Core Strategy which is the first part of the LDF delivers the vision and aspirations in terms of development within the Borough.

The Core strategy is focussed on the six principal towns of Thorne, Mexbrough, Adwick/Woodlands, Armthorpe, Askern and Conisbrough, and also the 2 potential growth towns of Rossington and Stainforth/Hatfield. Potential large development’s and growth in these identified areas may increase local flood risk, and this risk would be taken into account in Doncaster’s Local Flood Risk Management Strategy.



Key :

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig. 5a - 1  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

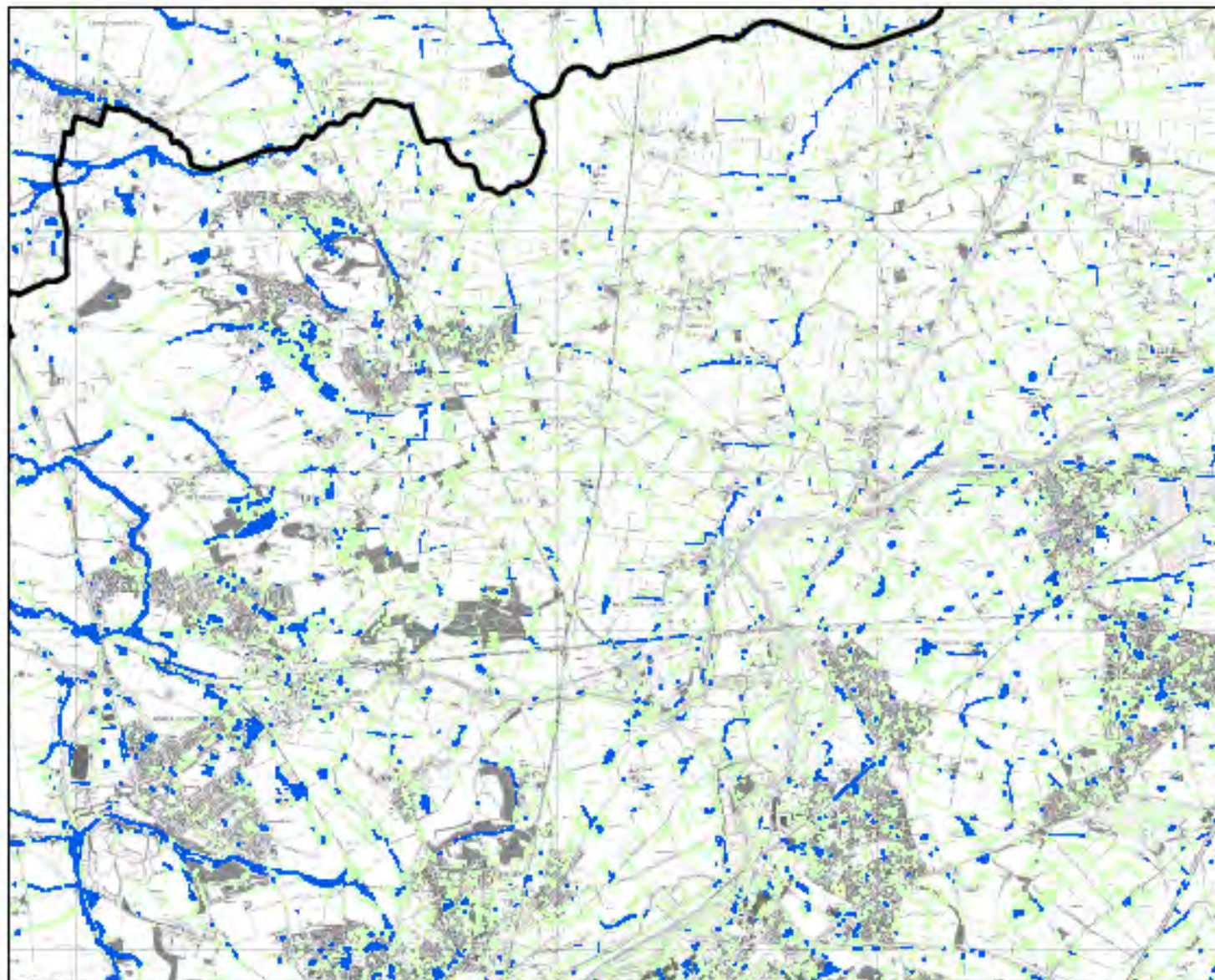
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Date :  
19 May 2011

Scale :  
1:50,000




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Key :

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig. 5a - 2  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

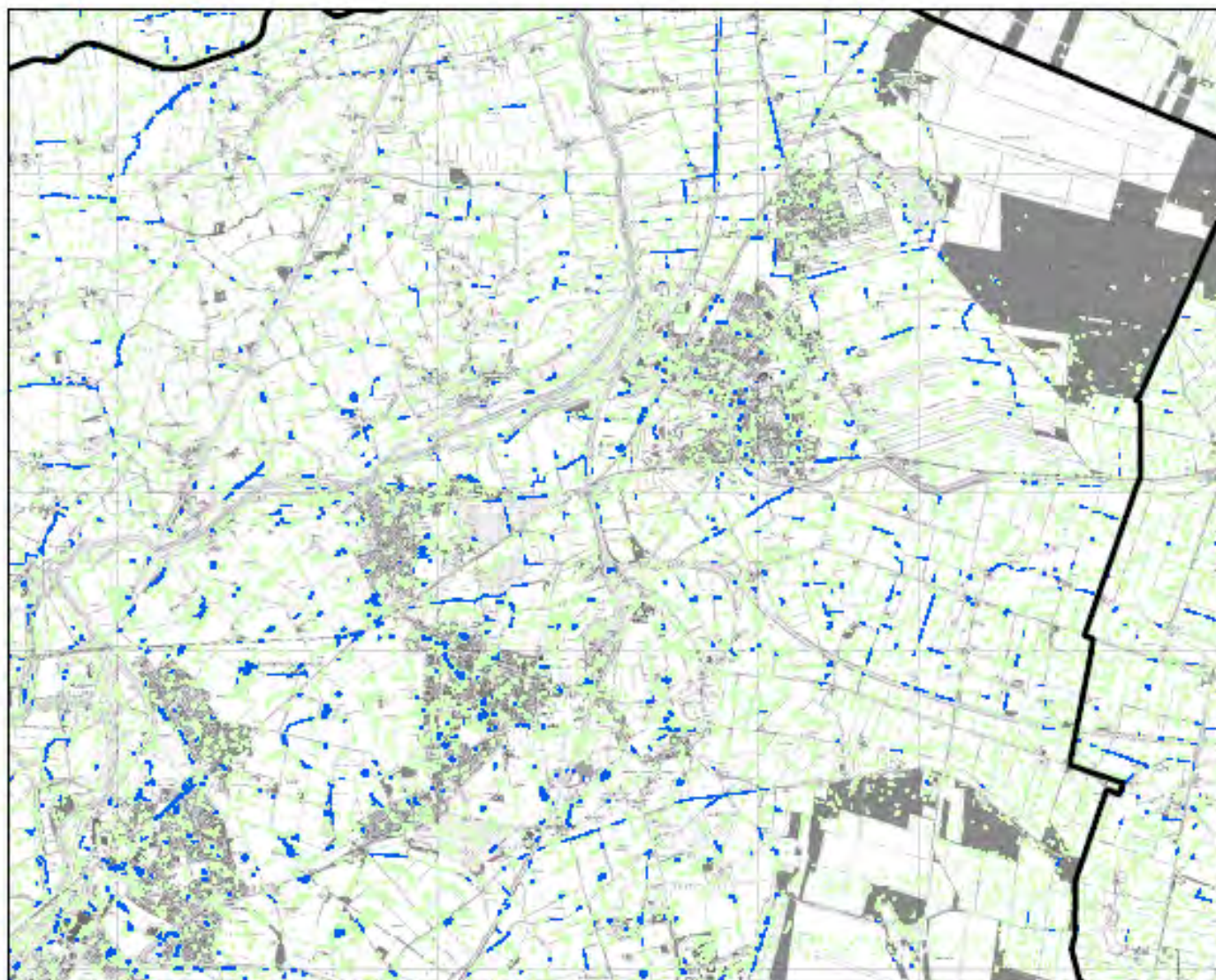
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Date :  
18 May 2011

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


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**Key :**

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

**Notes :**

Doncaster MBC  
Preliminary Flood  
Risk Assessment

**Title :** Fig. 5a - 3  
Flood Map for Surface  
Water 1/200 Year

**Completed By :**  
Robin Geldard

**Reference :**  
Figure 5b.mxd

**Date :**  
06 May 2011

**Scale :**  
1:50,000




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Key :

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig. 5a - 4  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

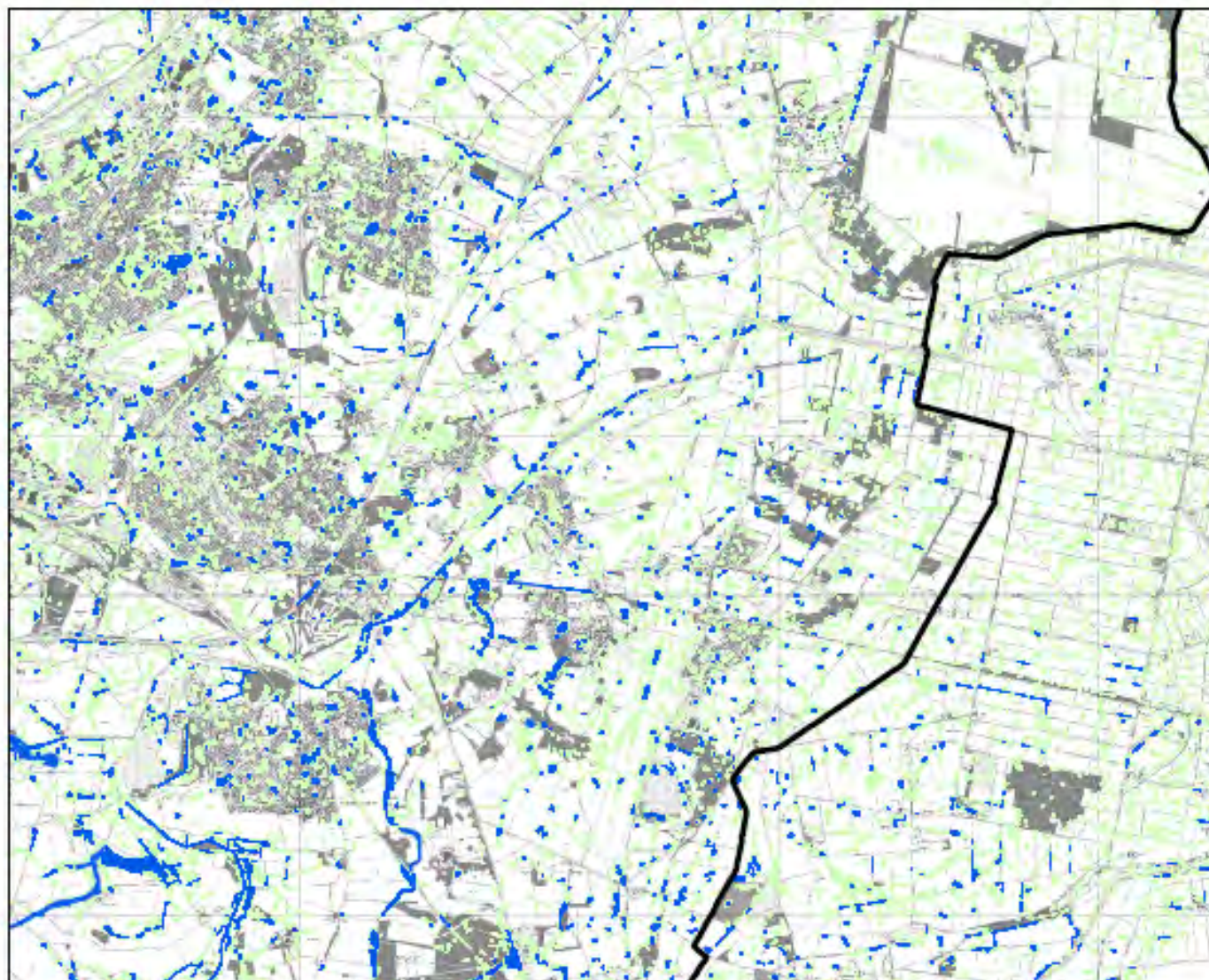
Reference :  
Figure 5a.mxd

Date :  
06 May 2011

Scale :  
1:50,000




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Key :

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig 5a - 5  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

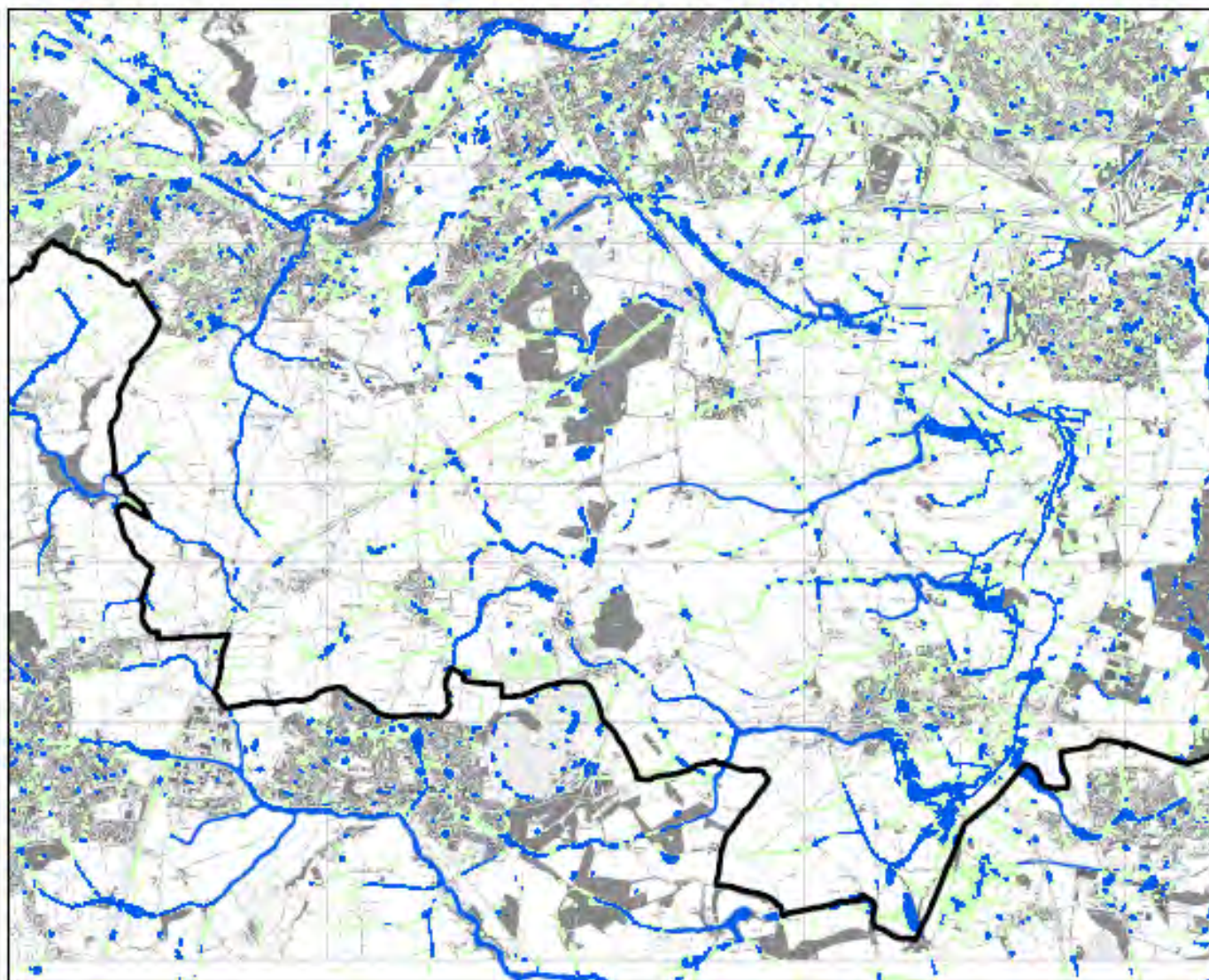
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Figure 5a.mxd

Date :  
06 May 2011

Scale :  
1:50,000




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Key :

### Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig. 5a - 6  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

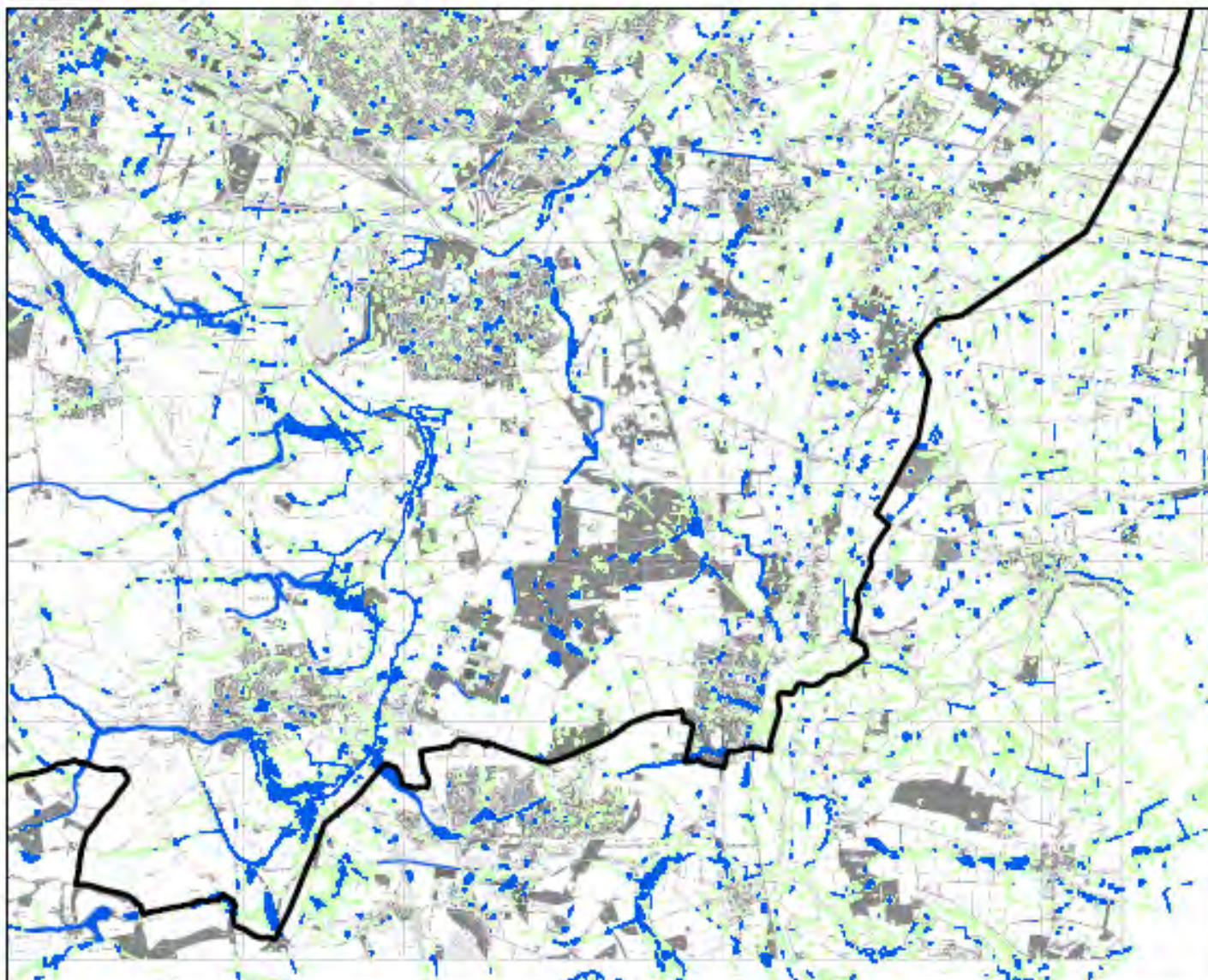
Reference :  
Figure 5a.mxd

Date :  
06 May 2011

Scale :  
1:50,000




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Key :

## Legend

-  Doncaster MBC Area
-  SV0000\_sw\_deep
-  SV0000\_sw\_shallow

Notes :

Doncaster MBC  
Preliminary Flood  
Risk Assessment

Title : Fig. 5a - 7  
Flood Map for Surface  
Water 1/200 Year

Completed By :  
Robin Geldard

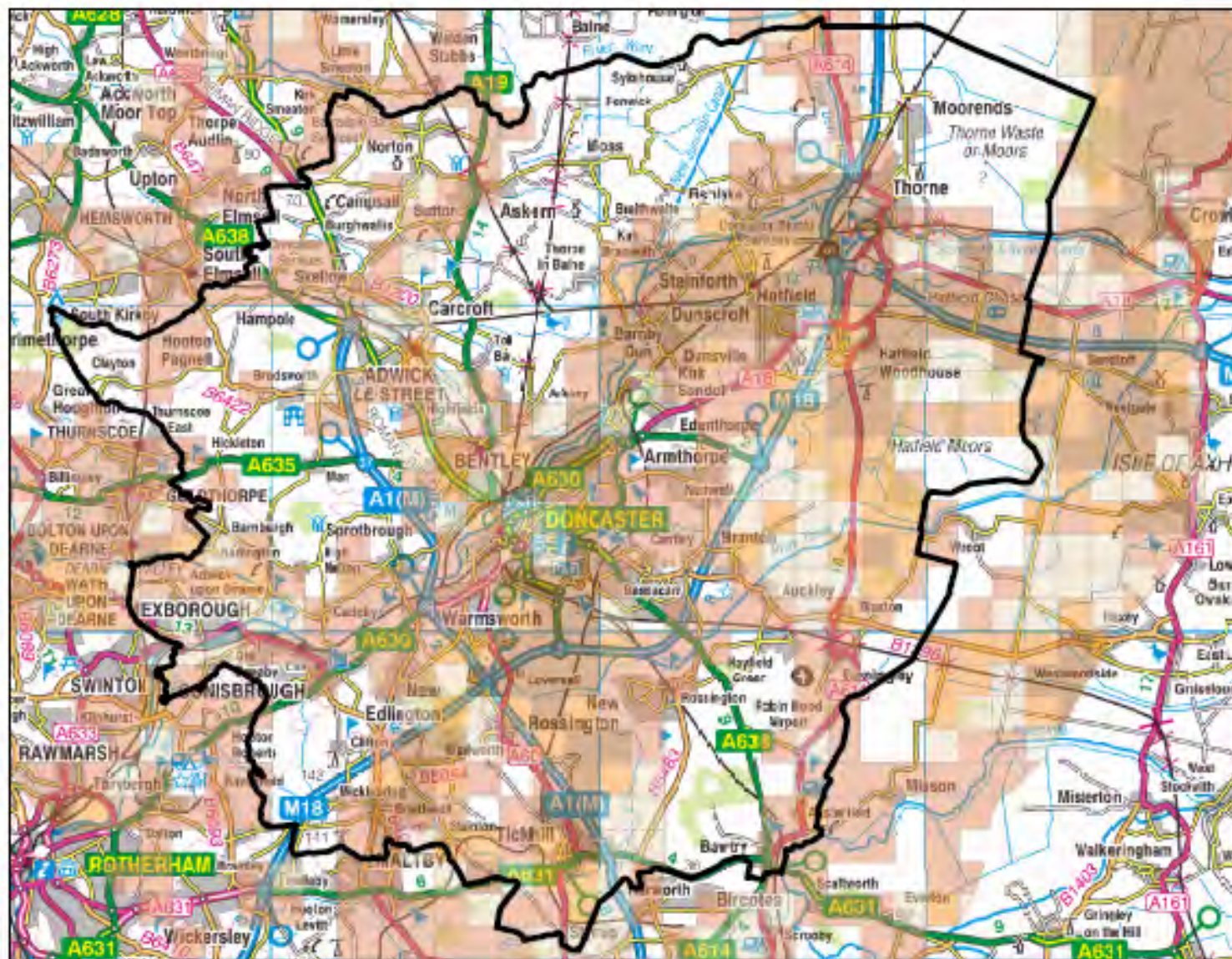
Reference :  
Figure 5a.mxd

Date :  
06 May 2011

Scale :  
1:50,000






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Key :

### Legend

	Doncaster Borough Boundary
<b>class</b>	
	< 25%
	>= 25% < 50%
	>= 50% < 75%
	>= 75%

Notes :

Doncaster MBC Preliminary  
Flood Risk Assessment

Title :

Areas Susceptible to  
Groundwater Flooding  
Fig 5b

Completed By :

Richard Ward

Reference :

PFRA.mxd

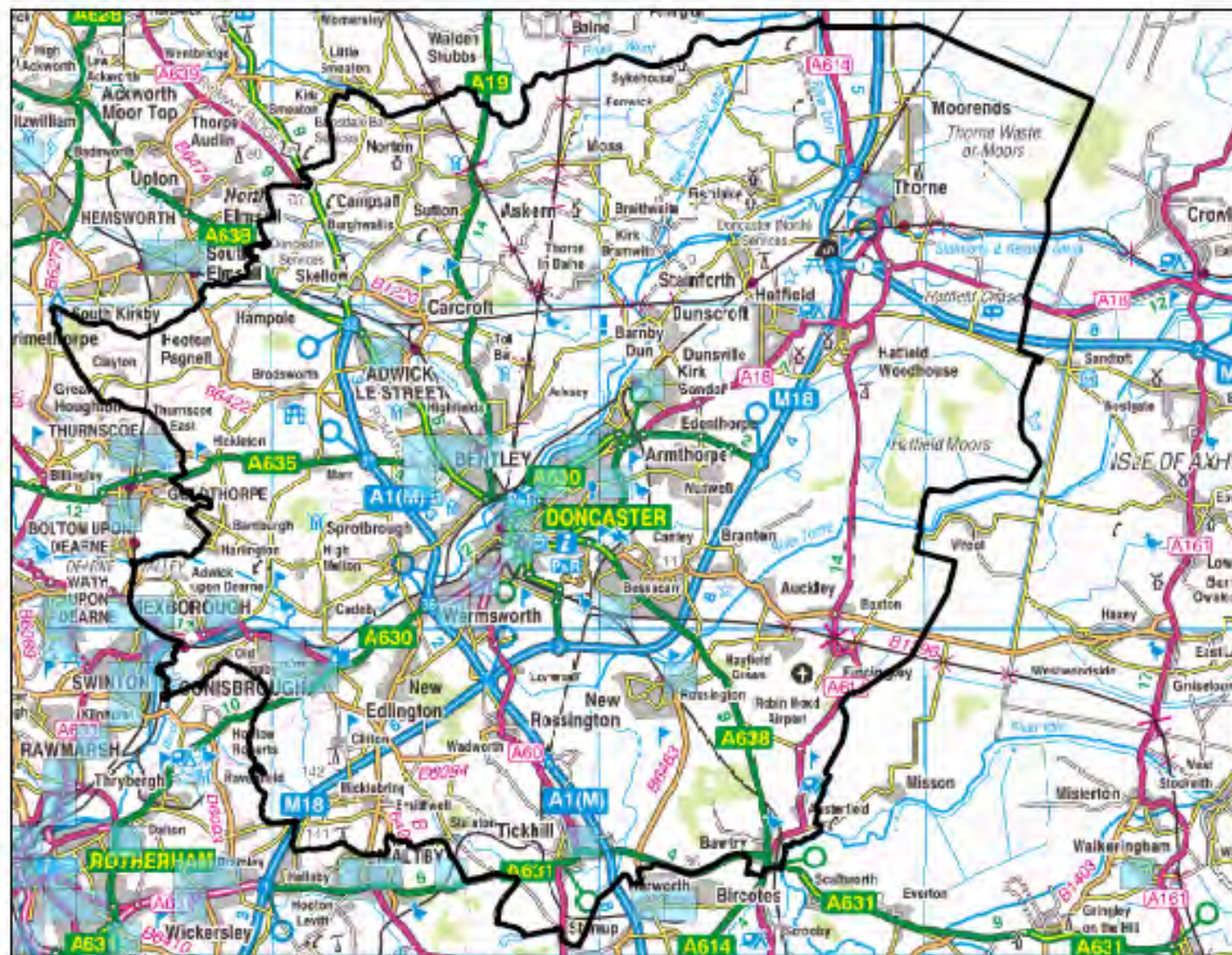
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18 May 2011

Scale :

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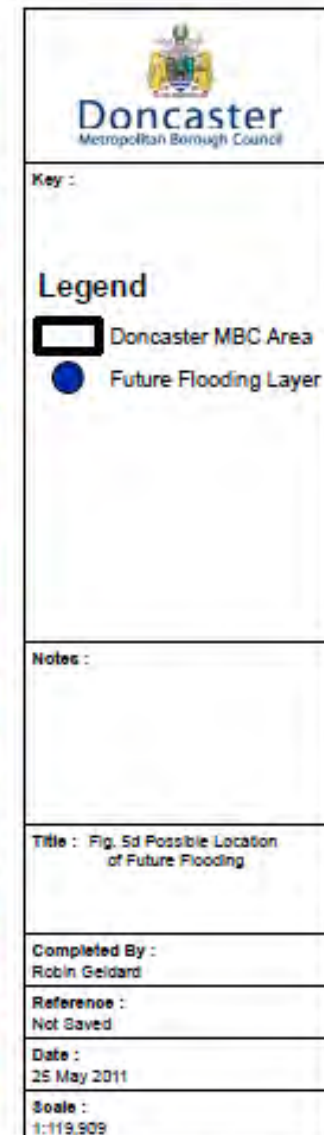




 <p><b>Doncaster</b> Metropolitan Borough Council</p>
<p><b>Key :</b></p> <p><b>Legend</b></p> <p> Doncaster Borough Boundary</p> <p> Places Above Flood Risk Threshold</p>
<p><b>Notes :</b></p> <p>Doncaster MBC Preliminary Flood Risk Assessment</p>
<p><b>Title :</b></p> <p>Places Above Flood Risk Threshold Fig 5c</p>
<p><b>Completed By :</b></p> <p>Richard Ward</p>
<p><b>Reference :</b></p> <p>PFRA.mxd</p>
<p><b>Date :</b></p> <p>18 May 2011</p>
<p><b>Scale :</b></p> <p>1:171,838</p>

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## **6 Review of Indicative Flood Risk Areas**

### **6.1 Overview**

There are no Indicative Flood Risk Areas within the study area, and therefore this particular section does not apply.

#### **Methodology for identifying Indicative Flood Risk Areas**

The Environment Agency has used the Flood Maps for Surface Water 1/200 year >0.3m depth and the National Receptors Database to identify a number of areas across the country that exceed a set threshold, as indicated below.

- > 200 people
- >20 businesses
- 1 critical service

This assessment was carried out based upon 1km<sup>2</sup> National grid squares (blue squares) which exceed the above criteria.

Where 5 or more “blue squares” are touching within a 3km by 3km square, these are identified and joined to create a cluster. Where a cluster identifies more than 30,000 people at risk of flooding, it has been designated as an Indicative Flood Risk Area.

## 7 Next Steps

### 7.1 Future Data Collection Arrangements

Under the new roles and responsibilities under the Floods and Water Management Act, Doncaster MBC is required to investigate future flood events. This will ensure accurate and detailed information is recorded on any future flood events, which will provide a long term evidence base, not only when the PFRA is reviewed in 6 years time, but also for other documents (local flood risk management strategy, SWMP's etc).

It is envisaged all flood event data will be recorded in a centralised database once it has been developed, but in the short term, all flood event data will be recorded in a simple spreadsheet as shown in Fig 7-1.

Fig 7-1

**Doncaster M.B.C. - Flood Event Data Recording System**

Records kept from - 01/04/2011  
Records kept to - 31/03/2012

Compulsory  
Preferred  
Optional

Flood Event (Outline Name)	Event Date	Street Name	District	Location (Post Code)	Section 19 (duy under the FWMA)	Grid Reference	Event Duration (hours)	Estimated Return Period of Event	Depth of Flooding (metres)	Extent of Flooding (Area m <sup>2</sup> )	Source of Flooding	Confidence in source of Flooding
April 2011, High Street, Bawtry	01/04/2011	High Street	Bawtry	DN5 0AA	Yes	125455,789001	1	1/50	0.1	50	Surface run-off	Medium

Residential Properties Flooded (Nr)	Commercial Properties Flooded	Critical Infrastructure at Risk	Damage Caused	Photos of Flood Event	Photo File Location	Risk Management Authorities Involved	Actions taken by Risk Management Authority	Additional Notes or Comments
5	0	0	Internal Flooding	Yes	S:\Highways\Land Drainage\FWMA\Section 19 Investigate Flooding\photos	DMBC	All highway gullies cleaned in this area	None

### 7.2 Scrutiny and Review Procedures

As recommended in the Environment Agency PFRA Final Guidance, Doncaster MBC will be carrying out their own internal review which includes consideration through Overview and Scrutiny Committee, to ensure Members are satisfied that the PFRA is fit for purpose and meets the requirements of the Flood Risk Regulations 2009.

Once the PFRA has been submitted to the Environment Agency, they will undertake their own internal review to ensure the PFRA meet the minimum standards as required by the European Commission. Once this review has taken place the Environment Agency will submit information on the PFRA to the European Commission at the level of river basin districts. Under the regulations the EA are responsible for publishing the PFRA reports, and it is intended for Doncaster MBC to make the report available on our website by 22<sup>nd</sup> December 2011.



## References

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S J Brown, M Beswick, E Buonomo, R Clark, D Fereday, D Hollis, R G Jones, E J Kennett, M Perry, J Prior and A A Scaife. Met Office Submission to the Pitt Review – Executive Summary, The extreme rainfall of summer 2007 and future extreme rainfall in a changing climate. 08/01/2008

The Flood Risk Regulations 2009

<http://www.legislation.gov.uk/uksi/2009/3042/contents/made>



## **Preliminary Assessment Report Spreadsheet v2**

### **Annex 1: Records of past floods and their significant consequences (Preliminary Assessment Report Spreadsheet)**

Please refer to Annex 1 of the Preliminary Assessment Spreadsheet which is attached with this report. This spreadsheet includes details of past flooding which has occurred within the study area which meets the 'significant' criteria (as explained earlier in the report)

### **Annex 2: Records of future floods and their significant consequences (Preliminary Assessment Report Spreadsheet)**

Please refer to Annex 2 of the Preliminary Assessment report Spreadsheet which is attached with this report. This spreadsheet includes a complete record of future flood risk within Doncaster, based upon the data provided.

### **Annex 3: Records of Flood Risk Areas and their rationale (Preliminary Assessment Report Spreadsheet)**

This section is not applicable, as the study area has no indicative flood risk areas.

### **Annex 4: Review Checklist**

Please refer to Annex 4, which is attached with this report, which contains the review checklist which is required for reviewing the PFRA by the Environment Agency.

#### **Table 4\_1 Significant Surface Water Flooding (June 2007) (for information only)**

This spreadsheet contains a list of each individual flooded area (surface water) during the June 2007 incident, which is classed as "Significant" (Refer to Section 4.2 for details)  
These individual flooded areas have been mapped (Refer to Fig 4b)

#### **Table 4\_2 Not Significant Surface Water Flooding (June 2007) (for information only)**

This spreadsheet contains a list of each individual flooded area (surface water) during the June 2007 incident, which is classed as "Not Significant"