

# PRELIMINARY FLOOD RISK ASSESSMENT

**North East Lincolnshire**

**(FLOOD RISK REGULATIONS 2009)**

**LLFA Preliminary Assessment Report**

## 1 Executive Summary

As a Lead Local Flood Authority (LLFA), the EC Floods Directive, through the Flood Risk Regulations (2009), requires North East Lincolnshire Council (NELC) to prepare a Preliminary Flood Risk Assessment (PFRA) by assessing the harmful consequences of past and potential future flooding, and to identify areas with significant flood risk.

The PFRA and spreadsheets have been prepared by NELC to meet the requirements of the PFRA under Flood Risk Regulations. The PFRA Final Guidance (December 2010) issued by the Environment Agency has been used to ensure these requirements are met. The main purpose of a PFRA is to assess past and future floods with significant harmful consequences, and to identify the areas of most significant flood risk across Europe.

The Environment Agency has responsibility for preparing the deliverables of the Flood Risk Regulations for flooding from Main Rivers and the Sea, whilst NELC (LLFA) has responsibility for flooding from surface runoff, ordinary watercourses and groundwater.

The first stage of the PFRA is to assess past floods which have had significant harmful consequences for human health, economic activity or the environment, or could have harmful consequences if they were to occur now. Following the 2007 summer flood events, records were collected by NELC on flood locations (internal and external) with information on sources and consequences. Data was also obtained following consultation with neighbouring local authorities, two Internal Drainage Boards, the Environment Agency, Network Rail, Anglian Water and Humberside Fire and Rescue. Consultation with the public provided further information. NELC collected, reviewed and mapped the data in order to complete the PFRA. Consideration has been given to the likelihood of future flooding within North East Lincolnshire using historical flood records, Environment Agency Surface Water maps, current and future developments, any proposed drainage works and local knowledge.

Finally, Places above the Flood Risk Thresholds (1km squares) have been identified by the Environment Agency. Additional to these have been identified by NELC using the data and maps provided by the Environment Agency along with the future flood risk locations also assessed by NELC.

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## 2 Introduction

### 2.1 Overview of the Flood Risk Regulations

In December 2009 the Flood Risk Regulations entered the statute book, transposing the EU Flood Directive into domestic law. As part of the Regulations and the Flood and Water Management Act, all Unitary Authorities are designated as the Lead Local Flood Authority (LLFA). The first requirement for the LLFA under the Regulations is the preparation of the Preliminary Flood Risk Assessment.

The report requires completion by 22 June 2011 in readiness for submission to the Environment Agency for approval. The assessment provides a high level summary of significant local sources of flood risk, based on available and readily derivable information, describing both the probability and harmful consequences of past and future flooding. The development of new information is not required, but new analysis of existing information may be needed.

Under the Regulations the Environment Agency have the responsibility to prepare a preliminary assessment report, flood risk maps and hazard maps and flood risk management plans for flood risk from the sea, main rivers and reservoirs. LLFA's have to do the same for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses.

The Environment Agency also has responsibility for collating and publishing the preliminary assessment reports, flood risk maps and hazard maps, and flood risk management plans.

The stages of the Flood Risk Regulations are illustrated in Section 8.3.

### 2.2 PFRA Aims and Objectives

The Preliminary Flood Risk Assessment involves an assessment of local flood risk, the preparation of a Preliminary Assessment Report and the identification of Places above the Flood Risk Threshold (where the risk of flooding is significant). The aim of the report is identify significant flood risk locations within North East Lincolnshire (both historic and future), review default flood risk areas (Environment Agency maps), propose strategy for management and maintenance of data and define communications with partners.

### 2.3 Study Area

North East Lincolnshire is a unitary authority in the Yorkshire and the Humber region of England, bordering the unitary authority of North Lincolnshire and the administrative county of Lincolnshire. These three administrative units make up the ceremonial county of Lincolnshire

North East Lincolnshire consists of the following towns and villages:

- Ashby cum Fenby, Aylesby
- Barnoldby le Beck, Beelsby, Bradley, Brigsley
- Cleethorpes
- East Ravendale
- Great Coates, Grimsby
- Habrough, Hatcliffe, Healing, Humberston
- Immingham, Irby upon Humber
- Laceby,
- New Waltham
- Stallingborough
- Waltham, Wold Newton

North East Lincolnshire has several potential sources of flooding. Several main rivers flow through the region and discharge to the River Humber which is tidal. Starting in the north of region (flowing between Immingham and Stallingborough) is Stallingborough North Beck which is an embanked upland river which receives pumped surface water run off from south, central and east Immingham as well as land drainage run off from West Lindsey. South of this river is Oldfleet Drain. Laceby Beck/River Freshney flows from upstream of Laceby through the northern part of Grimsby. The New Cut Drain flows through part of the same catchment providing a relief outfall for the Freshney in times of high flow. Buck Beck becomes main river at the A16 and flows north of New Waltham and Humberston and through south Cleethorpes. It receives surface water from Waltham, New Waltham, Humberston (partially pumped) and parts of south Cleethorpes (all pumped). In the south of the region Waithe Beck is the only main river without a tidal outfall within North East Lincolnshire; this outfalls into the Louth navigational canal at Tetney Lock. The source of Waithe Beck is the chalk streams of the Lincolnshire Wolds.

Additional to the main rivers, there are other significant watercourses where a threat of flooding exists within their catchment. Among these are; Habrough Marsh in the north of the catchment which receives gravity flow from west and north Immingham as well as some surface water run off from North Lincolnshire; Middle Drain which receives surface water from Stallingborough; smaller

watercourses within the Buck Beck catchment and Townscroft Drain which serves south Healing and Great Coates.

Because of the low lying nature of the coastal flood plain North East Lincolnshire is served by two Internal Drainage Boards who provide drainage and water level management within their district. Approximately 25% of the Borough is served by the IDB's. The unitary local authority is a drainage body using the permissive powers of the Land Drainage Act 1991 whenever necessary in the other part of the borough. Since the floods of 2007 both IDB's have been members of the Council's Drainage Infrastructure Group working collaboratively with the Council when necessary.

There is also the threat of surface water flooding resulting from the lack of capacity or surcharging of the drains or public sewers at the locations identified in the section dealing with Past Flood Risk.

The Humber Estuary is where the River Humber meets the North Sea. This is a tidal estuary with a range of up to 7.0 metres along the North East Lincolnshire frontage. A North Sea tidal surge in 1953 combined with an unusually high tide resulted in flooding which killed more than 300 people along the east coast of England and forced the evacuation of 30,000 more, with 24,000 homes destroyed or damaged. Although Cleethorpes suffered extensive damage with seafront businesses destroyed and 800 houses flooded, the really catastrophic flooding and loss of life occurred further south from Mablethorpe down to Canvey Island. According to meteorologists, the chances of a similar combination occurring again continue to increase, a likelihood which is being made worse by rising sea levels and increased storminess.

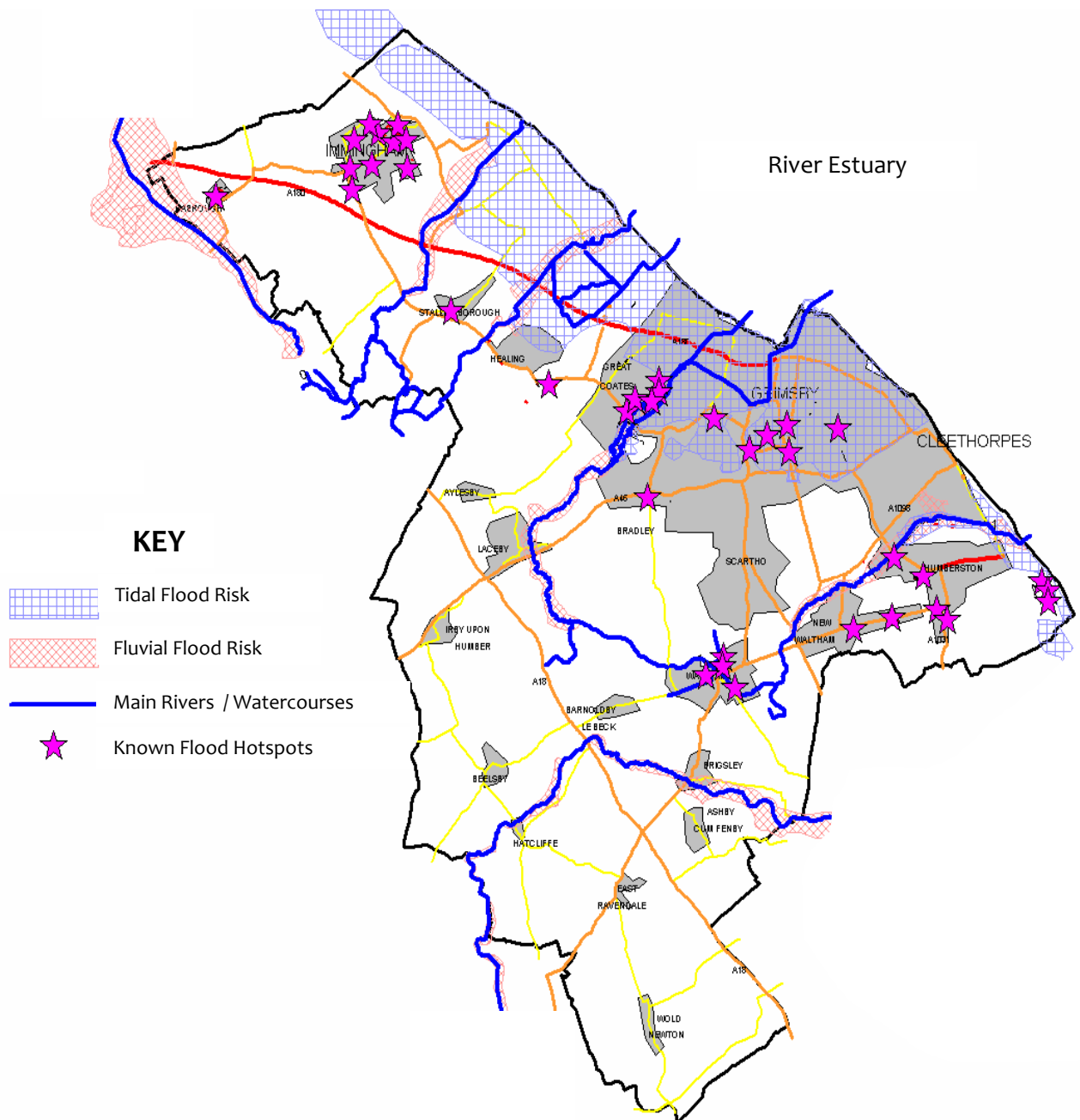
The coastline of North East Lincolnshire is split into four regions, with responsibility split between three organisations. Protection from the sea along the northern length (Immingham to Grimsby) is by way of a concrete sea wall, maintained by the Environment Agency. Associated British Ports are responsible for the sea walls around their land at Immingham and Grimsby Docks. Protection at the docks is offered by concrete sheet piled walls, concrete revetment walls and lock gates to control levels within the docks. There is concern at the standard of these defences with a Defra funded scheme planned for the near future. The length from Grimsby Dock to Cleethorpes promenade is a concrete sea wall also maintained by the Environment Agency. This wall was built in the late 1970's to replace the sea wall destroyed by the tidal surges of 1976.

The North and Central Promenades of Cleethorpes are maintained by North East Lincolnshire Council by way of a concrete sea wall, with timber groynes controlling the sand levels of the amenity beaches. To the south of Cleethorpes, Humberston Fitties is protected by a coastal embankment supported by a rock filled gabion toe. This embankment is the responsibility of North East Lincolnshire Council and lies in front of the secondary Environment Agency flood defence embankment. The majority of the Fitties' chalets lie between the two embankments. The section between the Humberston Fitties and the Cleethorpes Leisure Centre is protected by a sea defence embankment which is the responsibility of the Environment Agency.

North East Lincolnshire has several small villages with rural areas in between. The majority of the soil is clay which provides poor natural drainage. There are some small areas of glacio-fluvial sand and gravels which do provide some permeability. By the same token these areas of the substrata can allow groundwater to get to the surface from the pressurised chalk aquifers below. In the Wold area the chalk can be a lot nearer the surface and provide permeability suitable for surface water disposal. Drainage of the area is achieved by a complex network of land drains, riparian ditches and highway drains. The management, maintenance and control of these watercourses is hindered as developments take place and the villages increase in size.



## 2.4 River and Tidal Flood Risk Map



Flood Risk in North East Lincolnshire

### 3 Lead Local Flood Authority Responsibilities

The EU Floods Directive required that a Preliminary Flood Risk Assessment (PFRA) be undertaken by December 2011 to provide an assessment of the potential flood risks. This had implications for the Environment Agency (EA) and Lead Local Flood Authorities (LLFA).

The PFRA is an initial screening exercise to review historical and potential future flood risks and determine Flood Risk Areas. According to the Flood Risk Regulations, the PFRA is delivered in three phases.

1. Preliminary Assessment Maps  
*(produced by the Environment Agency)*
2. Preliminary Assessment Reports  
*(produced by LLFAs)*
3. Identification of Flood Risk Areas  
*(proposed by the Environment Agency, finalised by LLFAs)*

#### 3.1 Public Consultation

North East Lincolnshire Council, created an interactive online public survey with a link on the council's webpage to gather information relating to historic flooding. A similar form was also included in an edition of 'Linc-Up' the council's own community news and information supplement which is delivered to households throughout North East Lincolnshire.

In the aftermath of the 2007 floods the Council formed a Select Committee to carry out an investigation into the flooding. The Committee comprised 10 full council members and a representative from the Town and Parish Councils Liaison Committee. The Committee spent 5 days interviewing Council officers, representatives from other organisations including all those with responsibility for different aspects of drainage within the Borough and many members of the public who had been affected by the flooding. A large amount of written evidence was also submitted to the Committee. All this verbal and written evidence was made available to the Council's Drainage team for investigating the cause of flooding at different locations.

One recommendation from the Committee was the recruitment of additional Drainage team staff.

#### 3.2 Working in Partnership

North East Lincolnshire Council, is the LLFA for North East Lincolnshire (NEL) and undertook the PFRA Report for NEL. This considered historical and potential flooding from various sources; i.e.

ordinary watercourses, fluvial surface water, groundwater and the combined sewerage system when rainfall was a factor.

The impact of flooding from main rivers (which are the responsibility of the Environment Agency) and the sea are only considered where it impacts on local flood risk sources.

North East Lincolnshire Council is a member of the Yorkshire and Humber Local Action Alliance, a group of drainage and flood defence engineers established in the wake of the 2007 floods to share knowledge and information and assist each other with complying with requirements from new legislation such as the PFRA. North East Lincolnshire Council also meet regularly with the Environment Agency, Internal Drainage Boards and Anglian Water to discuss drainage and flooding matters, new legislation requirements and drainage maintenance or improvement works.

### 3.3 Flood Risk Management and Governance

North East Lincolnshire Council operate a unique partnership arrangement with Balfour Beatty Workplace (BBW). This means that the majority of operational and technical work is carried out by experts within BBW, under the strategic supervision and direction of NELC elected members and officers.

Flood Risk Management is one of the key areas of focus for the Planning, Transportation and Housing Team. To reflect this, a new management group will be established to set the strategic direction for the technical and operational work undertaken by BBW. This group will be chaired by NELC, but external stakeholders will be encouraged to attend. In particular, representatives from our neighbour LLFA's, the Environment Agency, the Internal Drainage Boards and Anglian Water Ltd will be asked to attend.

This group will be able to make decisions regarding routine matters and help ensure that the work we undertake supports and is supported by our key delivery partners. A further level of officer scrutiny will be provided through the creation of a Strategic Infrastructure Group, which will be chaired by the Assistant Executive Director for Planning, Transportation and Housing. This will set clear strategic goals and ensure that work is being effectively co-ordinate across a range of services. External partners will again be encouraged to attend these meetings, particularly when issues relevant to them are being considered.

Any matters which require elected member approval will be referred to the appropriate meeting for consideration, in accordance with the Council's constitution.

### Membership

Chair:	Head of Strategic Planning and Transportation (NELC)
Core Attendees:	Lead Officer for Highways and Transportation (NELC) / Lead Officer for Planning (NELC) Divisional Manager Highways Maintenance (BBW) Senior Drainage Engineer (BBW)
As required:	Flood and Drainage Officers (BBW) Spatial Futures Team Leader (BBW)
By invitation:	Environment Agency Humber Emergency Planning Service Internal Drainage Boards (IDBs) Anglian Water ABP Highways Authority Humber Local Resilience Forum

### Frequency of meeting

Initially the Flood Risk MG will need to meet every one to two months to establish working arrangements. The expectation is that it will eventually meet every quarter, with dates agreed 3 months in advance. No meeting will exceed three hours in length.

### Minutes and Agendas

BBW will be responsible for the keeping and distribution of minutes and agendas for this meeting.

### Attendance

The Chair and Core Attendees should attend all meetings or send a suitable deputy in their place. There should, as a minimum, always be at least one NELC officer and one BBW officer at each meeting.

Other officers from BBW and NELC may be required to attend at the discretion of the Chair. Officers who are not required to attend, but would like to, may do so at the discretion of the Chair.

There is an expectation that representatives from the Environment Agency, the IDBs and Anglian Water will attend every meeting.

Other departments of the council and some organisations will be given an open invitation to attend as and when they wish to do so. Specific organisations will be notified when matters which might affect them are placed on the agenda. So if, for example, a matter relating to emergency planning is brought to the MG, the Humber Emergency Planning Service would be specifically invited to attend.

Organisations and individuals which do not have an open invitation will be allowed to attend at the discretion of the Chair.

### Purpose and Scope

The purpose of the Flood Risk MG is to implement the roles and responsibilities of the lead local flood authority. It will supervise the production of the local flood and coastal flood risk strategy, and co-ordinate delivery by partner organisations.

The group's principal output will be the establishment of a single integrated strategy for local flood risk management. This will be achieved through a work programme implementing key strategies and plans and determined by the group.

As well as ensuring that borough wide strategic resources are in place, such as the flood risk asset register and shared information systems, the group will work to resolve specific issues as they arise. This will include addressing uncertainties over individual partners' flood risk and drainage management roles and responsibilities, strategic issues in respect of a particular development, or local issues as and when referred by a local delivery group.

Specifically, the Flood Risk MG will oversee the following work and areas of responsibility:

- Mapping partners' resources and responsibilities, currently and under proposed legislation against anticipated future requirements and local needs;
- To establish an on-going register of all strategies and plans on flood risk held within the borough. This would enable developers and other parties undertaking work that could affect flood risk to access comprehensive information on relevant strategies and plans, as well as technical work carried out and planned within the borough;
- Ensuring development of the flood risk management asset register;
- Developing and implementing local flood risk management strategies and plans, and ensuring appropriate monitoring and reporting arrangements;
- Focusing delivery functions and funding on surface water, groundwater and ordinary watercourses;

- Overseeing the delivery of partners' flood risk management work and funding;
- Commissioning and co-ordinating development of Surface Water Management Plans;
- Supporting the implementation of action plans for SMPs, CFMPs, Coastal Study options, relevant elements of the Sustainable Community Strategy, Local Area Agreement, etc.
- Ensuring effective liaison with established groups such as the North East Coastal Group with the aim of influencing the strategic management of the risk from sea flooding and coastal erosion;
- Prioritising available funding and resource for partnership initiatives and co-ordinate bids for additional funding, supporting the Lead Local Flood Authority to deploy resources where needed;
- Ensure data sharing and communications mechanisms meet the needs of partner organisations and local communities
- Provide a focal point for liaison with the delivery arms of all relevant partner organisations within North East Lincolnshire, including the Council and its service delivery partner (particularly highways, planning and building control services), Environment Agency, Internal Drainage Boards, water and sewerage companies, developers, statutory undertakers, emergency services, riparian landowners and developers, in order to facilitate enhanced joint working between partners;
- Provide reports to the Environment Portfolio Holder and SIG for approval to Cabinet and Full Committee;
- managing requests for information for scrutiny and other purposes;
- Liaise with the Regional Flood and Coastal Committee on the production of local strategies;
- Ensure that elected Members are fully briefed on all aspects of flood, coastal and drainage risk management affecting North East Lincolnshire;
- Resolve problems referred by groups such as the Drainage Infrastructure Group;
- Ensure Sustainable Drainage Systems are being promoted;
- Support the Humber Local Resilience Forum, ensuring lessons learned from emergency incidents inform approach to long-term flood and drainage management, particularly with regard to resilience and planning;
- Co-ordinate and support development of commissioning arrangements that may be established between partners;
- Provide an arbitration role on responsibility for assets and for roles and responsibilities arising from new arrangements; and
- Exchange and develop local policy ideas with other groups.

It should be noted that not all decisions on these issues can be made by the Flood Risk MG without referral to the SIG. The vast majority of work falling under the Council's responsibility will be undertaken by BBW and reported back to this group for approval or support.

Standing Agenda Items will be developed through discussion at the initial meetings.

Additional agenda items should always be accompanied by a one or two page written report that sets out:

1. a summary of the issue and why it has been brought to the MG;
2. the options for dealing with the issue; and
3. a recommendation for action.

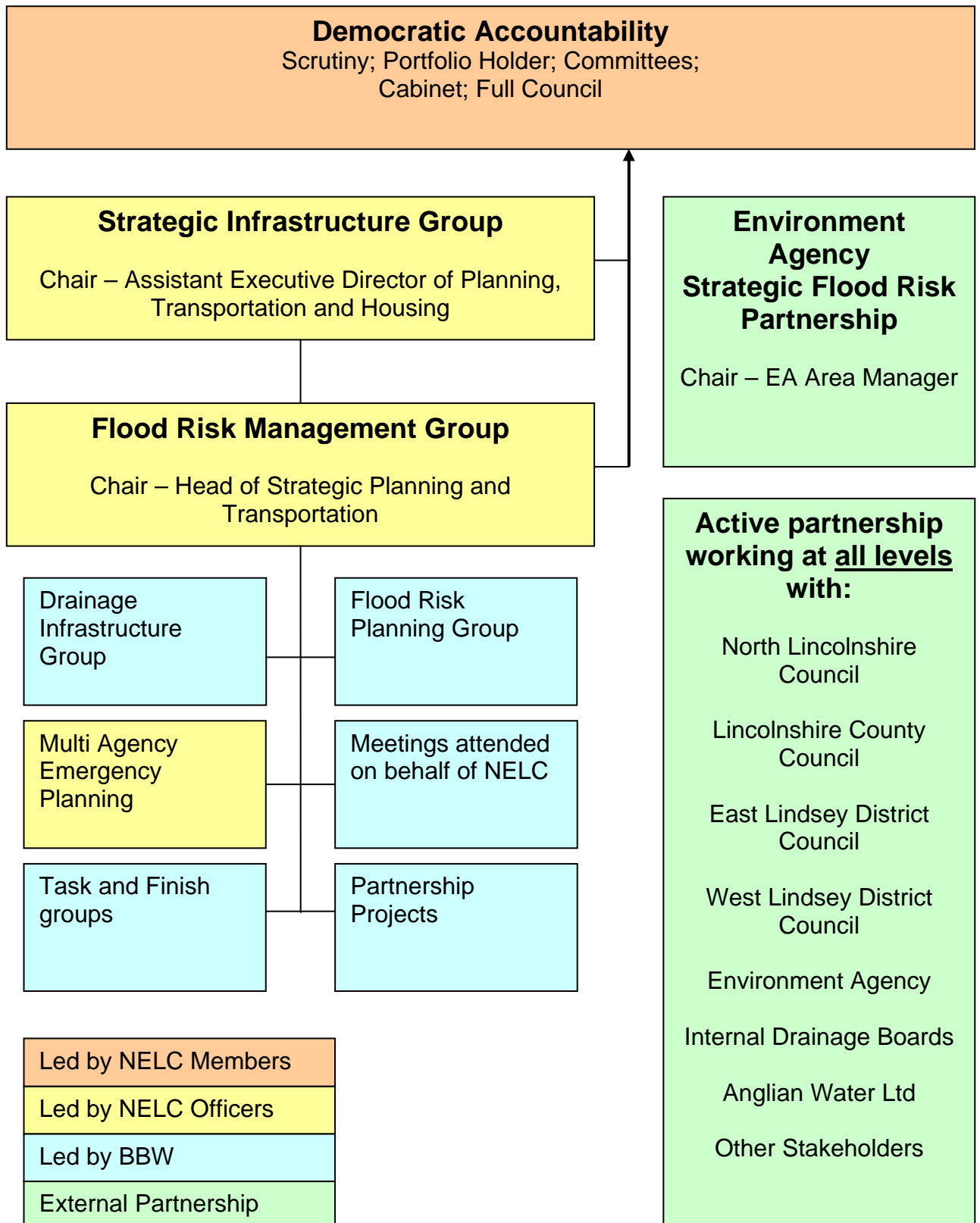
If a matter will need to be referred to elected members, an appropriate report should also be submitted to the MG for approval.

### Decisions

All decisions must be approved by the Chair or their appointed representative. Essentially, anything within the delegated powers of the Head of Strategic Planning and Transportation can be agreed at this meeting, other than those issues which have to be referred to the SIG.

The Flood Risk MG is to enable NELC to discharge its responsibilities as Lead Local Flood Authority. The decisions of this group are likely to also include ones affecting other organisations. The MG will have no power to force its decisions on its partners. It is therefore important that decisions are agreed by all the relevant stakeholders.

### 3.4 Governance Flowchart





## 4 Methodology and Data Review

It is a requirement that the PFRA includes an assessment of past floods which had significant harmful consequences for human health, economic activity or the environment (cultural heritage) or which would have harmful consequences if they were to occur again. The PFRA can ignore floods that are not likely to occur now (e.g. because flood risk management work have been completed).

### 4.1 Main Sources of Information

- Environment Agency Flood Risk Maps.
- Environment Agency Areas Susceptible to Surface Water Flooding
- Environment Agency Flood Map for Surface Water
- Historical flooding reports
- Local knowledge
- Improvement schemes and maintenance
- Anglian Water
- Internal Drainage Boards
- Network Rail
- Humberside Fire Service
- North East Lincolnshire Strategic Flood Risk Assessment (May 2010)
- Grimsby and Ancholme Catchment Flood Management Plan

### 4.2 Data Storage

By September 2007 the Council had arranged for the first meeting of the Drainage Infrastructure Group for North East Lincolnshire. At this meeting it was agreed that North East Lincolnshire Council would collate all the available drainage asset information from the flood risk management authorities at the meeting. The mapping system used is MapInfo and all the different agencies supplied the necessary data showing their different assets.

### 4.3 Past Flood Data

#### 4.3.1 Local Flood Risk Maps

Following the summer 2007 floods and using the data collected, maps were produced using AutoCAD to show the locations of individual properties that suffered internal and external flooding. The maps have since been converted into MapInfo and developed to include vulnerable and critical

infrastructure (schools, sheltered housing, medical centres emergency services, depots and public buildings etc). The surface water flood risk maps produced by the Environment Agency have been added along with the public sewer network and other drainage assets (road gullies, grilles and screens, flood plains etc).

#### 4.4 Future Flood Data

The PFRA also includes an assessment of the possible consequences of future floods. This section of the report describes the information available to assess the possible consequences of future floods:

##### 4.4.1 National Flood Risk Maps

At the national scale the Environment Agency has produced two national surface water flood maps:

- Environment Agency ‘Areas Susceptible to Surface Water Flooding’ national map (AStSWF) – this map, which covers England and Wales, was released in June 2009 to provide a general indication of areas which are more likely to suffer from surface water flooding. No allowance was made for any drainage systems which may be serving the area in question and;
- Environment Agency ‘Flood Map for Surface Water’ national map (FMfSW) – this map, which covers England and Wales, was released in November 2010 and provides a revised approach to mapping surface water flooding including accounting for the presence of drainage systems. The drainage systems were modelled providing a run off rate of 12mm per hour.

##### 4.4.2 Grimsby and Ancholme Catchment Flood Management Plan

The Catchment Flood Management Plan (CFMP) provides details on predicted future flooding in the catchment. The data within this Plan has been used in the assessment of future flood risk.

#### 4.5 Sharing and Storage of Flood Data

Historical and future flood data is displayed graphically in Mapinfo. Extracts of the maps and flood data tables are included in the appendices of this report. This report will be made available to the general public via a link on website for North East Lincolnshire Council ([www.nelincs.gov.uk](http://www.nelincs.gov.uk))

#### 4.6 Quality Assurance and Scrutiny

This report and the associated mapping have been produced by the drainage engineers that dealt with the flooding of 2007 and have since undertaken investigations and drainage infrastructure improvement works. This team of engineers have over 20 years of experience and knowledge dealing with the drainage systems of North East Lincolnshire.

The report has been reviewed and improved and finally scrutinised by an officer of NELC.

## 5 Past Flood Risk

This section lists known flooding incidents in reverse chronological order which had significant consequences for; human health, economic activity or the environment.

### 5.1 2007 Flooding Incidents

**15 June 2007** and the **25 June 2007** severe flooding occurred in North East Lincolnshire. During these events more than 630 properties reported internal flooding and a further 270 were recorded as being at risk from internal flooding. The combined sewer system also flooded, meaning properties were contaminated, causing a health risk to the public. The highway network was also severely disrupted, although major infrastructure damage was avoided.

#### Immingham

As with a lot of North East Lincolnshire, Immingham is a low lying area with the majority of the catchment pumped. All the town is drained into the surrounding land drainage systems most of which are pumped into the high level North Beck main river. The system serving the areas north and west of Immingham discharges into the Habrough Marsh Drain which has a gravity outfall into the Estuary. During periods of high tide, relief can be given to this Drain by opening the “Habrough Slide” which allows flow to enter the pumped catchment.

In 2007 a 10 day period of heavy rainfall led to the catchment becoming fully saturated prior to the extreme rainfall event of 25<sup>th</sup> June 2007. The land drainage systems were overwhelmed; there was tidal locking each side of high tide and all surface water outfalls in Immingham became submerged with surface water systems surcharging.

In excess of 270 properties internally flooded in Immingham. These were mainly concentrated in two areas; firstly, the north of Immingham including Woodlands Avenue, Copse Close, Ashtree Close and Oaklands Road. Apart from the above fairly generic description of the flooding causes, the main cause here was the lack of maintenance of the land drainage systems to the north and north east of the affected properties.

The other main problem spot was Manby Road and Pelham Road. The surface water public sewer serving both locations was found to have a blocked outfall. Therefore there was very little capacity to deal with the on-going rainfall and the water running south down Manby Road from the surcharged land drainage system to the north. This same land drainage system caused extensive flooding to the Manby Road industrial estates.

### Humberston

There were three main areas affected; Humberston Avenue with 9 properties internally flooded in 2 locations, the Coniston Crescent area with more than 40 properties internally flooded and Lonsdale Close with 6 properties internally flooded.

The main flooding event in Humberston Avenue was caused by a large area of land draining to a significantly undersized surface water public sewer draining under the Avenue. This problem has since been rectified as explained in section 6.

The two other areas of flooding were due to the overwhelming of surface water drainage systems. At Coniston Crescent flooding of the roads from the surface water drains was gradually worsening when overland run off from the land drainage system to the rear of the properties greatly exacerbated the problem. At Lonsdale Close problems throughout the length of the outfall meant the flood waters built up far quicker than they could drain away.

Significant maintenance requirements were identified at both locations but doubts about the infrastructure capacity remains. Further investigation and hydraulic analysis will be carried out at both locations in due course.

The other area of Humberston affected was the Humberston Fitties chalet park, a holiday home park open from March 1<sup>st</sup> to December 31<sup>st</sup>. The flooding here came from the site's land drainage systems which outfall to the Louth Navigational Canal. This is a gravity outfall from a very flat catchment to a tidally affected main river meaning tide locking increases flood risk.

Waltham

The flood risk for Waltham is mainly attributable to Buck Beck. Through the village this is a significant ordinary watercourse, part of which is culverted and it also passes between properties, meaning that access for maintenance is very difficult. There is an undersized section in the piped length as well as problems with steps in the invert. The reasons for this are unclear due to the piping work all having been complete prior to 1988 (no files or drawings have been located in archives). The Beck becomes the responsibility of the North East Lindsey Drainage Board just before it leaves Waltham and then becomes a main river at the A16. Lidar survey data for the area shows that an area around Mount Pleasant is particularly low lying and this was the location of severe flooding in June 2007. At this same location Buck Beck merges with a second open watercourse which is fed from a series of ditches and land drains.

The second watercourse comes from the east running down the side of Barnoldby Road prior to turning north into Mount Pleasant. Some of the Barnoldby Road properties flooded due to the overwhelming of the land drainage system.

Properties internally flooded included 14no. around Mount Pleasant, 10no. in Barnoldby Road, 3 no. in Archer Road and 4 no. in Cheesemans Close.

Willows Estate, Grimsby

The start of the flooding on the Estate was caused by the surcharging of the Estate's combined public sewer system. The surcharging of the system meant that there was no capacity available for the exceptionally heavy rainfall on June 25<sup>th</sup>. Flooding of the highway in Grasby Crescent and Anderby Drive was the first stage of the flooding. The Willows Estate sits alongside the River Freshney flood plain. As the rainfall continued falling on a saturated catchment, water from the River Freshney began to fill the flood plain via the spillway. The flood plain was unable to cope with the volume of water coming over the spillway as the outfall into the New Cut Drain did not provide the necessary relief. The inundation of the Estate by river water from the flood plain then added to the flooding caused by the surcharging of the Estates combined public sewer system. The surcharging and flooding already present meant the incoming river flood water resulted in 186 properties being internally flooded.

Bradley Road, Grimsby

Seven properties were flooded in Bradley Road due to surface water run off from adjacent agricultural land. There was also external flooding around properties in Bradley village again caused by run off from agricultural land.

Habrough

The flooding which occurred in West End Road, Habrough was found to be caused by an undersized surface water drain. This 150mm diameter drain serves both the highway and properties in West End Road and was overwhelmed by the rainfall event of 25<sup>th</sup> June 2007 causing the internal flooding of properties in West End Road and the south end of Chapel Lane. The surface water drain passes under the railway line and discharges to a ditch on the opposite side, to the south of the village.

There was also significant surface water flooding at the north east end of the village internally flooding properties in Chapel lane, Cravens lane and Kesteven Court. The flooding here was exacerbated by lack of maintenance of the surface water drains whose design standards were already greatly exceeded.

Ashby cum Fenby

Adjacent to Waithe Beck there were properties that internally flooded. The source of the flooding was the Beck which is main river exacerbated by surface water run off across the land to the west. Properties to the north of the Beck are in Brigsley (the Beck is the boundary between the two villages) and these are protected to a better standard as the residents funded the raising of the flood bank on their side.

Healing

There is a large catchment to the west of Great Coates Road, Healing which drains to an undersized 300 mm diameter road crossing. This, in turn, discharges to a road side ditch comprising a series of piped and open sections. The restrictions within this system caused the internal flooding of 8 properties along Great Coates Road.

Similarly, surface water run off from an area of land to the south of Wells Road internally flooded two of the Wells Road properties. There is little in the way of positive

surface water drainage serving this area of land so there is some reliance on the highway and domestic drains in the locality. As with many older local drainage systems these are under capacity.

#### Laceby

A number of properties were flooded where Grimsby Road meets the Laceby by-pass. The main causes of this were surface water run off from the by-pass and adjacent farmland.

#### Peaksfield Avenue, Grimsby

There is a 900mm surface water drain fronting properties down Peaksfield Avenue. This was an open watercourse which conveyed land drainage from the area between Scartho and Weelsby Woods plus drainage to the old Grimsby to Louth railway embankment. Since the closure and dismantling of the railway in 1981 the old track bed has been used for the construction of the Peaks Parkway highway which has provided a direct route into Central Grimsby from the south. Peaks Parkway was constructed during the 1990's and drains into this surface water drain.

500 metres downstream of Peaksfield Avenue is the Wintringham Road inverted syphon which constitutes twin 450mm diameter cast iron pipes. This restriction combined with the intensity of the event led to the flooding of the Peaksfield Avenue properties.

The above is a brief summary of the main 2007 flooding events in North East Lincolnshire. All the above plus the other 2007 flooding locations are summarised in Appendix 1 and 2.

## **5.2 Pre 2007 Flooding Incidents.**

Grimsby experienced flooding in March 1979 in the Willows Estate from the River Freshney but the flood waters were dealt with by the drainage system for the roads. There was flooding on the Estate during February 1981 due to very heavy rainfall on an already saturated catchment that resulted in high river levels. Both banks of the River Freshney downstream of Great Coates Road were overtopped and 40 properties on the



Estate were flooded. A more severe event occurred in April 1981 which flooded 300 properties. During both events, surcharging of the main sewerage system meant this could provide no drainage capability in dealing with incoming flood water from the main river. These events resulted in a flood defence improvement scheme being carried out in 2001. This scheme constituted the raising of flood embankments to form a flood storage reservoir and undoubtedly this scheme helped mitigate the effects of the 2007 flooding event.

Isolated flood incidents have been recorded throughout the borough, for instance, Thorganby Road, Cleethorpes which incurred carriageway and footpath flooding in 2004.

### 5.3 Sewer Flooding

Nearly all the older areas of Grimsby and Cleethorpes are served by combined sewers. However Cleethorpes benefited from a £50M scheme during the 1990's which involved the installation of a deep large diameter tunnel with large scale upgrades of the combined sewer systems discharging to the new tunnel. The result was a substantial reduction in the threat of sewer flooding in Cleethorpes. Even the severe weather of June 2007 only resulted in some areas of external flooding in the town.

Grimsby has more areas under threat of flooding from the sewers. Among the locations are the lower lying areas of the Willows and Wybers Wood estates. As would be expected these areas tend to be near the River Freshney which offers a high risk of fluvial flooding.

Other locations in Grimsby at risk from combined sewer flooding are Runswick Road, Wentworth Road, Willingham Street, Welholme Avenue and Ainslie Street.

### 5.4 Groundwater Flooding

The catchment is underlain by permeable chalk layers. Rainfall will soak into the chalk and may emerge again in the base flow of streams and rivers or as springs. The main source of the Laceby Beck/River Freshney is at the base of the Wolds adjacent to the A18

and a number of other watercourses have sources in, or close to, the Wolds. As the chalk geology predominates it also acts as a major aquifer. It is a complex aquifer system which is difficult to manage in terms of flood risk as groundwater flooding is dependent on a number of factors, especially the local geological structure and topography. This means that although the conditions that cause a flood (high groundwater levels and rainfall) can be monitored, it is difficult to predict where and when flooding may occur. The best indicator is where there has been previous groundwater flooding but new springs can emerge, existing springs can stop running and old springs can re-activate. There are many existing and historical artesian springs throughout the Borough.

Generally the risk of flooding from groundwater is in the coastal areas from Immingham to Humberston, i.e. the lower lying parts of the Borough. This is caused by artesian spring flows from confined chalk where high groundwater pressures force an upward flow path through the confining clay. These high hydrostatic pressures are brought about by the adjacent higher land of the Lincolnshire Wolds. In some locations, the clay is coarser, sometimes with pockets of fluvio-glacial deposits and spring flows are more likely to occur. These flow paths are known as blow-wells. Some of the water abstraction wells are located in these same areas because more water can be obtained here. Abstracting water from water supplies can affect groundwater levels locally, reducing groundwater levels and so reducing the effect of flooding. In the Wolds, where the chalk is considerably nearer the surface, the springs and flow paths tend to be already established through the steeper topography.

Groundwater levels tend to get re-charged again during the winter and high groundwater levels can cause flooding as the water table rises. This rise in water table levels can be very slow dependant on rainfall patterns. Certainly, groundwater flooding brought about by rainfall on the Wolds can occur months after the period of the heaviest rainfall.

#### Little Coates

There were problems in the Little Coates area of Grimsby after an increase in groundwater levels in the winter of 2000/2001 coincided with a 31% reduction by Anglian Water in groundwater abstraction. This reduction was because of a leaking underground petrol tank threatening to contaminate the aquifer. Water from the blow-wells close to the Anglian Water

abstraction point flooded allotments, gardens and the sub floor space of a small number of properties. Should extraction rates increase in the future then the threat of flooding may be reduced. The main area affected were the properties in Chelmsford Avenue with some external flooding to properties in Clare Court.

Although there a number of other active springs the consequences tend to be wet areas in gardens or playing fields. Usually, where springs have been running for many years, close to domestic property, arrangements have been made to ensure the spring discharges into the domestic drainage system.

## 5.5 Significant Harmful Consequences.

The Authority classes the following incidences of flooding as having the potential for significant harmful consequences:

- i) Internal flooding of domestic property – potential threat to human health, both physical and mental.
- ii) Internal flooding of commercial property – potential threat to human health and potential adverse effect on economic activity.
- iii) External flooding around property where the water's depth or velocity poses a risk to occupants/users of the property.
- iv) Flooding of the highway to a depth or velocity which endangers road users.

## 6 Future Flood Risk

### 6.1 Future Flood Risk in North East Lincolnshire

This section assesses the possible consequences of potential future flooding, taking account of; topography, the locations and characteristics of water courses and flood plains and effectiveness of flood defence/resilience works. These works include measures that have been put into place as a result of past flooding events including those of June 2007. Also considered are the locations of populated areas, concentrations of economic activity and the current and predicted impact of climate change or any other long term developments.

Recent mitigation works since the flooding of June 2007 have been carried out at the following locations:

#### Mount Pleasant, Waltham

The construction of an earthen flood defence embankment protecting all those properties that flooded in June 2007. The standard of protection is such that a similar event to June 2007 would not cause internal flooding as long as a regular maintenance programme is applied downstream.

#### North Immingham

The floods of 2007 revealed widespread maintenance requirements needed for the land drainage systems. A programme of works was undertaken to restore the systems to the appropriate standard. Other measures such as overflow swales and channel realignment were also used to enhance the works carried out.

#### West End Road, Habrough

A new surface water drainage system was installed by North East Lincolnshire Council to improve the level of protection to those properties previously flooded.

#### Humberston

A programme of land drainage maintenance works was carried out around the Coniston Crescent area to restore the land drainage to its design standard. Here though the land drainage systems

discharge into the Anglian Water public surface water sewer so the serviceability condition of these sewers is of great importance.

In Humberston Avenue an under capacity surface water public sewer was replaced by North East Lincolnshire Council. This work increased the system capacity by 1300%, greatly increasing the levels of protection for those properties previously internally flooded.

Despite the above work and other improvements in flood resilience at most of the locations affected by the 2007 floods the majority of the mitigation works involved maintenance of the existing infrastructure rather than improvements to it.

The data used for consideration of future flood risk is outlined in 4.4. The main dataset used for the assessment is the Flood Map for Surface Water. This shows the areas at risk from two flooding depth bands, i.e. deeper than 100mm and deeper than 300mm.

The maps show the effect of a single rainfall event with a 1 in 200 year chance of occurring in any one year. It is assumed that underground sewerage and drainage systems provide a uniform capacity of 12mm/hr. The impact of buildings and their effect on flood flow is also considered.

The Areas Susceptible to Surface Water Flooding map was also assessed as it considers a longer duration storm (6.5 hours) and makes no allowance for infiltration. The assumption that drainage systems are full may give a better representation in flatter catchments prone to groundwater flooding. These flatter systems are slow flowing and prone to sediment accumulations and the 12mm/hr capacity allowance may be too generous for the majority of the Borough. Far greater numbers of properties were found to be at risk using these first generation surface water flooding maps.

## 6.2 Climate Change

There is clear 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 mean 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 2080s.

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 2080s, the latest UK climate projections (UKCP09) are that there could be around three times 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 locally by 40%.

### 6.3 Key Projections for Humber River Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s 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 unlikely 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%

### 6.4 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 runoff, increasing localised 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 locally 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.

## **6.5 Adapting to Climate 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 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.

## **6.6 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 25 (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 new 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's criteria).



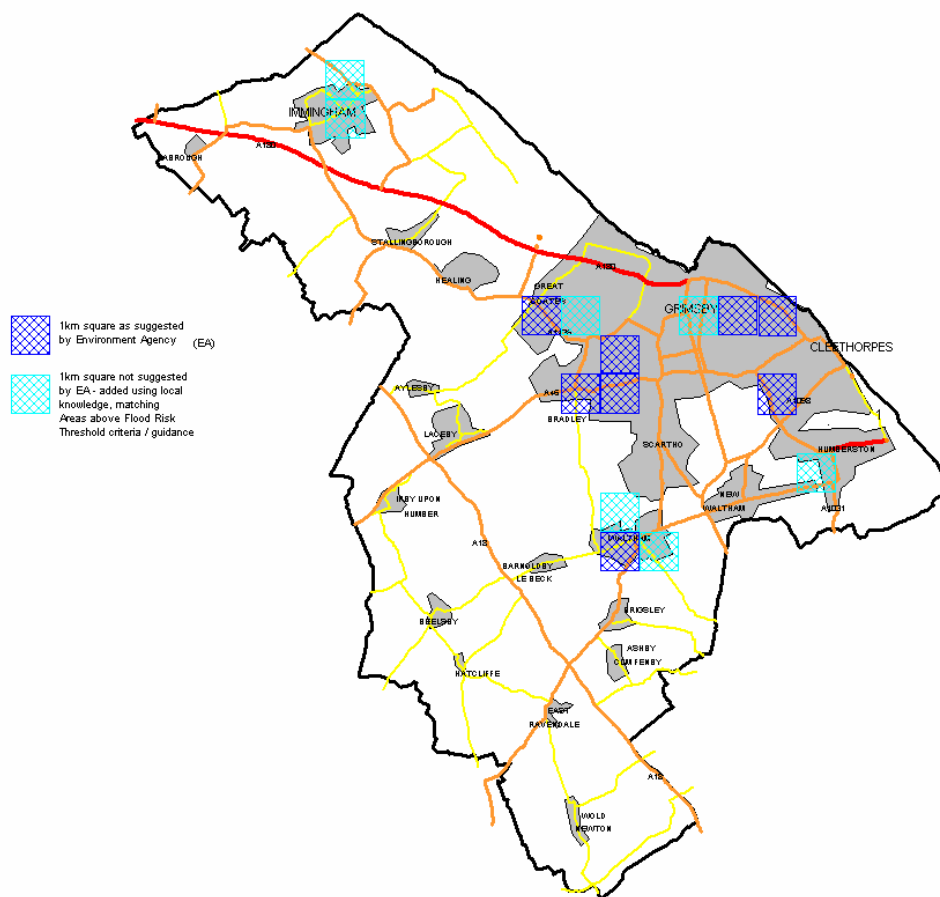
## 7 Review of Places above the Flood Risk Thresholds (1km squares)

### 7.1 Review of Environment Agency Places above the Flood Risk Thresholds

It is essential to consider the consequences of potential future flooding on people, property and the environment. To objectively assess the impacts of potential future floods the Environment Agency produced maps showing Places above the Flood Risk Thresholds as 1km squares. They are based on national datasets including the Flood Map for Surface Water, the Areas Susceptible to Surface Water Flooding, the National Receptor Dataset and the below thresholds to identify areas at significant risk of flooding.

Using local knowledge a number of additional squares have been identified as being Places above the Flood Risk Thresholds. These are shown below in light blue.

The Flood Risk Thresholds are wherever at least 200 people or 20 businesses or more than 1 critical service might be flooded to a depth of 0.3 metres by a rainfall event with a chance of 1 in 200 of occurring in any given year (equivalent to 'in the order of' 1 in 100 chance of flooding).



**Immingham**

Woodlands Ave, Pelham Road, Manby Road received some of the worst flooding during the 2007 summer floods with some 192 houses flooded internally and 90 externally. More than 450 houses are at risk with a number of schools and commercial premises. The inclusion of these areas is also verified by the EA Surface Water mapping.

**Grimsby**

The Willows and Wybers estate have areas at risk from flooding from the surcharged main sewer system and this threat is exacerbated by the adjacent main rivers and flood storage area.

Bradley Cross Roads area is at risk from surface water flooding plus adjacent land drainage systems.

The Nunsthorpe area is at risk from surface water flooding.

The Chelmsford Avenue/Westward Ho area is at risk from both surface water and groundwater flooding.

The Hainton Avenue/Sixhills Street area is at risk from surface water flooding.

The Grant Thorold /Wellington Street /Runswick Road area is at risk from surface water flooding.

**Cleethorpes North**

The Grimsby Road/ Brereton Avenue area is at risk from surface water flooding with groundwater flooding being an additional risk in the east part of the area.

**Cleethorpes South**

This area is at risk from surface water flooding. No flooding in recent years has been recorded in the location, except within Ormsby Close (1997). A problem was found with the Anglian public sewer. Anglian Water undertook remedial work which involved some relaying. No flooding of note occurred during 2007.

**Humberston**

The Coniston Crescent / Littlebeck Road /Buttermere Crescent area is at risk from surface water flooding and flooding from the adjacent land drainage systems. Lack of capacity in the surface water public sewer may be an exacerbating factor.

**Waltham**

The Mount Pleasant/Barnoldby Road/Cheesmans Close area is at risk from the Buck Beck critical ordinary watercourse catchment. Surface water flooding is also a risk in this area.

## 8 Next Steps

### 8.1 On-going work to support future PFRA reviews

The Flood Risk Regulations require that the PFRA is reviewed every 6 years. As part of their new responsibilities under the Flood and Water Management Act and to support the future reviews of the PFRA, NELC will be:

- further enhance and maintain its GIS maps. It is the intention that all local flood risk management partners will be able to access the maps.
- developing Surface Water Management Plans in the areas most vulnerable to surface water flooding.
- continuing to build close working partnerships with local flood risk management partners to better understand and alleviate flood risk in North east Lincolnshire

### 8.2 Scrutiny and review procedures

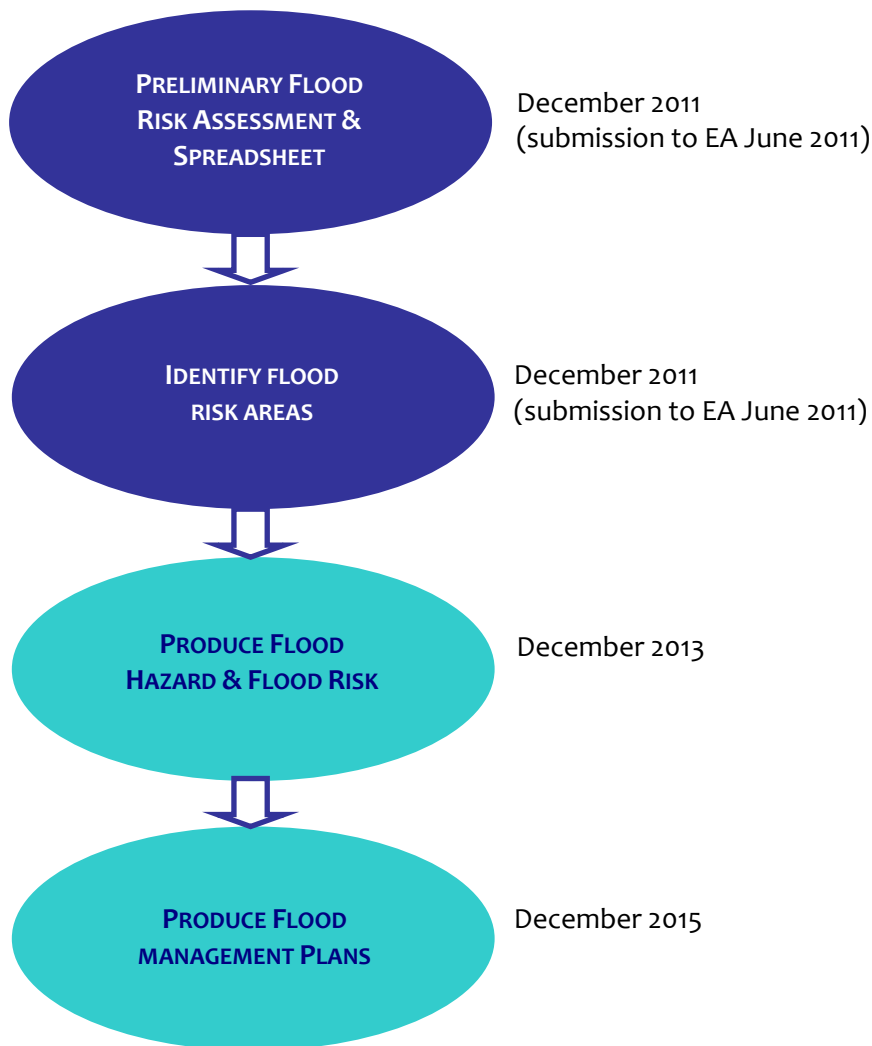
The scrutiny and review procedures for the PFRA have been set out in the PFRA guidance provided by the Environment Agency.

The first part of the review process for the PFRA is through an internal review by NELC. Internal approval should be agreed prior to submission of the PFRA to the Environment Agency in June 2011.

Under the Flood Risk Regulations the Environment Agency has a duty to review, collate and publish all of the PFRA's nationally. The Environment Agency (area review and national review) will review the PFRA to ensure it meets the minimum requirements required by the Flood Risk Regulations and to provide an opinion on the selection/amendment of any 'Flood Risk Areas'. If satisfied, they will make recommendations to the relevant Regional Flood and Coastal Committee (RFCC) for endorsement. Once the RFCC has endorsed the PFRA a relevant Director at the Environment Agency will sign-off the PFRA, after which all PFRAs will be collated, published and submitted to the European Commission.

### 8.3 Future Requirements of the Flood Risk Regulations

The Flood Risk Regulations 2007 require four stages of flood risk management over the coming years as set out below. The first two stages have been addressed by this report. The Environment Agency and Defra will provide further guidance on the requirements for the hazard / risk mapping and completion of flood risk management plans.



## 9 References

North East Lincolnshire Council Strategic Flood Risk Assessment (SFRA)

CLG (Communities and Local Government) (2010), Planning Policy Statement 25: Development and Flood Risk (PPS25), Revision March 2010

Defra / Welsh Assembly Government (2010), Selecting and reviewing Flood Risk Areas for local sources of flooding - Guidance to Lead Local Flood Authorities

Environment Agency (2010a), Preliminary Flood Risk Assessment (PFRA)  
Final Guidance, Report GEHO1210BTGH-E-E

Environment Agency (2010b), What are Areas Susceptible to Surface Water Flooding, Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities, November 2010

Environment Agency (2010c), What is the Flood Map for Surface Water, Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities, November 2010

Environment Agency (2010d), Using Surface Water Flood Risk Information, Guidance for Local Resilience Forums, Regional Resilience Teams, Local Planning Authorities and Lead Local Flood Authorities, November 2010

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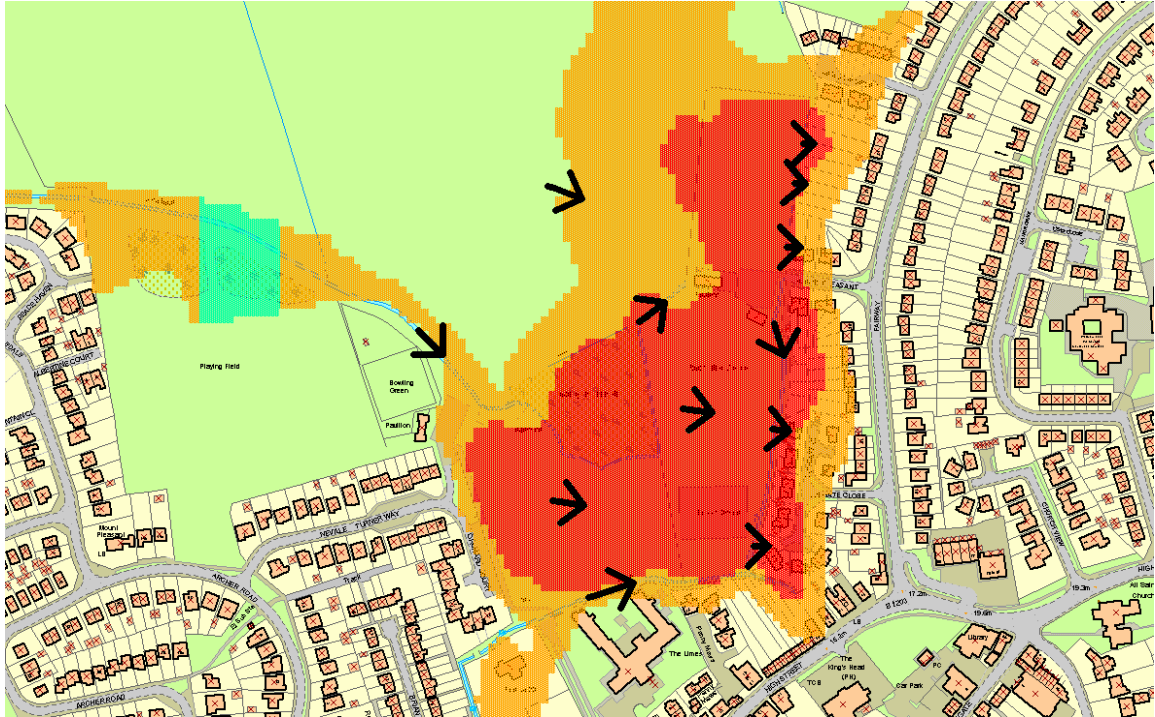
Environment Agency (2011), Flood Risk Regulations – PFRA FAQs (version 2), March 2011



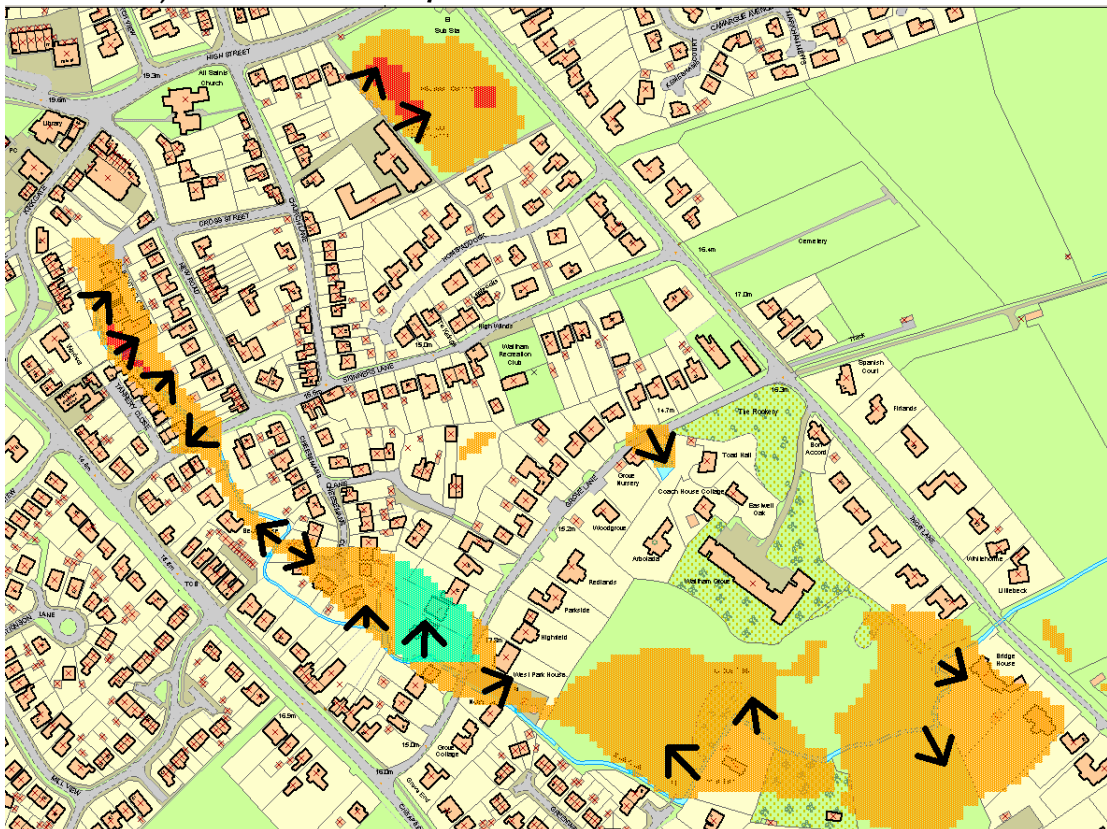
## Appendix 1 – Historical Flooding

### Maps Showing Extent of Flooding with Conveyance Routes.

#### 1. Mount Pleasant / Ludgate Close, Waltham - June 2007

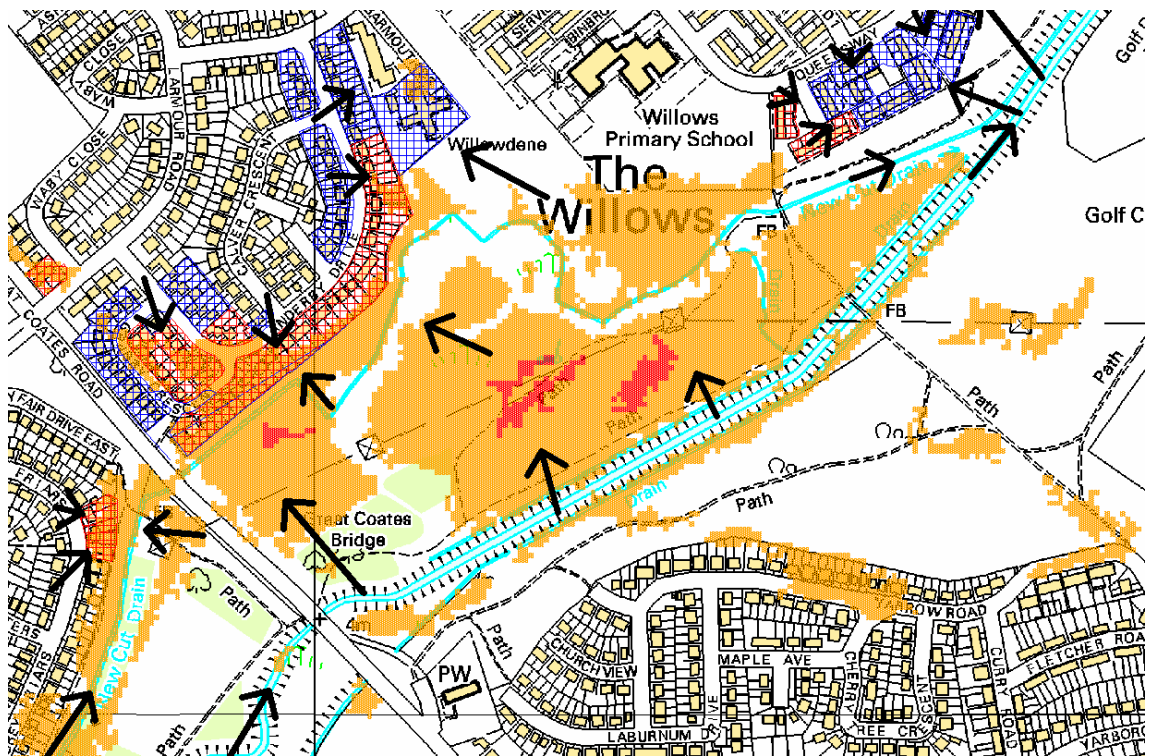
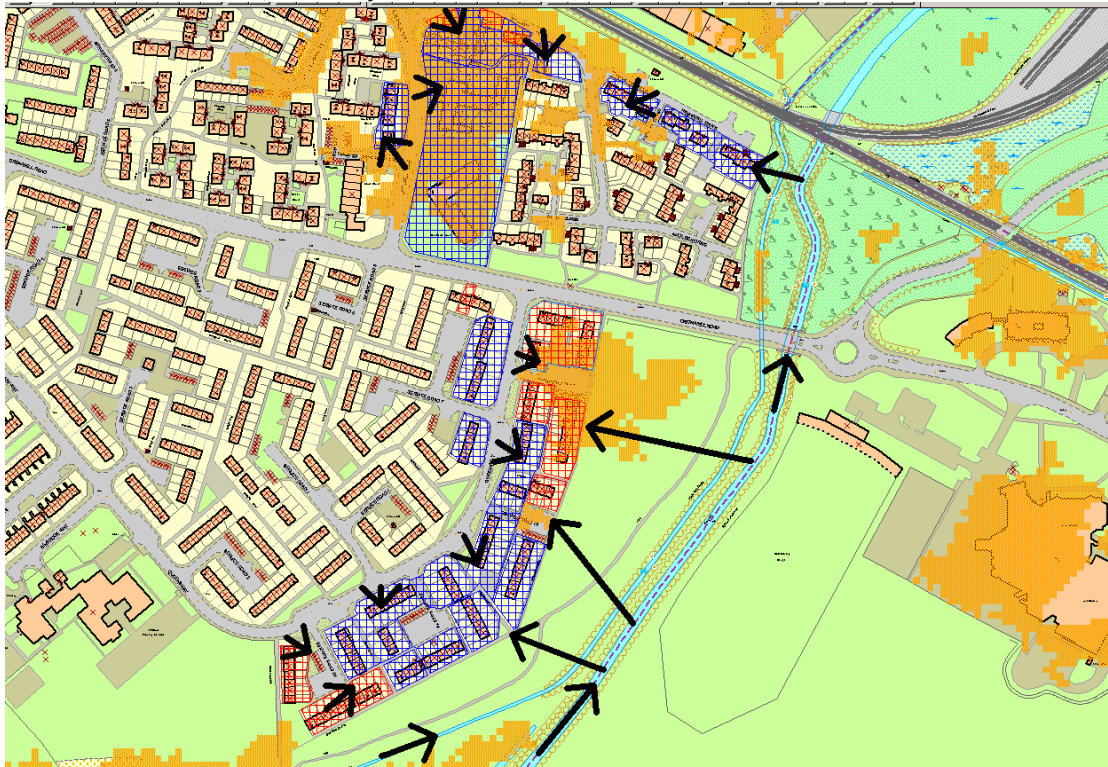


#### 2. Buck Beck, Waltham - June 2007

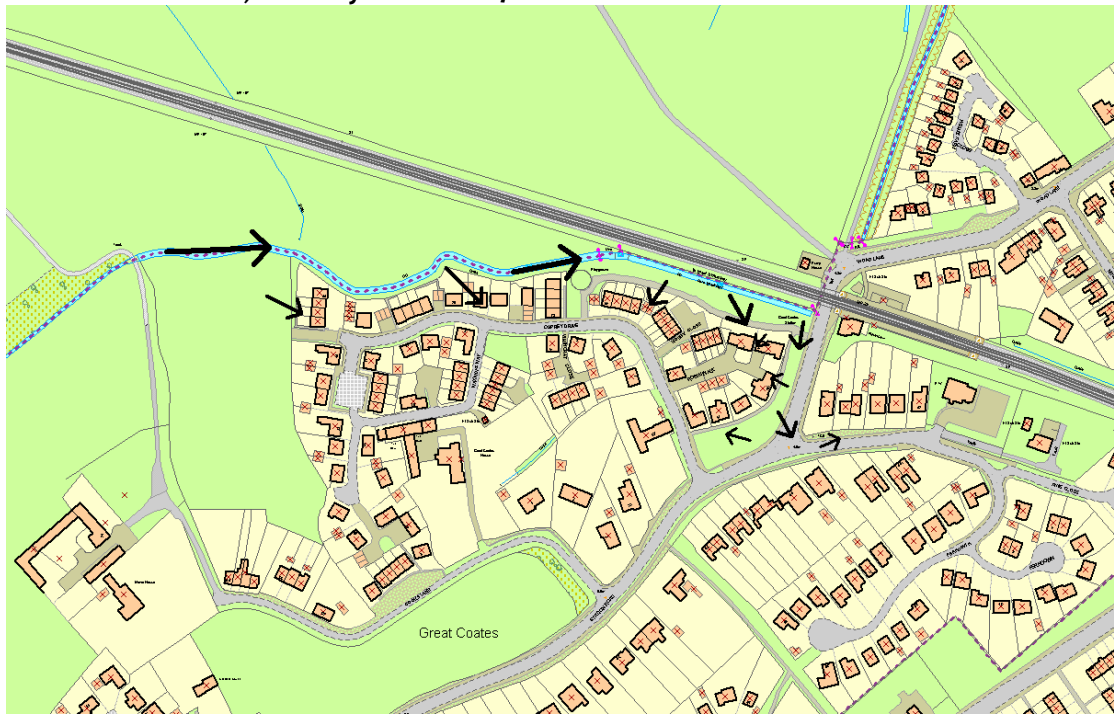




3. Willows Estate, Grimsby - June 2007



4. Great Coates, Grimsby - June 2007

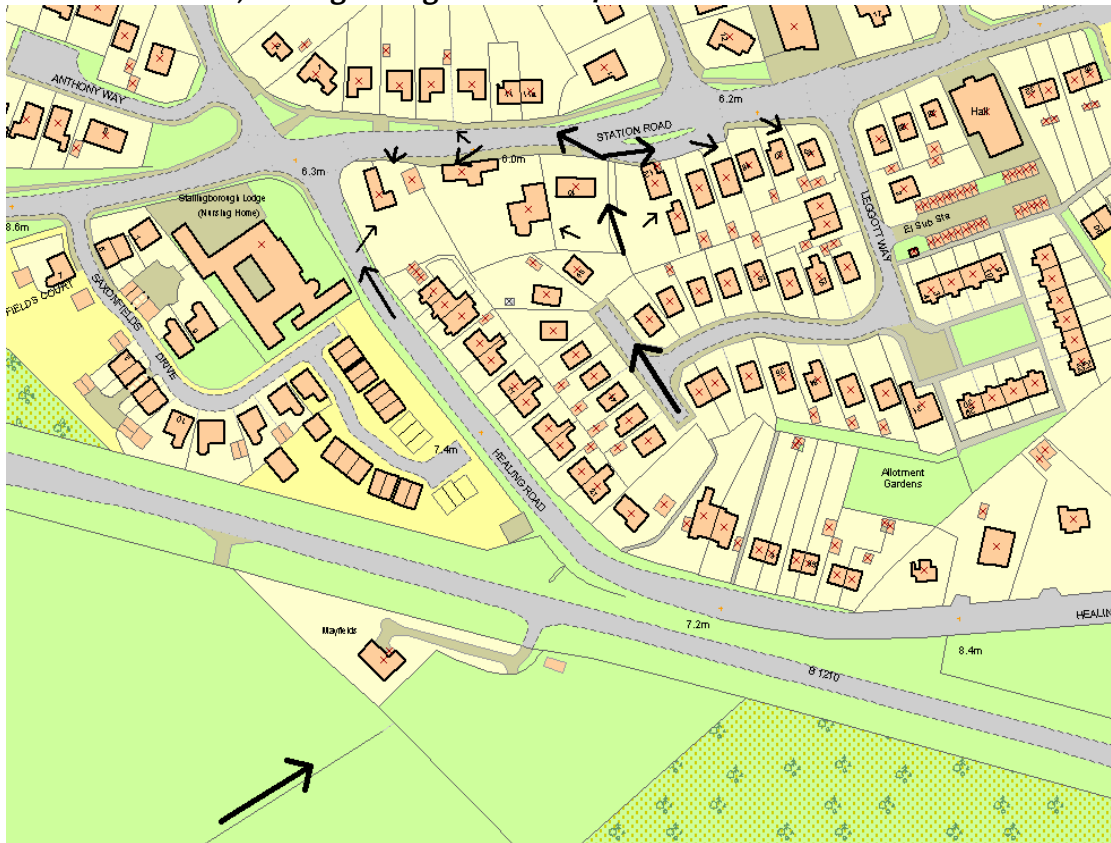


5. Great Coates Rd, Healing - June 2007

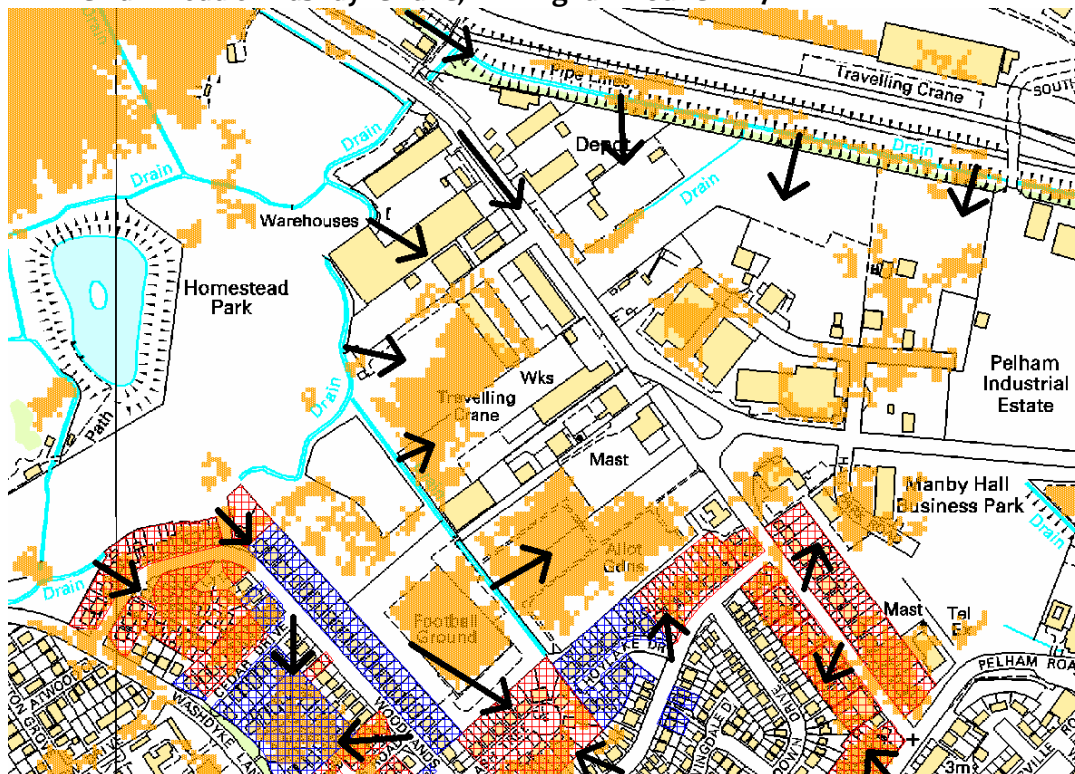




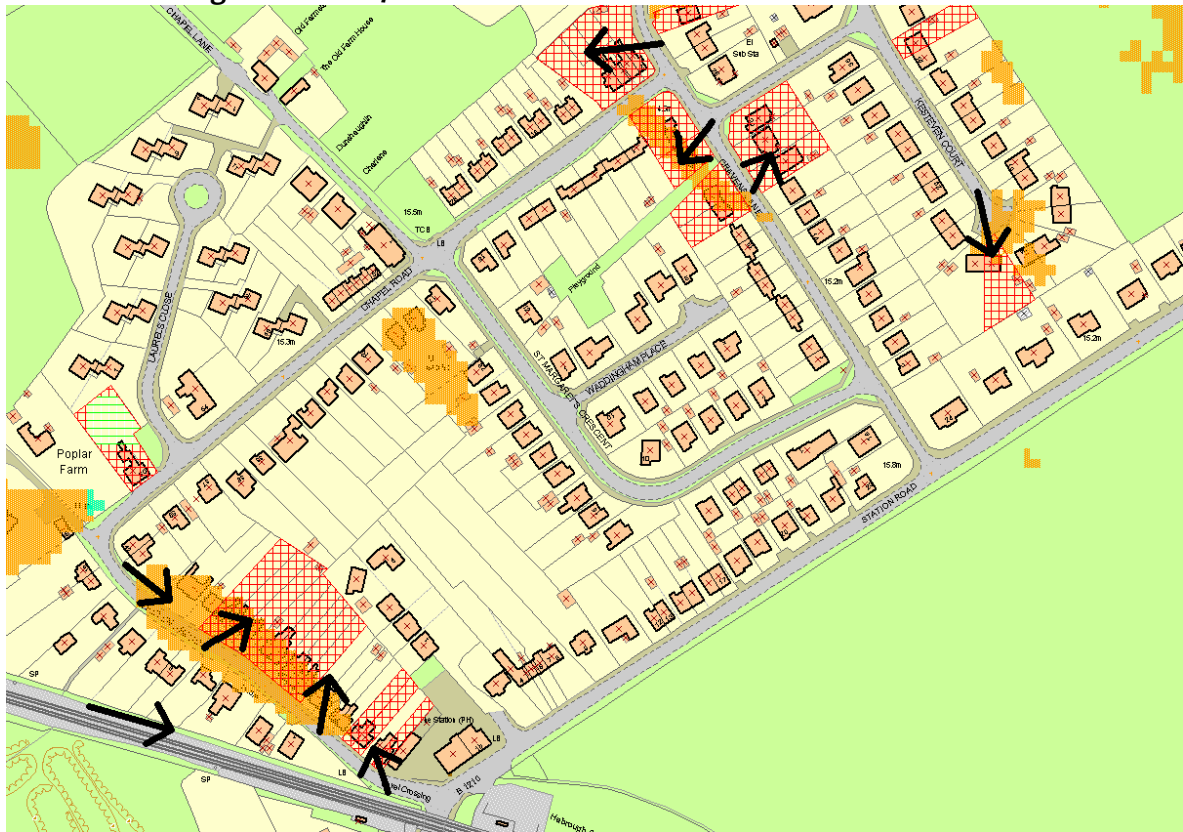
6. Station road, Stallingborough - June 2007



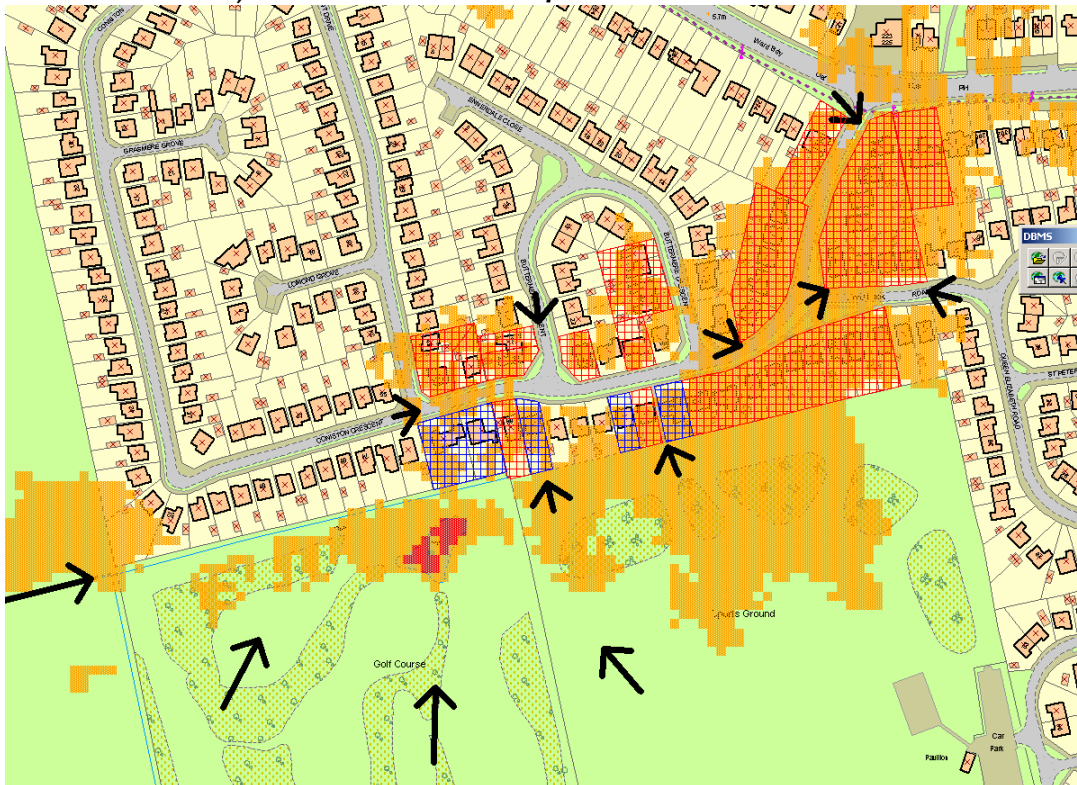
7. Pelham Road & Washdyke Lane, Immingham - June 2007



8. Habrough - June 2007

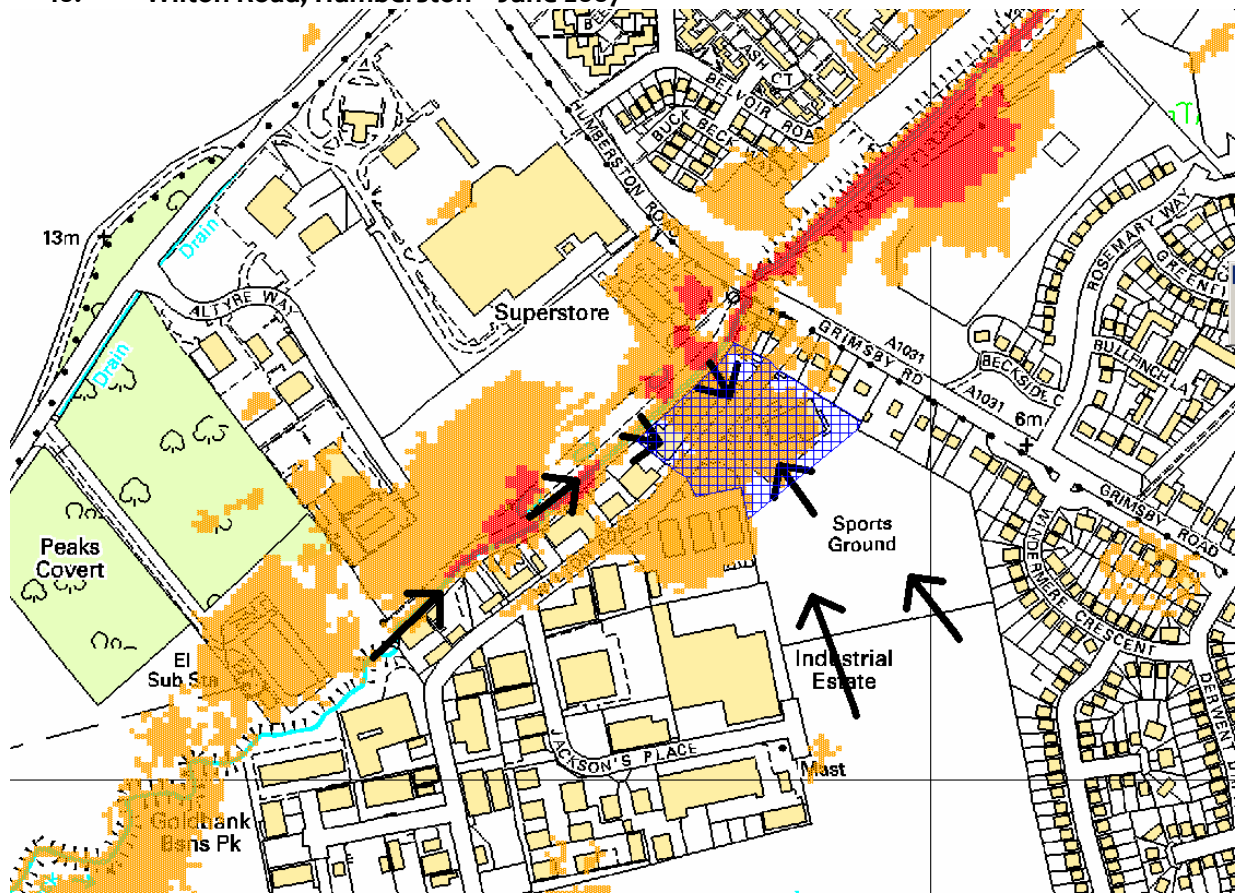


9. Coniston Cres, Humberston - June 2007

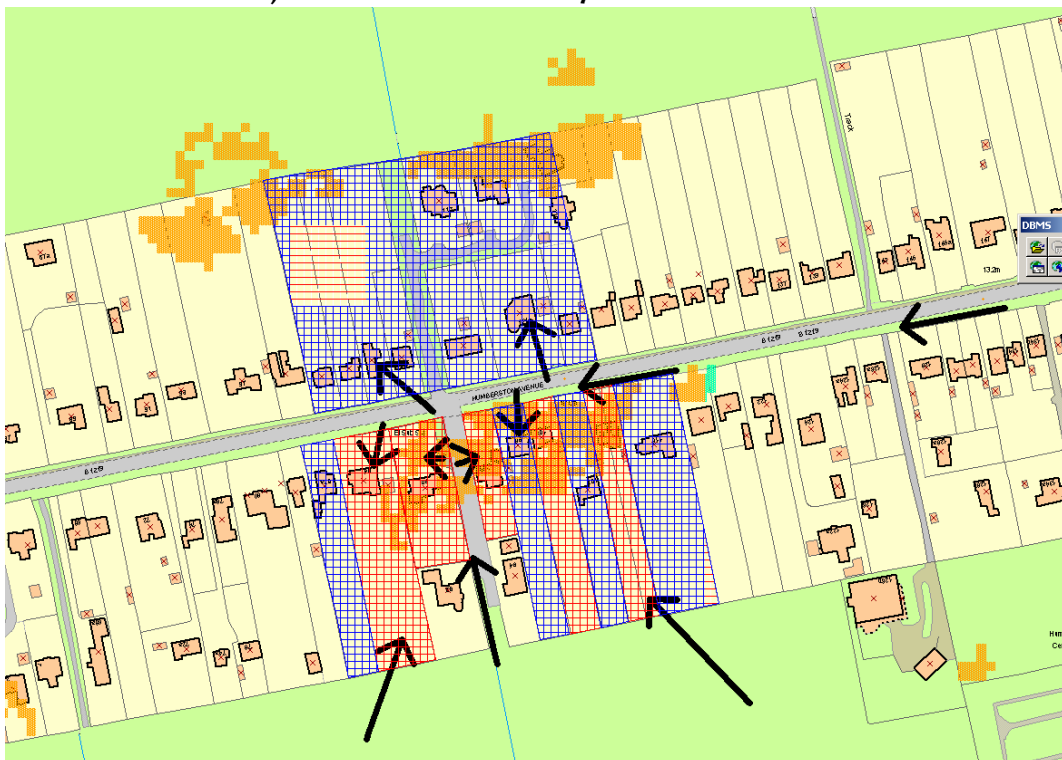




10. Wilton Road, Humberston - June 2007



11. Humberston Ave, Humberston - June 2007



## 12. Humberston Ave, Humberston - June 2007



Table (Location, date, Source and Mitigation)

Street	Location	Date	Source	Mitigation
Hobby Close	Great Coates	Jun 2007	adjacent land drainage system	new trash screens, improved flood storage arrangements.
Robin Walk	Great Coates	Jun 2007	adjacent land drainage system	new trash screens, improved flood storage arrangements.
Station Road	Great Coates	Jun 2007	adjacent land drainage system	new trash screens, improved flood storage arrangements.
Woad Lane	Great Coates	Jun 2007	adjacent land drainage system	new trash screens, improved flood storage arrangements.
Waithe Lane	Brigsley	Jun 2007	surface water and main river	
Waltham Rd	Brigsley	Jun 2007	surface water	
Ravenhill Close	Cleethorpes	Nov 2000	surface water	
Central Promenade	Cleethorpes	Jan 2003	surcharged sewers	
Thorganby Road	Cleethorpes	Nov 2000	surface water	
Ampleforth Avenue	Grimsby	Jun 2007	surface water/main river	

Anderby Drive	Grimsby	Jun 2007	surface water/main river	
Barnsdale Way	Grimsby	Jun 2007	surface water/main river	
Barry Avenue	Grimsby	Jun 2007	surface water run off from land	improved land drainage and proposed flood bund
Bradley Rd	Grimsby	Jun 2007	adjacent land drainage system	new trash screen and maintenance
Cranwell Drive	Grimsby	Jun 2007	surface water/main river	
Cromwell Rd	Grimsby	Jun 2007	surface water/main river	
Ainslie St	Grimsby	Jun 2007	surface water	
Grasby Crescent	Grimsby	Jun 2007	surface water/main river	
Greyfriars	Grimsby	Jun 2007	surface water/main river	
Hemswell Drive	Grimsby	Jun 2007	surface water/main river	
Ingleby Grove	Grimsby	Jun 2007	surface water/main river	
Ladysmith Rd	Grimsby	Jun 2007	surface water	
Larmour Rd	Grimsby	Jun 2007	surface water/main river	
Le Burghdike Close	Grimsby	Jun 2007	surface water	
Mulgrave Close	Grimsby	Jun 2007	surface water/main river	
Peaksfield Ave	Grimsby	Jun 2007	surface water/culvert	improved maintenance
Queensway	Grimsby	Jun 2007	surface water/main river	
Runswick Rd	Grimsby	Jun 2007	surface water	
Vicarage Gardens	Grimsby	Jun 2007	surface water	
Welholme Ave	Grimsby	Jun 2007	surface water	
Wentworth Rd	Grimsby	Jun 2007	surface water	
Willingham St	Grimsby	Jun 2007	surface water	additional highway gullies
Wintringham Road	Grimsby	Jun 2007	surface water	
Chapel Rd	Habrough	Jun 2007	surface water	improved maintenance and drain repairs
Cravens Lane	Habrough	Jun 2007	surface water	improved maintenance and drain repairs
Kesteven Court	Habrough	Jun 2007	surface water	improved maintenance and drain repairs
West End Road	Habrough	Jun 2007	surface water	new surface water sewer
Aylesby Lane	Healing	Jun 2007	adjacent land drainage system	new culvert road crossing
Great Coates Road	Healing	Jun 2007	adjacent land drainage system	
Marsh Lane	Healing	Jun 2007	adjacent land	

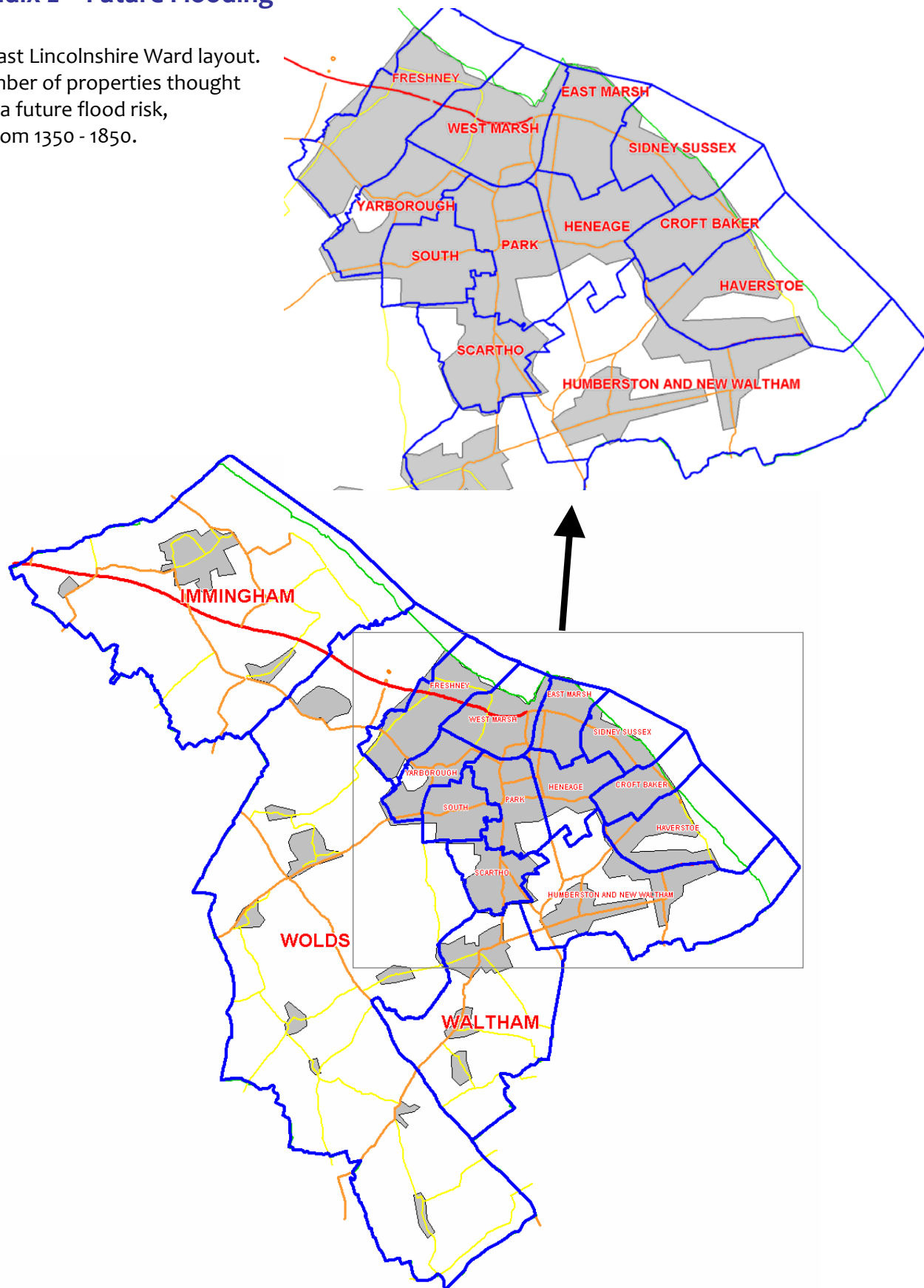
			drainage system	
Stallingborough Road	Healing	Jun 2007	adjacent land drainage system ?	
Wells Road	Healing	Jun 2007	surface water	
1st Main Road	Humberston	Jun 2007	surface water	
2nd Avenue	Humberston	Jun 2007	surface water	
Anthony's Bank Road	Humberston	Jun 2007	adjacent land drainage system	
Derwent Drive	Humberston	Jun 2007	surface water/land drainage system	improved maintenance to land drains. New highway gullies
Buttermere Cres	Humberston	Jun 2007	surface water/land drainage system	improved maintenance to land drains. New highway gullies
Coniston Crescent	Humberston	Jun 2007	surface water/land drainage system	improved maintenance to land drains. New highway gullies
Grimsby Road	Humberston	Jun 2007	surface water	
Hewitts Ave	Humberston	Jun 2007	adjacent land drainage system	new trash screen and pipework arrangement
Humberston Ave	Humberston	Jun 2007	adjacent land drainage system	new culvert road crossing next to no. 96
Littlebeck Road	Humberston	Jun 2007	surface water/land drainage system	improved maintenance to land drains. New highway gullies
Lonsdale Close	Humberston	Jun 2007	surface water	drain repairs
Wilton Road	Humberston	Jun 2007	surface water/main river	
Arran Close	Immingham	Jun 2007	surface water	
Ashtree Close	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Battery St	Immingham	Jun 2007	surface water	
Beechwood Avenue	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Cedar Drive	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Clynton Crescent	Immingham	Jun 2007	surface water	
Copse Close	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Harlech Walk	Immingham	Jun 2007	surface water	
Hawthorne Avenue	Immingham	Jun 2007	surface water	
Hollingsworth Avenue	Immingham	Jun 2007	surface water	
Hoylake Drive	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Langley Walk	Immingham	Jun 2007	surface water	
Manby Road	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Maple Grove	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Oaklands Road	Immingham	Jun 2007	surface water/land	improved maintenance,



			drainage system	drain repairs
Pelham Road	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Pilgrim Ave	Immingham	Jun 2007	surface water	
Robert Close	Immingham	Jun 2007	surface water	New highway gullies
Spinney Close	Immingham	Jun 2007	surface water	
Stallingborough Road	Immingham	Jun 2007	surface water	
Talbot Road	Immingham	Jun 2007	surface water	
Thornton Place	Immingham	Jun 2007	surface water	
Warwick House	Immingham	Jun 2007	surface water	
Winslow Drive	Immingham	Jun 2007	surface water	
Woodlands Ave	Immingham	Jun 2007	surface water/land drainage system	improved maintenance, drain repairs
Butt Lane	Laceby	Nov 2000	surface water	
Cottagers Plot	Laceby	Jun 2007	surface water	drain repairs
Laceby Road	Laceby	Jun 2007	surface water /land drainage system	improved maintenance
Grimsby Road	Laceby	Jun 2007	surface water / land drainage system	improved maintenance
St Giles Avenue	Scartho	Jun 2007	surface water /surcharged sewer	new public sewer and storage
Healing Road	Stallingborough	Jun 2007	surface water/land drainage system	improved maintenance and pipe repairs
Leggott Way	Stallingborough	Jun 2007	surface water/land drainage system	improved maintenance and pipe repairs
Station Road	Stallingborough	Jun 2007	surface water/land drainage system	improved maintenance and pipe repairs
Archer Road	Waltham	Jun 2007	surface water/ surcharged sewer	improved maintenance
Barnoldby Road	Waltham	Jun 2007	Land drainage system	improved maintenance
Cheesemans Close	Waltham	Jun 2007	significant ordinary watercourse	improved maintenance/ culvert improvements
Ludgate	Waltham	Jun 2007	significant ordinary watercourse	improved maintenance/ earth bund
Mount Pleasant	Waltham	Jun 2007	significant ordinary watercourse	improved maintenance/ earth bund
Penny Mews	Waltham	Jun 2007	significant ordinary watercourse	improved maintenance/ earth bund

## Appendix 2 – Future Flooding

North East Lincolnshire Ward layout.  
The number of properties thought  
to have a future flood risk,  
range from 1350 - 1850.





## Future Flood Tables

Current Future Flood Risk			
Ward	Res.	Com.	Cri / Vul
Immingham	450 - 500	2	2 SS 1 TE 1 CH
Wolds	50 - 100	1	-
Waltham	50 - 100	-	1 RH
Freshney	300 - 350	-	1 RH 3 SS
West Marsh	-	-	-
East Marsh	-	-	-
Yarborough	100 - 150	-	1 SS 1 RH
South	50-100	-	-
Scartho	-	-	-
Park	50-100	-	1 SS
Heneage	100-150	-	-
Sidney Sussex	-	-	-
Croft Baker	-	-	-
Haverstoe	50-100	-	1 SS
Humberston & New Waltham	150-200	-	1 SS

- Res – Residential
- Com – Commercial
- Cri / Vul – Critical / Vulnerable
  - SS - Sub Station
  - RH - Residential Home
  - CH - Community Hall
  - TE - Telephone Exchange

Potential Extra Flood Risk (Future Developments)		
Ward	Flood Source	Res.
Freshney	Freshney Flood Plain	+250
West Marsh	Surface Water	+150

### Appendix 3 – Preliminary Assessment Report Spreadsheet (Annexe 1-3)

The EU flood reporting spreadsheet is attached as a separate document. In accordance with the guidance, the spreadsheet has not been altered as this forms the basis for the information which will be reported to the European Commission.

- This is where more detailed information regarding past flood events is recorded. Only past floods with significant consequences have been included in the spreadsheet.
- Each flood location has been reported as a separate row in the spreadsheet.

**# The EU Spreadsheet forms part of the overall submission, see folder Annexe 1-3 separate spreadsheet file.**

## Appendix 4 – PFRA Checklist Coversheet (Annexe 4)

Preliminary Flood Risk Assessment Review		
LLFA Name	North East Lincolnshire Council	
If collaboration, list other LLFAs		
LLFA Lead contact name	Jake Newby	
Email address	jake.newby@nelincs.gov.uk	
Contact telephone number	01472 324227	
Date sent to Environment Agency	17/06/2011	
Documents submitted		
	LLFA	EA date received
Preliminary Assessment Report	Yes	
Annex 1 - Past floods reporting template	Yes	
Annex 2 - Future floods reporting template	Yes	
Annex 3 - Flood Risk Area reporting template	Yes	
Annex 4 - Review checklist	Yes	
Flood Risk Areas		
Was there an indicative Flood Risk Area?	No	
Is a Flood Risk Area proposed?	No	
Approvals		
LLFA approval		
Name	Councillor Wallace	
Title	Portfolio Holder for Environment	
Date	Jun-11	
For completion by Environment Agency		
Region		
Area		
Lead contact name		
	Review date	Recommendation
Environment Agency area		
National review panel		
RFCC/FRMW		
Regional Director Sign-off		
Ministerial referral (if applicable)		

# The full coversheet and checklist form part of the overall submission, see folder [Annexe 4](#) separate spreadsheet file)

## Appendix 5 – GIS Layers (Annexe 5)

The following table lists the GIS layers which are included under Appendix 5. These layers are MapInfo Tab files and each layer is made up of a series of files with the same name.

Layer Name	Layer Description
Future_Flooding	Extents of areas considered to be at risk from future flooding
Flood_Summer_2007	Properties flooded (internally and externally) during the summer 2007 floods
1km Flood Threshold EA	1km blue squares as provided by EA
1km Flood Threshold New	Additional 1km blue squares as determined by NELC

# The MapInfo files are located in a folder named Annexe 5 which forms part of this submission.