Appendix A

Low Regret Adaptation Options

Contents

A1 Low regret adaptation options included within applications analysed

Fluvial Flooding		Pluvial flooding		Heat Stress	Water Stress	Biodiversity
Safety measures	Place of safety at first floor Evacuation plan Flooding notices on site Flood management plan	Safety measures	Provision place of safety Evacuation plan Flooding notices on site	Building design/ passive design measures e.g. natural ventilation (Solar orientation measures/ design)	Low flow taps/ showerheads/ low flush toilets	Improvement of habitat areas e.g. fish pass, buffer zones to mitigate against degradation
Resistance measures	Barriers at doorways Raised floor levels	Resistance measures	Raised floor levels	Selection of resilient building materials	Leak detection	Green and brown roofs
Resilience measures: building design takes account of high risk of flooding	Choice of resilient building materials Raising level of electrical cables Inverting normal arrangements of rooms Building on stilts	Resilience measures: building design takes account of high risk of flooding	Minimum level for access roads and paths Building on stilts No carpet on ground floor Raising level of electrical cables	Reflective surfaces	Water meters	S106 contribution towards implementation of BAP
Water run off	Surface water runoff measures (SUDs/ Soakaways) (Permeable paving)	Water run off	Details of surface water runoff measures (SUDs/ Soakaways) (Permeable paving)	Green roof	Rainwater harvesting	
Storage of flood water	Attenuation pond Storm water storage facility	Storage of surface water	Attenuation pond Rainwater harvesting		Greywater recycling	
Flood defences	Creation of embankment to act as flood defence Re-construction of onsite flood defences	Flood defences	Creation of earth bund to augment defences			

Appendix B

Case Study Pro-Forma

Contents

B1 Case Study Pro-Forma

B1.1 Case Study Selection and Analysis

Key Questions

The key question influencing the case study analysis process is:

- How does this case study demonstrate that land-use planning is planning for climate change?

The key objectives of this study are important to refer to also when undertaking the case study analysis as they should be consistently driving the research process. These are:

- How are land use planning decisions managing current and future climate risks and underlying drivers of climate change?
- What evidence is there that land-use planning is incorporating low-regret adaptation measures that increase resilience to climate change?

Localities

Case studies are to be drawn upon from the following localities:

- East Riding of Yorkshire
- London Borough of Islington
- Stockton Borough

3 case studies must be explored for **each** locality (9 in total), and the following climate risk areas are relevant:

- Fluvial and Pluvial Flooding
- Sea Level rise and coastal inundation
- Heat Stress
- Water Stress
- Loss of biodiversity and functioning of ecosystem services
- Impact on agricultural production areas

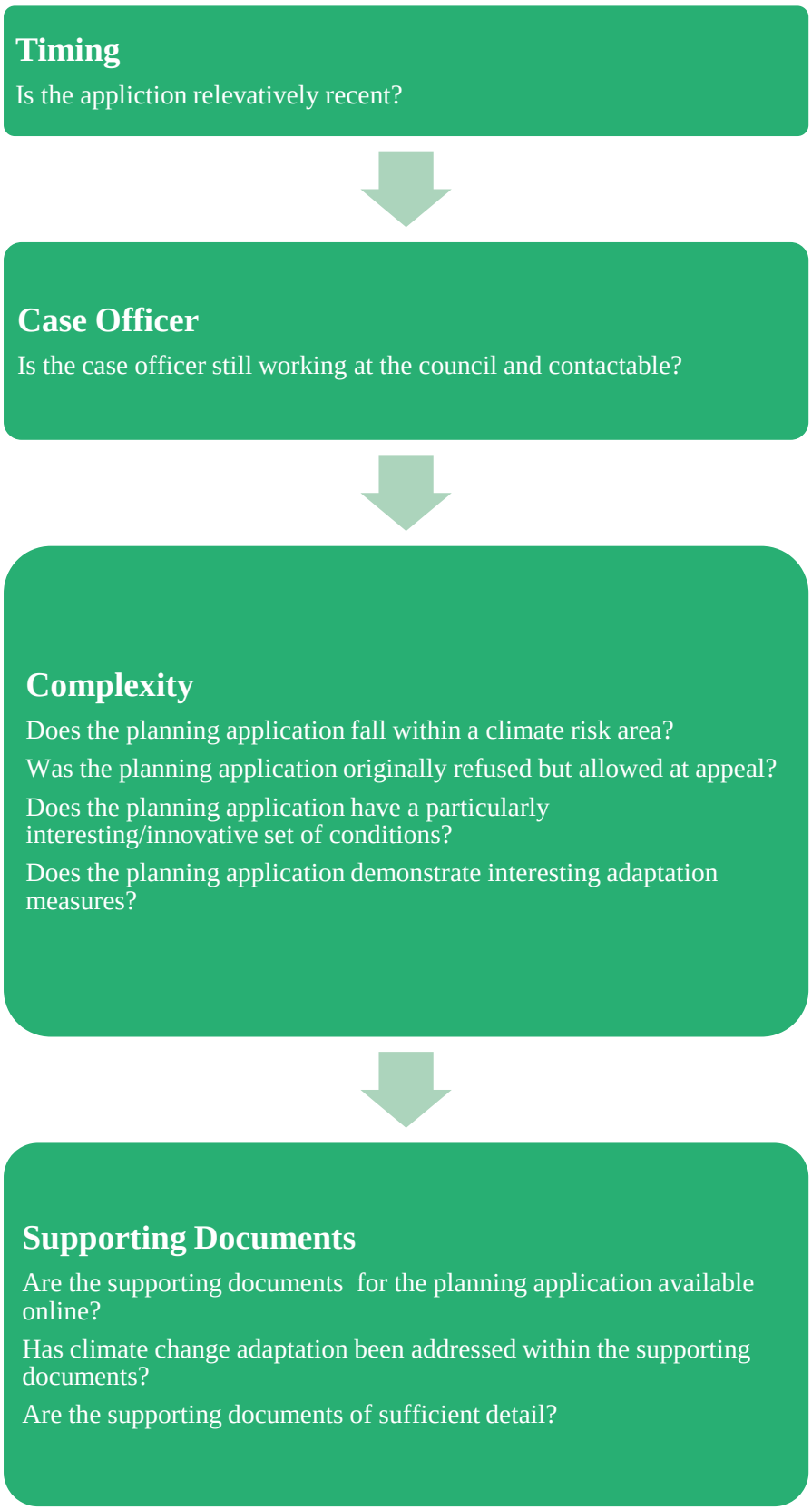
The next section explains how to select your case studies.

B1.2 Selection

Criteria for Selection

We have developed some key questions which define the criteria for case study selection. The flowchart below demonstrates this selection process. The hierarchy represents a move from essential criteria at the top to less essential but useful criteria at the bottom.

N.B. We are only incorporating approvals (at officer, committee and appeal level) as potential case studies. All types of approvals, however, are acceptable.



Process for Selection

Criteria	Process
Is the application relatively recent?	Filter the approvals spreadsheet so that only applications from 1st January 2007 to present are selected. The date should be taken from the final decision date. Filter the applications within GIS so that only applications from 1st January 2007 to present are selected also.
Does the planning application fall within a climate risk area?	From the applications fitting within the required timescale (above), use the selection method in GIS to highlight those remaining applications which all intersect with a climate risk layer (Step 3.5 in the GIS training guide)
Was the planning application originally refused but allowed at appeal?	Applications refused but allowed at appeal have been highlighted yellow within the refusals tables so should be easily identifiable. A SQL (query) within GIS should also highlight these applications spatially (See Step 3.9 of the GIS training guide)
Does the planning application have a particularly interesting/innovative set of conditions? Does the planning application demonstrate interesting adaptation measures?	Research the planning conditions within the decision notice and identify any interesting/innovative conditions. Research decision notices/officers reports/statutory consultee responses to determine any interesting references to climate change adaptation. Research the planning application documents to see if any interesting adaptation measures are proposed.
Are the supporting documents for the planning application available online? Has climate change adaptation been addressed within the supporting documents? Are the supporting documents of sufficient detail	The approvals spreadsheet states whether supporting documents are available on line for each application. A search function should help identify whether climate change adaptation has been addressed within the supporting documents. How does this compare the number of

	supporting documents compare to most of the applications? Are there more supporting documents? Are there more detailed supporting documents?
Is the case officer still working at the council and contactable?	Web search for mentions of case officers within recent committee reports, etc. For example "John Smith" site:www.tewkesbury.gov.uk Ring or email the relevant LPA and ask if the case officer still works there? If so, speak to the case officer and check whether a short, informal phone interview to discuss the planning application would be possible. If so, arrange for as soon as possible. A follow up email with information about the project and the objectives of the interview would be useful.

B1.3 Analysis

When a suitable case study has been identified and selected, it then needs to be analysed in order to determine how it demonstrates that land-use planning is planning for climate change.

Analysis Questions and Actions

Theme	Key Questions	Action
General application	How has climate change been addressed in this application? How did the officer deal with climate change? To what extent it is dealt with?	Review the application and begin to draft notes on how climate change is being addressed within the application. Extract key paragraphs which refer to climate change risks and issues.
	Why the application was considered acceptable despite being in a climate risk area?	Review reports and talk to the case officer to determine why the application was considered acceptable, despite being within a climate risk area?
	How is climate change weighted within the officer's report/committee report/member's decision report?	Review the application's report and consider how climate change risk appears to be weighted against other planning issues? Talk to the case officer to explore this in more

		detail.
	What adaptation/mitigation measures/avoidance measures were proposed? Did these make the application more acceptable?	Review the application and extract any adaptation/mitigation/avoidance measures proposed or requested.
	Are applicants pro-actively setting out how their proposals take into account climate change issues or are the issues being dealt with at a later stage in the process, i.e. through conditions.	Do the supporting documents explicitly set out the proposals will deal with climate change risks and issues? Do the conditions pick up gaps within the supporting documents?
	Is climate change dealt with implicitly or explicitly?	Are climate change risks and issues associated with the application directly addressed or are the links more subtle, e.g. open space preservation is important for many reasons, one of which happens to be the risks associated with climate change.
	To what extent are applicants dealing with climate change issues in their proposals? How do they take account of future climate change forecasts?	Does the applicant's proposals deal with climate change risks as they exist at present or do they go further and suggest adaptation/resistance/resilience measures in relation to future climate change scenarios/ extreme weather events associated with future climate change, etc. For example, is there evidence of the Flood Risk Assessment taking into account future extreme rainfall events in addition to present extreme rainfall events?
	Did the planning process add value to the application in relation to climate change? If so, how?	Review the application to determine if planning made a difference in relation to climate change, and if so how. Begin to draw conclusions.
Supporting	What supporting documents	Review supporting documents and

Documents	did the applicant provide which contained reference to climate change adaptation?	list those which contained references to climate change adaptation.
	Has climate change adaptation been addressed within the supporting documents?	
	How has climate change adaptation been addressed within the supporting documents? To what extent is climate change addressed within the supporting documents?	Review the supporting documents and extract key paragraphs.
	What information was required by the LPA within the supporting documents? What level of evidence does the LPA need to make a robust decision on the application, in relation to climate change?	Review the application and search for any requirements listed. Talk to the case officer to explore what level of evidence he needs to make a decision on the application.
	How has analysis been carried out within the supporting documents? Are consistent methodologies being used in the supporting documents (which require a methodological process)? Are consistent data sources being used?	Review the supporting documents and comment on how climate change analysis is carried out? Review the methodologies adopted. Make a note of the data sources being used also, to allow comparison with other case studies. For example, do the Flood Risk's Assessments all follow a similar method process or are they widely variable? Is the local evidence base being used as a data source, or are national statistics drawn upon?
Committee	• Was the application recommended for refusal or approval by the officer? • Did the committee concord or discord with the case officer's	Review the officer's report and the committee report.

	recommendation? If it did discord, what were the reasons for this?	
	• To what extent did the committee give weight to climate change issues in their decision, if at all? • Did the committee reinforce or reduce the importance placed on climate change issues?	Review the officer's report and the committee report. Talk to the case officer if possible to see how the committee dealt with any climate change risks.
Appeal	• Were the original reasons for refusal related to climate change? If so, what role did it play in the decision making process?	Review the reasons for refusal and extract those which relate to climate change. If none of the reasons relate to climate change, this is also a finding within itself and should be noted. Check both the decision notice, which will list the reasons for refusal, and the officer's report, which may describe in more detail the reasons for refusal.
	• Why was the application eventually permitted? Did introducing climate change adaptation measures influence any change in the decision? What did planning do to make it better in relation to climate change?	Review the appeal report to find out why the refusal was overturned. List any comments which suggest climate change measures influenced any change in the decision?
Conditions	• What/how many conditions were applied to the planning application which related to climate change risk?	Review conditions (within decision notice) and make a note of how many related to climate change. Particularly interesting conditions should be extracted.
	• How many	Review conditions (within decision

	conditions could be discharged on a one-off basis and how many involved ongoing monitoring?	notice)
	• What happened to the climate change related conditions after the planning application was approved? Did the case officer follow them up? Did the case officer/enforcement ever have to follow up on of the climate change related conditions?	Talk to the case officer and question. Is this an area of difficulty for the case officer in practice?
	• To what extent are the climate change related planning conditions adding time and costs to the development?	Talk to the case officer. For how long did discharging conditions delay the development starting/finishing? What were the direct and indirect associated costs?
Policy	• What policy in relation to climate change was drawn upon within the application? What relevant policies were in place at the time that are found within the application/decision notice?	Review the planning application and relevant reports and extract policy which relates to climate change.
	• At what level was climate change policy identified e.g. local, regional, and national in the application/decision notice? Was there any site specific policy that related to climate change?	Review the planning application and relevant reports and make a note of the local, regional and national climate change policies drawn upon? Search for any site specific policy for the site. Does this relate to climate change?
Pre-	• Was there any pre-	Look for pre-application meeting

Application Discussion	application discussion? • Who was involved in the discussion? Case officer/Stat consultees, e.g. EA/specialists? • How did the application change as a result of pre-application discussions? Did climate change risk influence any changes in the development proposed e.g. lead to a reduction in scale.	notes and minutes. However, these are rarely formally recorded. Discussion with the case officer may be needed.
Validation	• Do LPAs think about climate change adaptation at the validation stage of the planning process? E.g. is a Climate Change Adaptation report/FRA, etc. on the checklist?	Talk to the LPA or case officer and ask what their validation process entails and whether climate change is brought into this e.g. what is on their checklist.
Consultation	• Did the Statutory consultees comment on the application? (EA is the most significant). If they did comment, did they bring up climate change issues?	Review list of statutory consultees and their comments. Extract any which relate to climate change risks and issues.
	• Did internal planners deal with the application, or did they have to seek external advice?	Talk to the case officer to find out this information.
Planning Obligations	• Are there any s106 contributions requested which relate to climate change? • Were there any unilateral undertakings proposed which related to climate change? (Similar to s106, so search document for wording: "unilateral	Review the application – a search function for "obligations" "s106" and "unilateral undertakings" should help identify the relevant sections. Extract any agreements which relate to climate change? How do they relate to climate change? Why are they important? How do they make the planning application more acceptable against climate change

	undertaking").	risk?
Monitoring and Compliance Analysis	• Is monitoring and compliance a tick box exercise or do case officers actively go on site before discharging conditions?	Talk to the case officer to find out their follow up process and the extent to which it is carried out.

B1.4 Interview Pro-Forma

The interview pro-forma is intended to provide some direction for the case officer interviews, but does not constitute a rigid framework. If any other questions are felt to be relevant to your case study, please ask them.

Interview Pro Forma – Case Officer

Introduction

- How has climate change been addressed in this application?
- What weight did the issue of climate change play in determining the application? Do you see climate change as an important/unimportant factor in relation to other determining factors?
- Why was the application allowed despite being in a climate risk area?
- Do you feel the adaptation/mitigation/avoidance measures proposed were sufficient?

Conditions

- What was the reason behind applying X conditions (which relate to climate change)?
- Are the climate change related conditions followed up/monitored by the case officer?
- What process is undertaken when discharging conditions? Is the site visited, for example, or are details of the scheme sufficient?
- Were all the conditions relating to climate change successfully discharged? If not, did you (the case officer) or enforcement take action?

Supporting Documents

- What level of evidence do you (the case officer) require in the supporting documents to make a robust decision on the application in relation to climate change?

Pre-Application Stage

- Was there any pre-application discussion?
- If so, who was involved in the discussion? Case officer/Stat consultees, e.g. EA/specialists?
- How did the application change as a result of pre-application discussions? Did climate change risk influence any changes in the development proposed e.g. lead to a reduction in scale.

Policy

- When did climate change risk begin to be addressed within the LPA's policy?
- Are there any site specific policies relating to this site? Do any of them relate

to climate change risk?

Validation

- Does the planning department think about climate change adaptation at the validation stage of the planning process? If so, how? E.g. is a Climate Change Adaptation report/FRA, etc. on the checklist?

Consultation

- Did internal planners deal with the application, or did the LPA seek external advice?

Committee

- If the application went to the planning committee, was climate change brought up as an issue to be addressed? If so, how?
- Did the planning committee place any weight on the climate change issues of the application?

Planning Obligations

- Why were there no s106 agreements in relation to climate change for this application? (If none are evident).
- How important were climate change issues during the s106 negotiation for this application? Is this reflected in the outcome of the s106 negotiations?

Appendix C

Fluvial Flooding

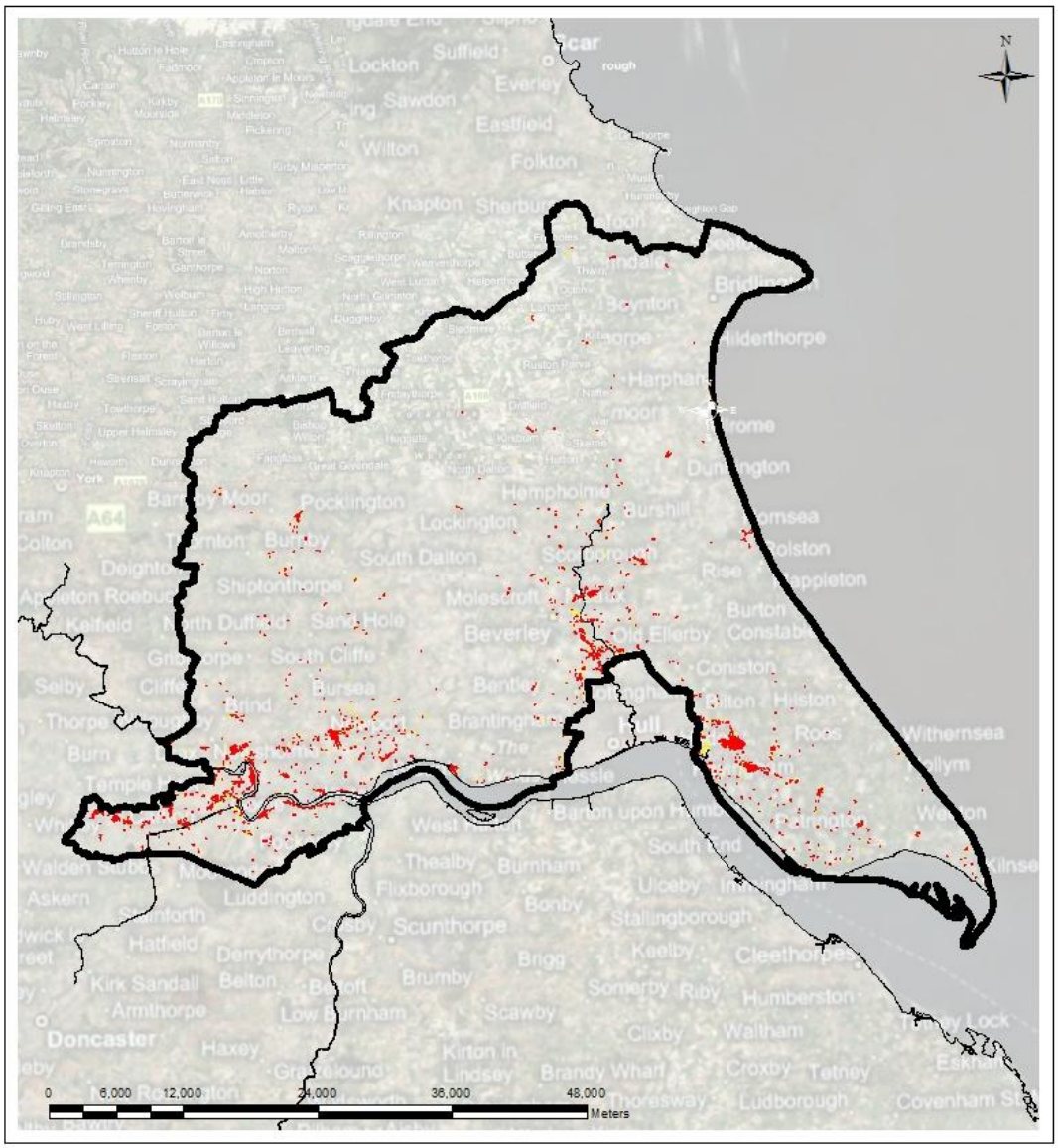
Contents

C1 Fluvial Flooding

C1.1 Data Note

Note: Change in area of buildings between 2001 and 2011 within the fluvial data does not take into account positional accuracy improvements made within Ordnance Survey MasterMap data over this period. See http://www.ordnancesurvey.co.uk/oswebsite/pai/ and http://www.ordnancesurvey.co.uk/oswebsite/pai/faqgeneral.html#g1 for further details

C1.2 East Riding: change in buildings within flood risk areas (2001 to 2011)

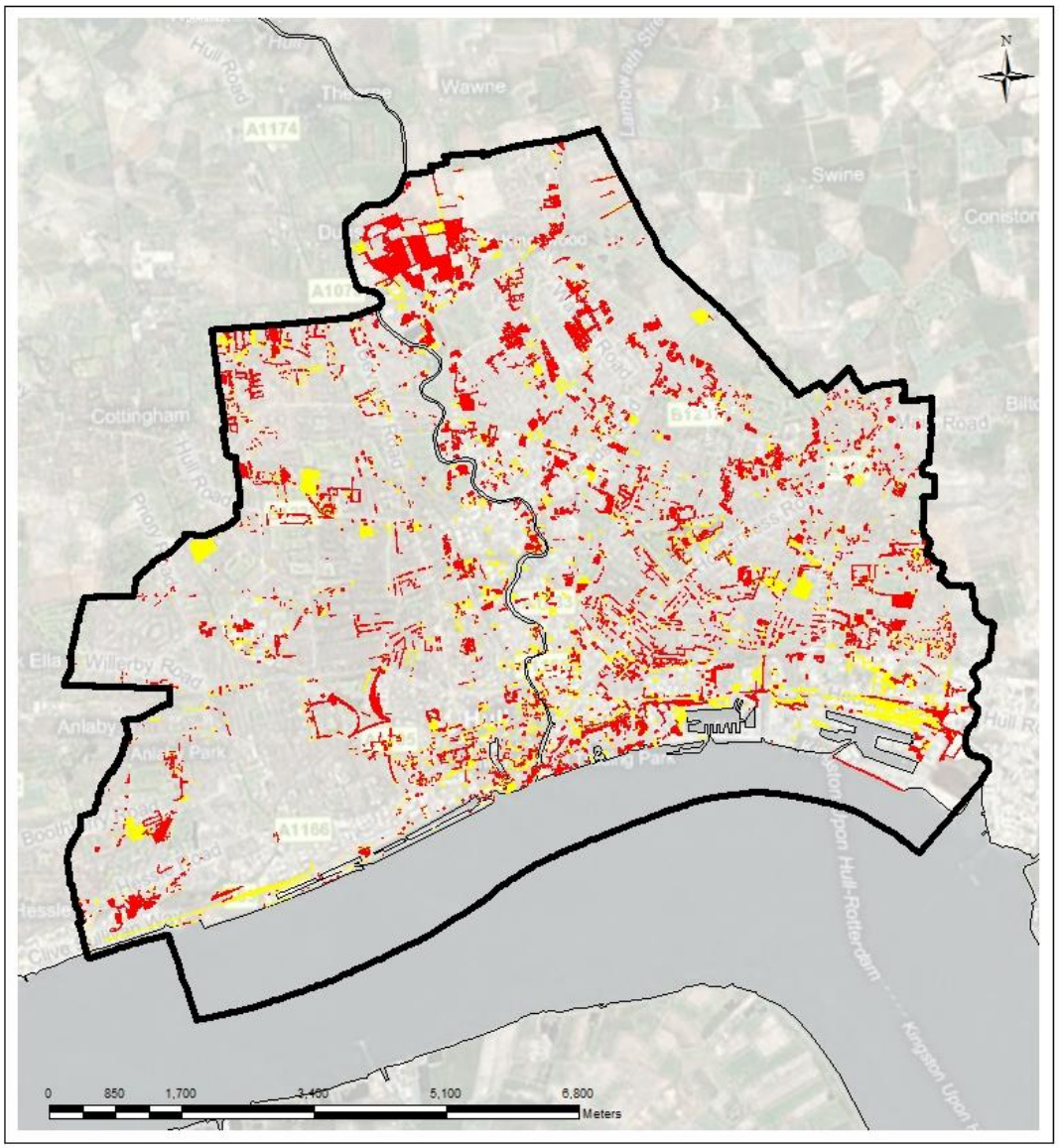


Legend

East Riding: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

East Riding: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.3 Hull: Change in land covered by buildings within flood risk areas (2001 to 2011)

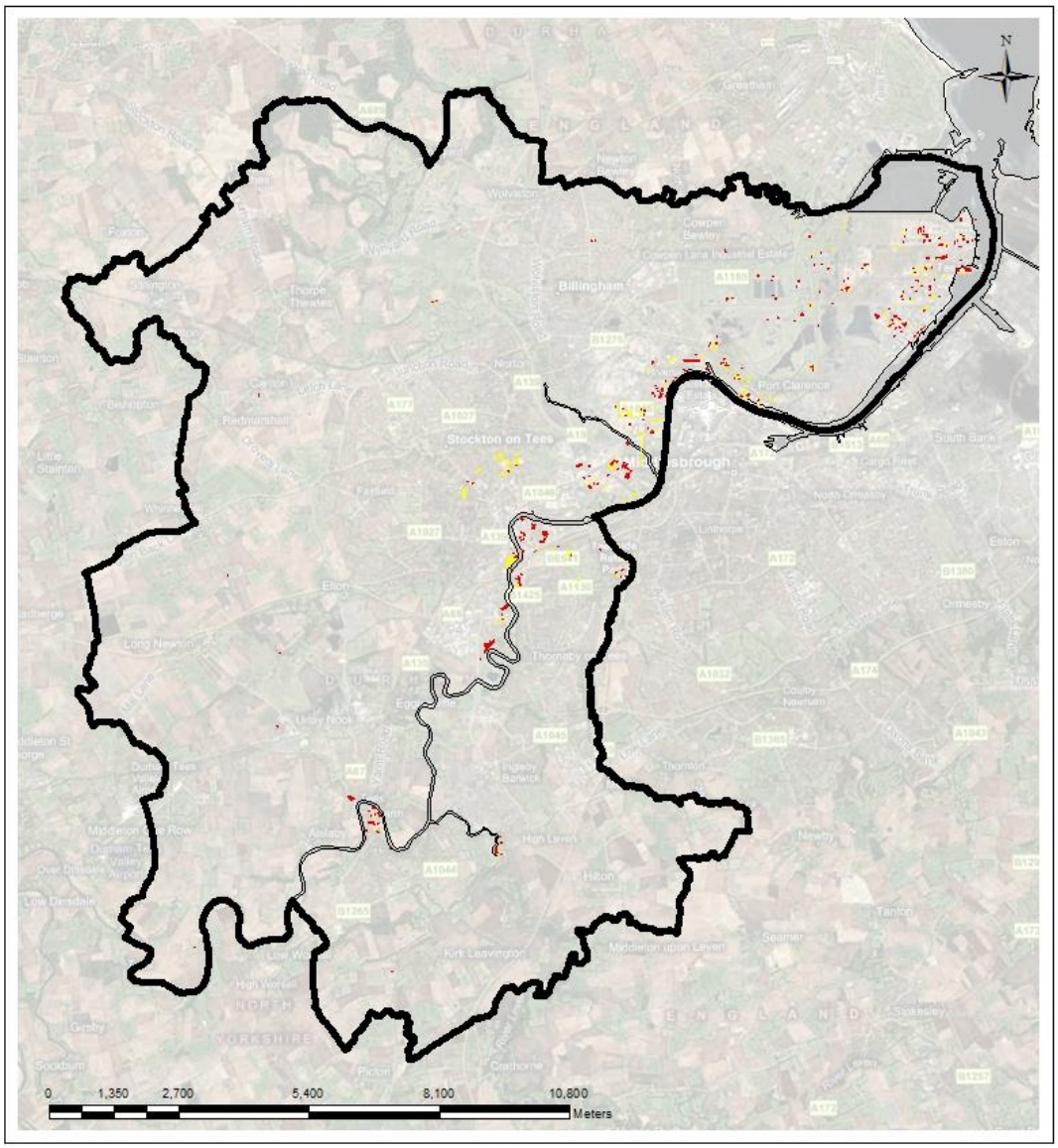


Legend

Hull: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

Hull: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.4 Stockton: Change in land covered by buildings within flood risk areas

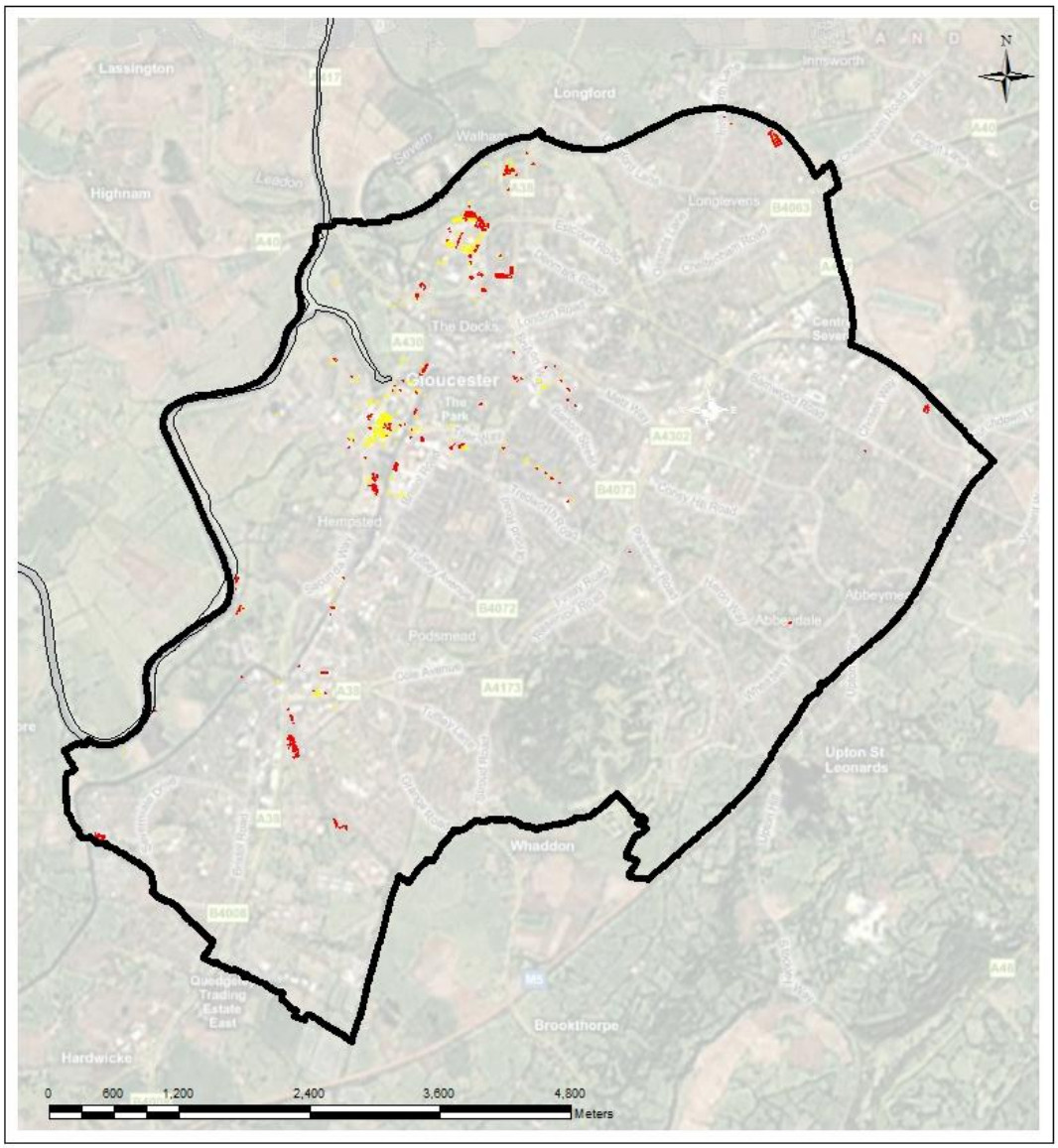


Legend

Stockton: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

Stockton: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.5 Gloucester: Change in land covered by buildings within flood risk areas

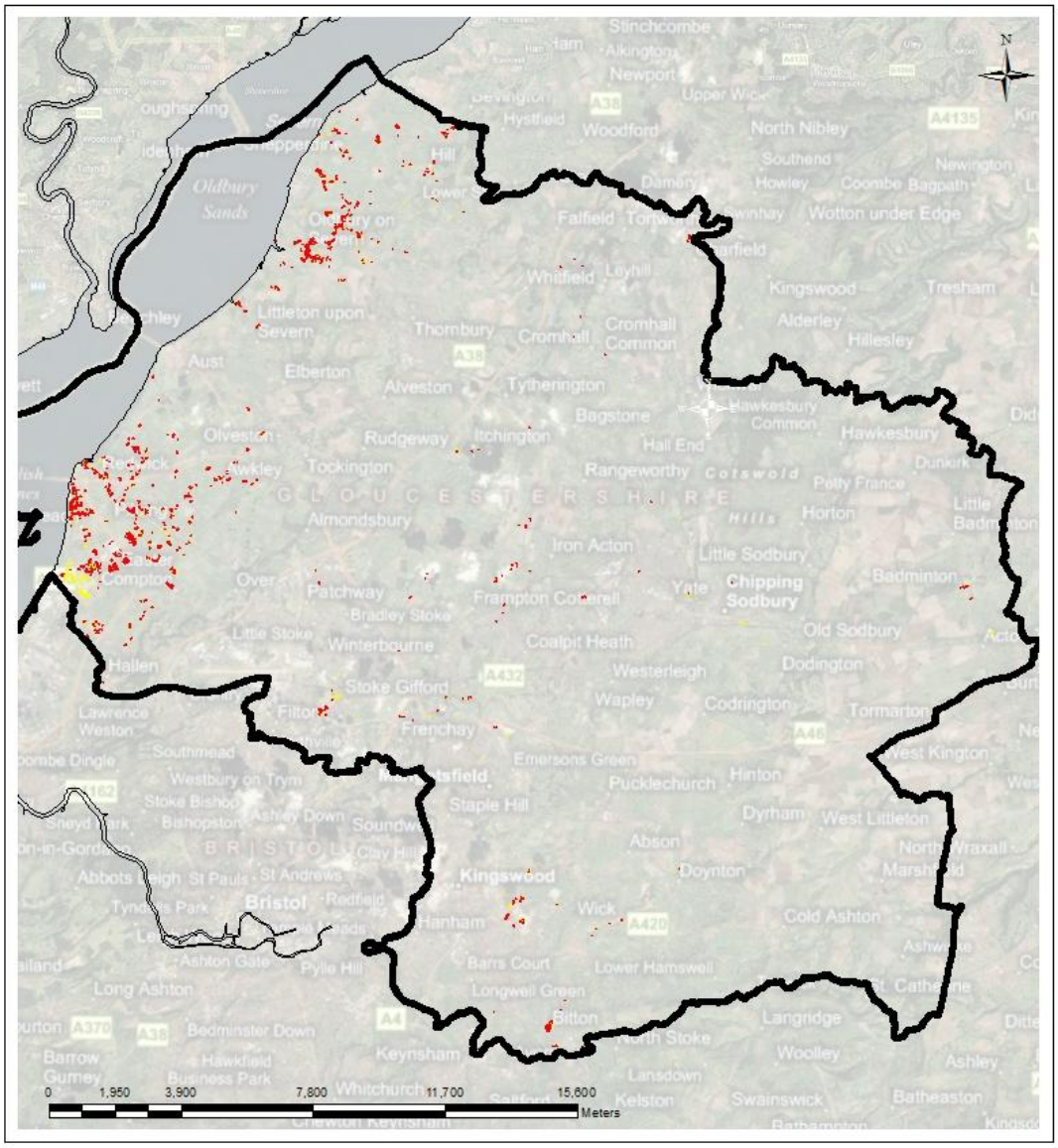


Legend

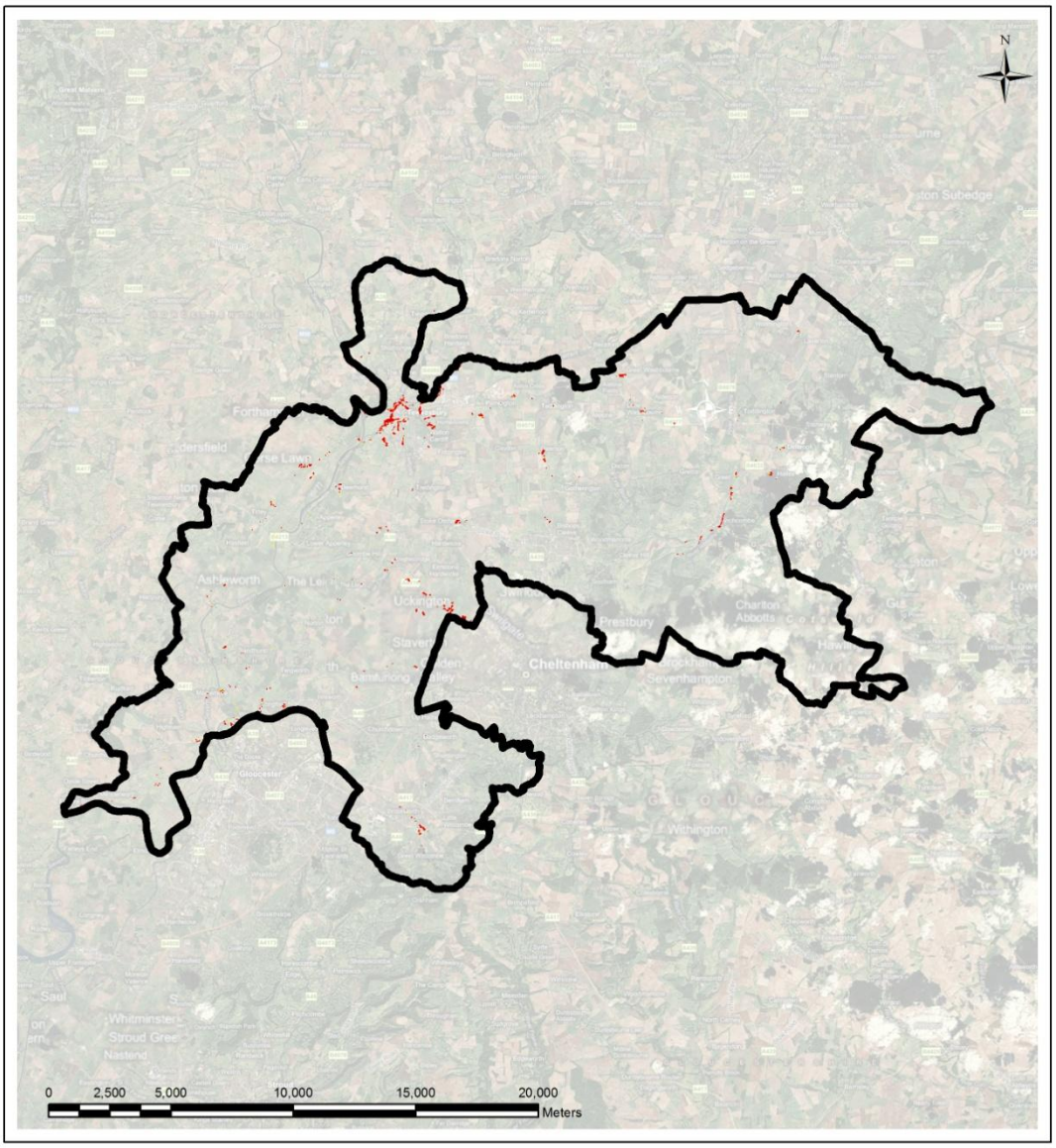
Gloucester: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

Gloucester: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.6 South Gloucestershire: change in land covered by buildings within flood areas (2001 to 2011)



C1.7 Tewkesbury: change in land covered by buildings within flood risk areas (2001 to 2011)

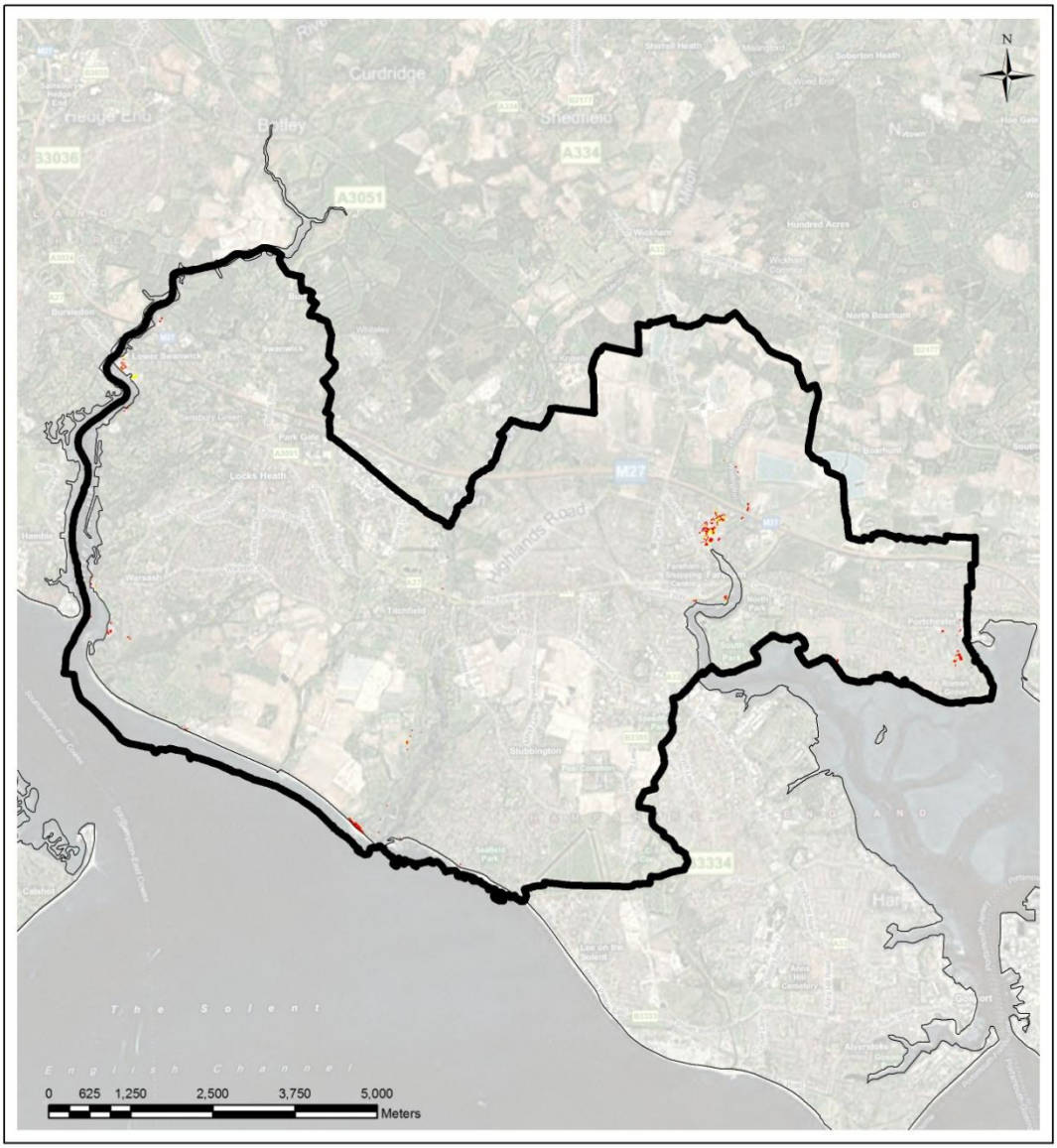


Legend

Tewkesbury: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

Tewkesbury: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

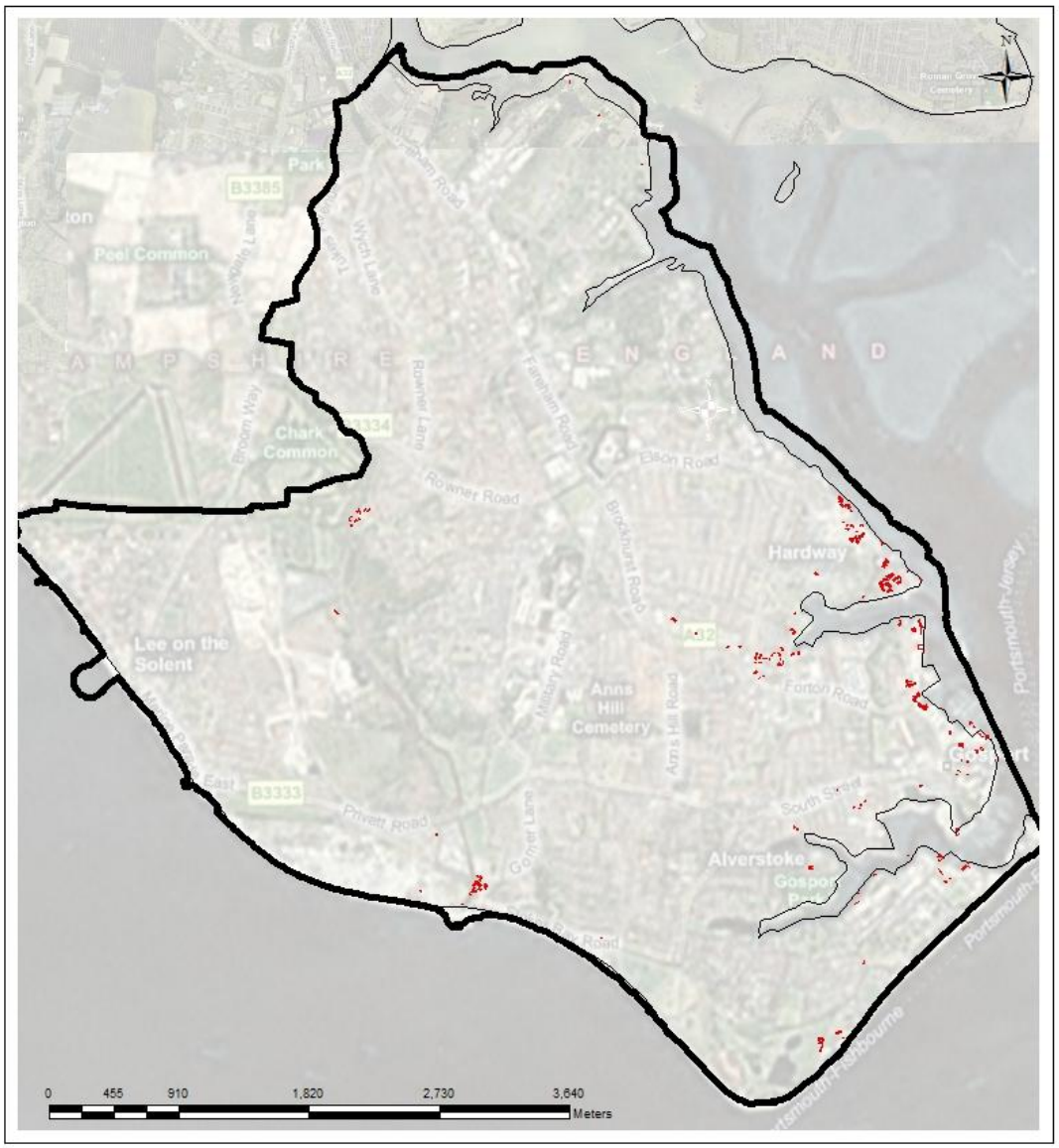
C1.8 Fareham: change in land covered by buildings within flood risk areas (2001 to 2011)



Legend

- Fareham: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011
- Fareham: decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.9 Gosport: change in land covered by buildings within flood risk areas (2001 to 2011)

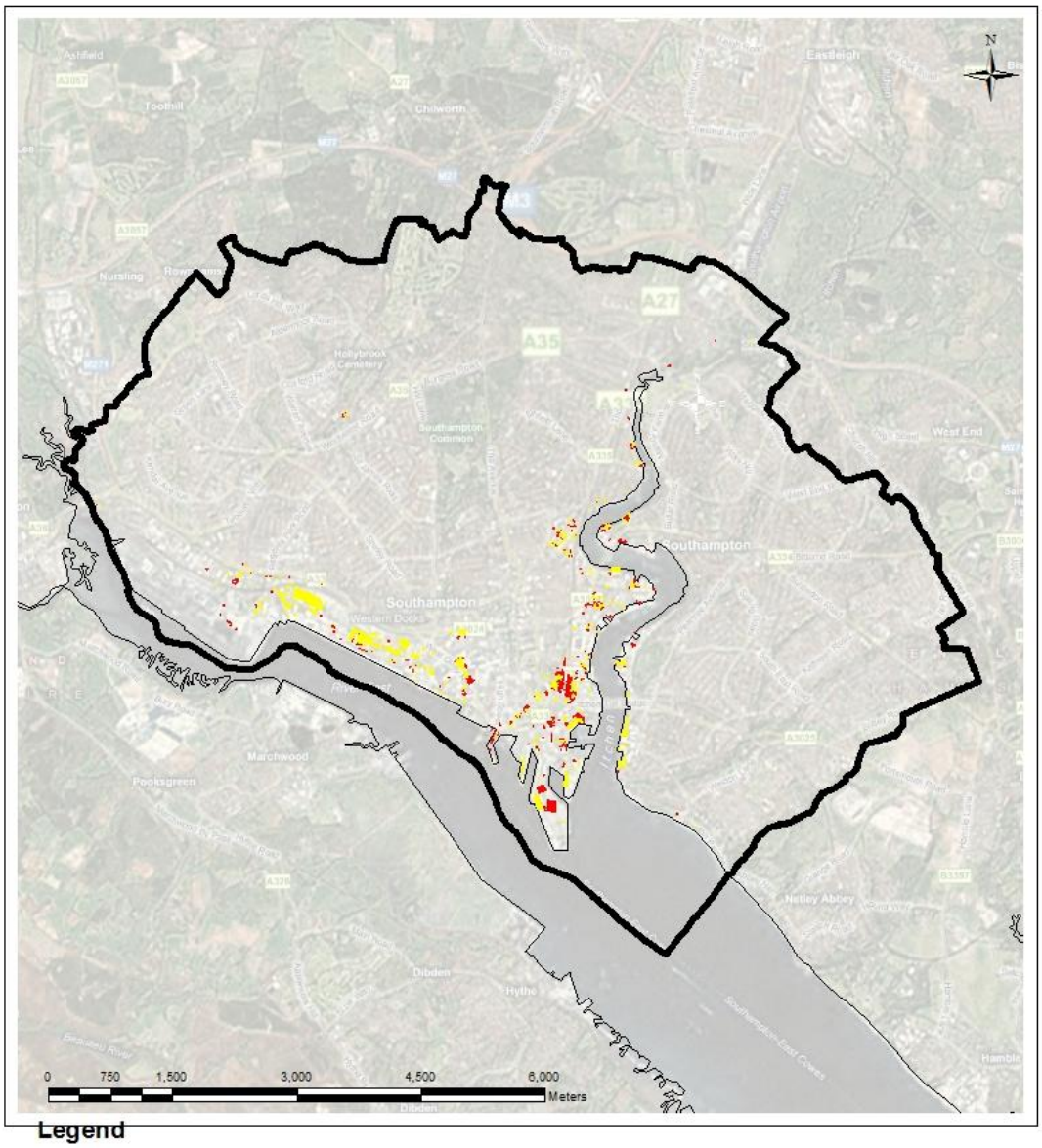


Legend

Gosport: increase in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

Gosport decrease in land covered by buildings within areas at risk of fluvial flooding between 2001 and 2011

C1.10 Southampton: change in land covered by buildings within flood risk areas (2001 to 2011)



Appendix D

Pluvial Flooding

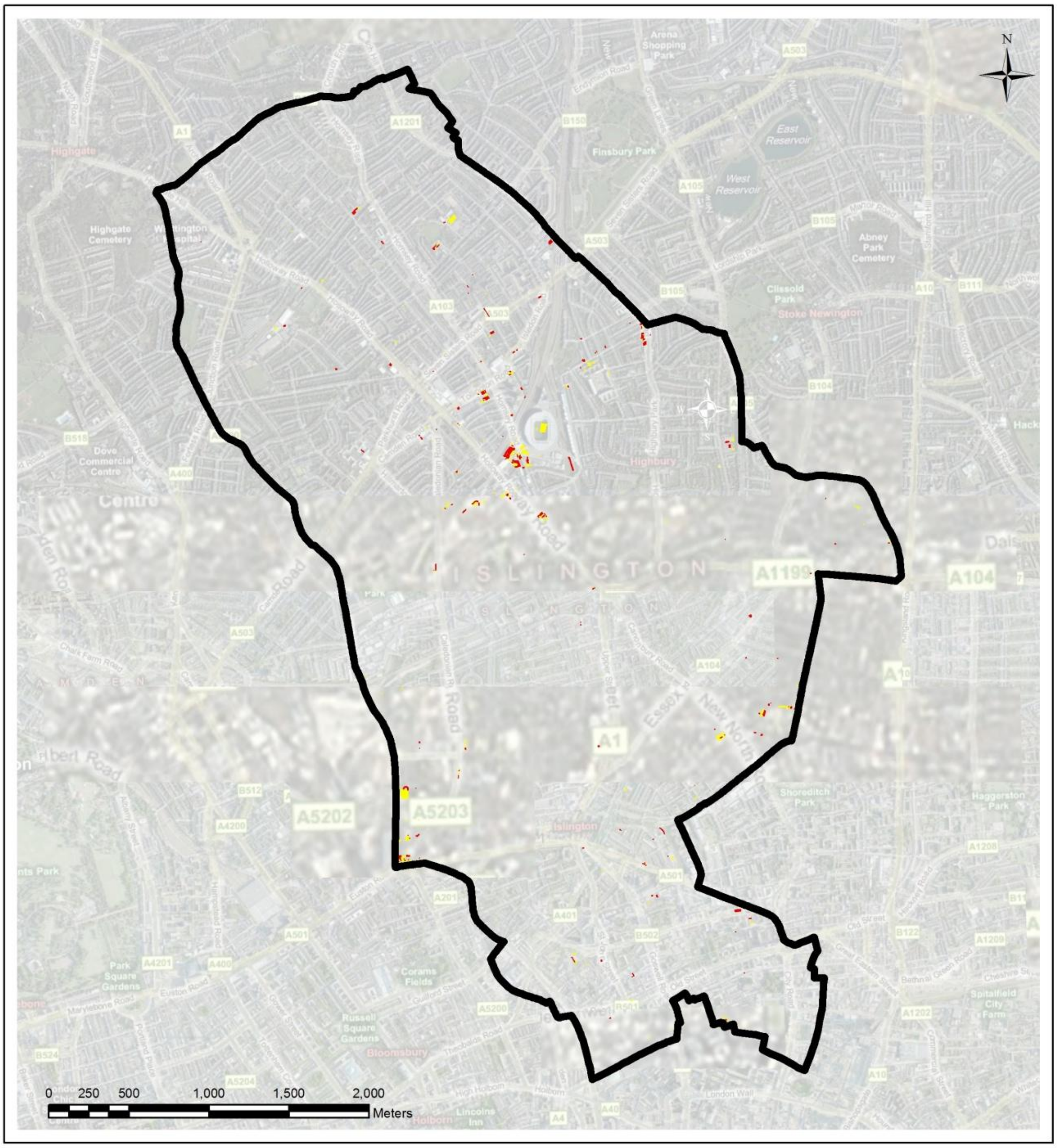
Contents

D1 Pluvial Flooding

D1.1 Data Note

Note: Change in area of buildings between 2001 and 2011 within the pluvial data does not take into account positional accuracy improvements made within Ordnance Survey MasterMap data over this period. See http://www.ordnancesurvey.co.uk/oswebsite/pai/ and http://www.ordnancesurvey.co.uk/oswebsite/pai/faqgeneral.html#g1 for further details

D1.2 Islington: change in buildings on pluvial land (2001 to 2011)

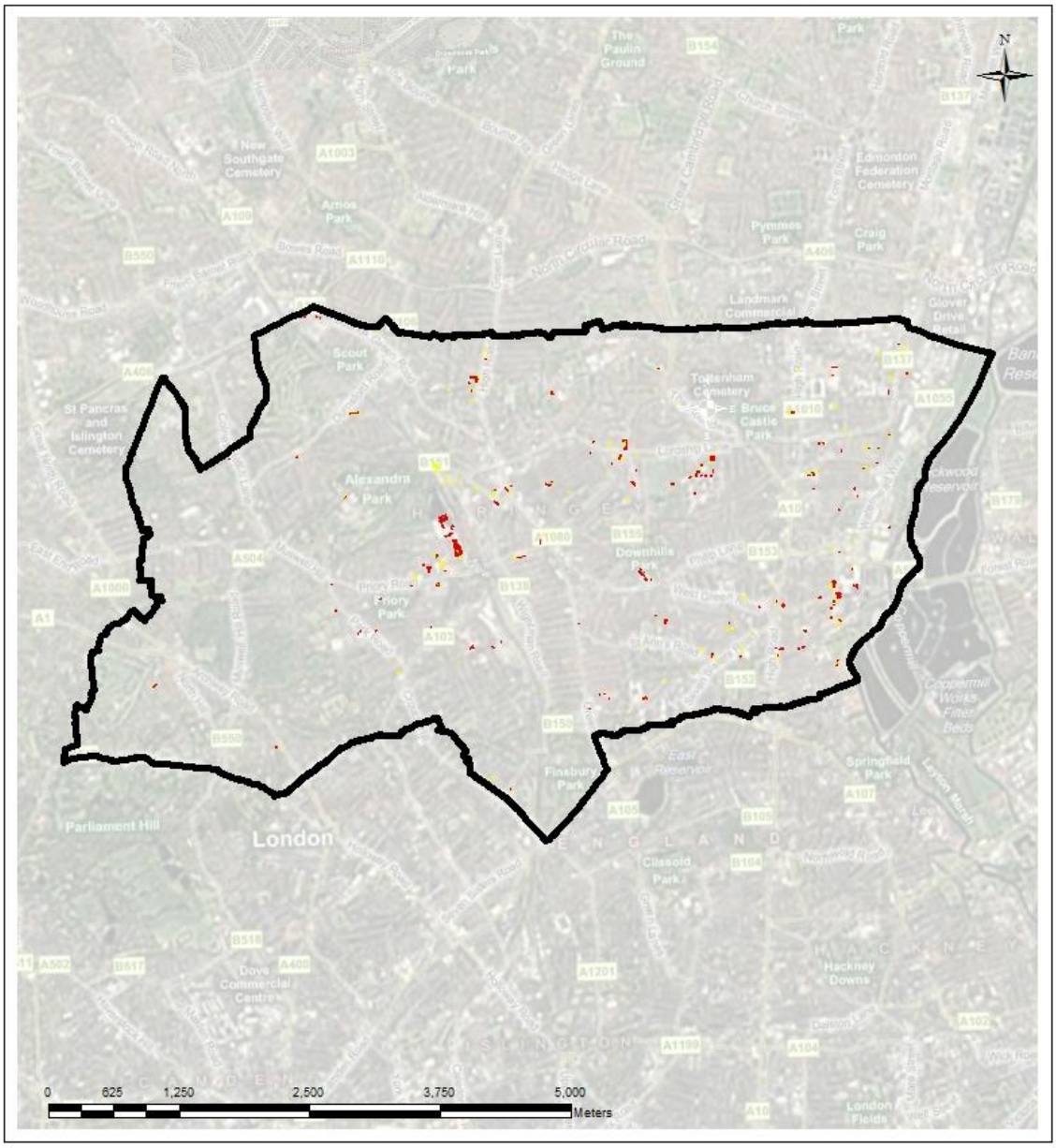


Legend

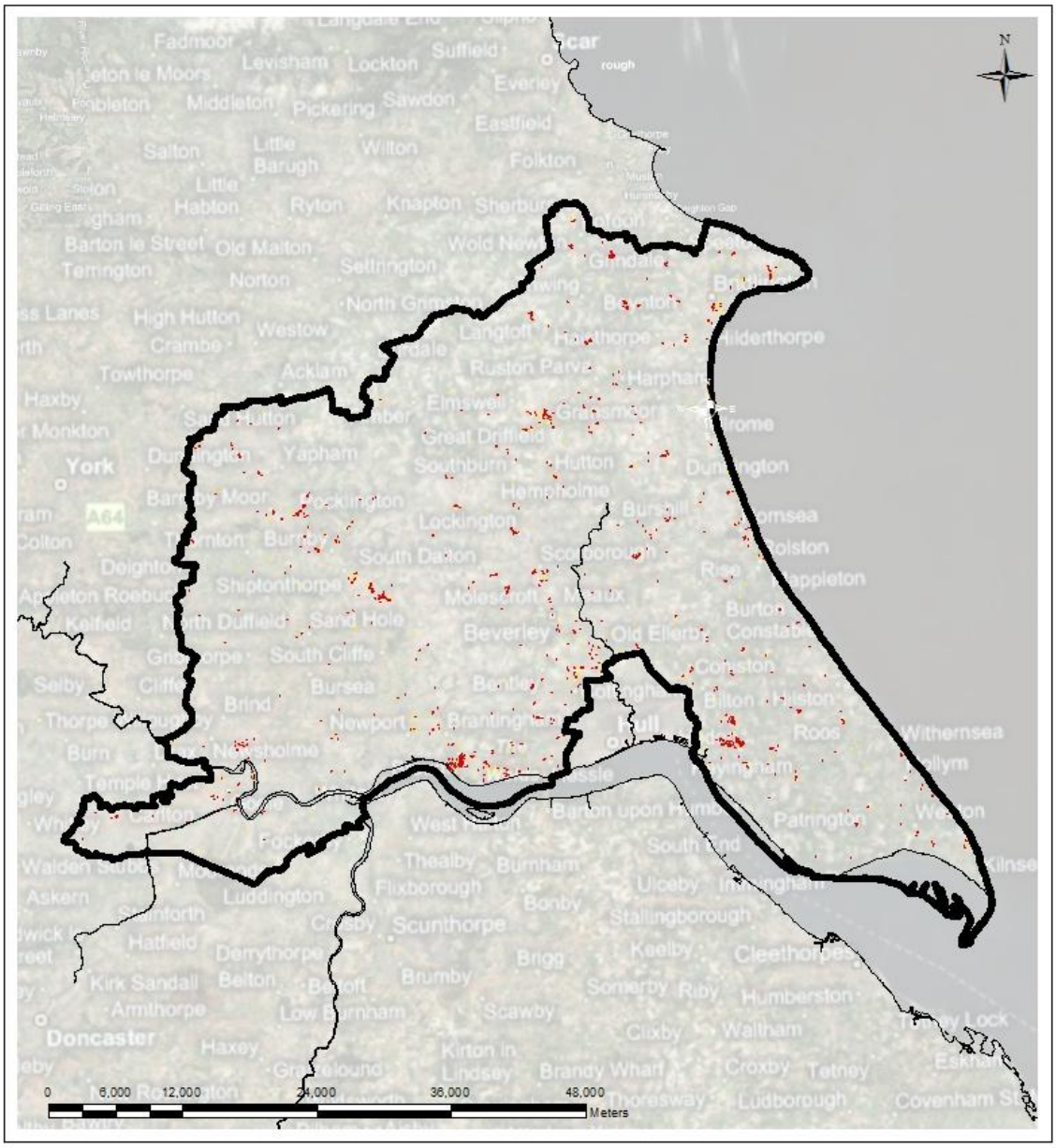
Islington: increase in buildings from 2001 to 2011 on pluvial land

Islington: decrease in buildings from 2001 to 2011 on pluvial land

D1.3 Haringey: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)



D1.4 East Riding: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)

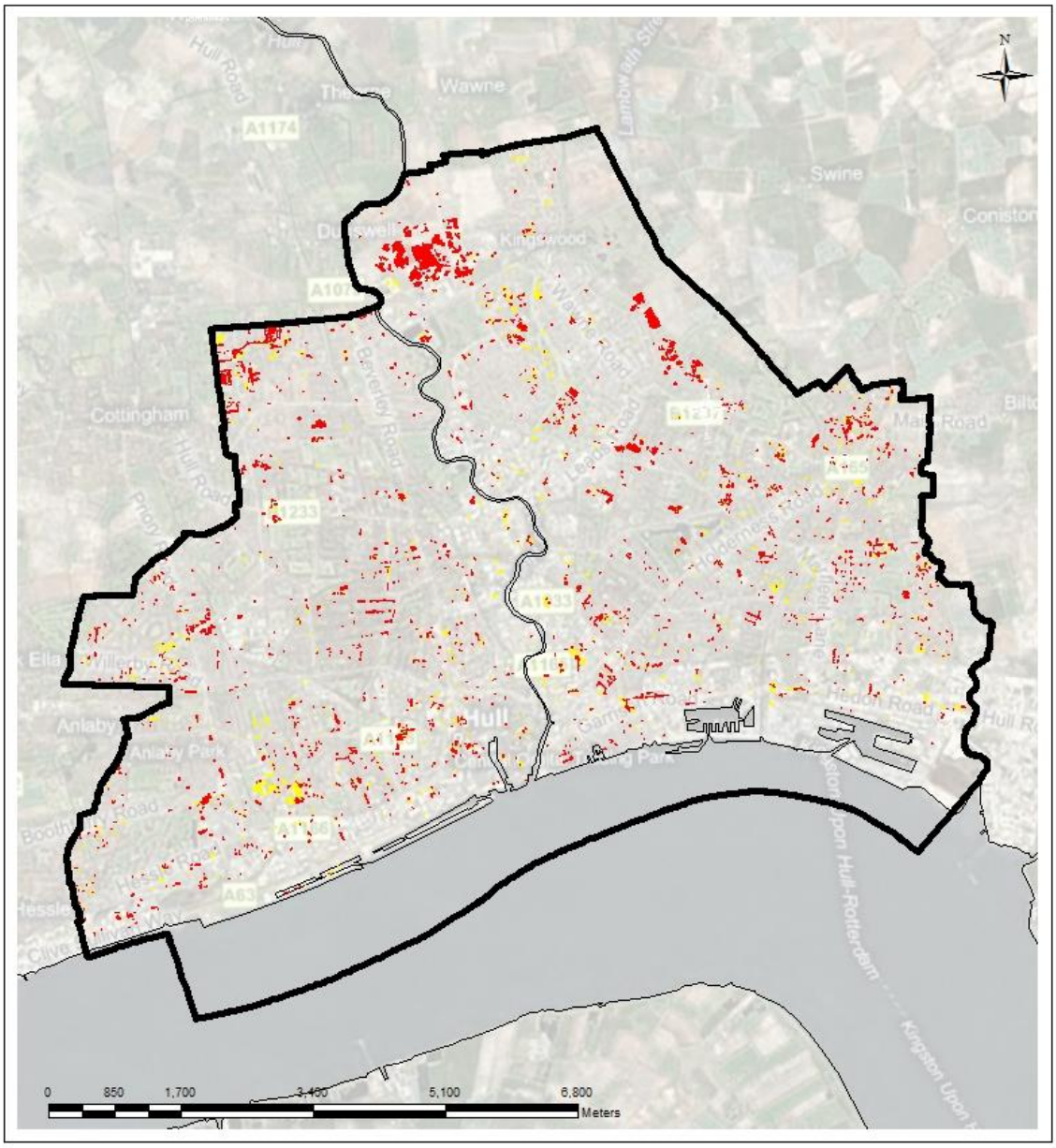


Legend

East Riding: increase in buildings from 2001 to 2011 on pluvial land

East Riding: decrease in buildings from 2001 to 2011 on pluvial land

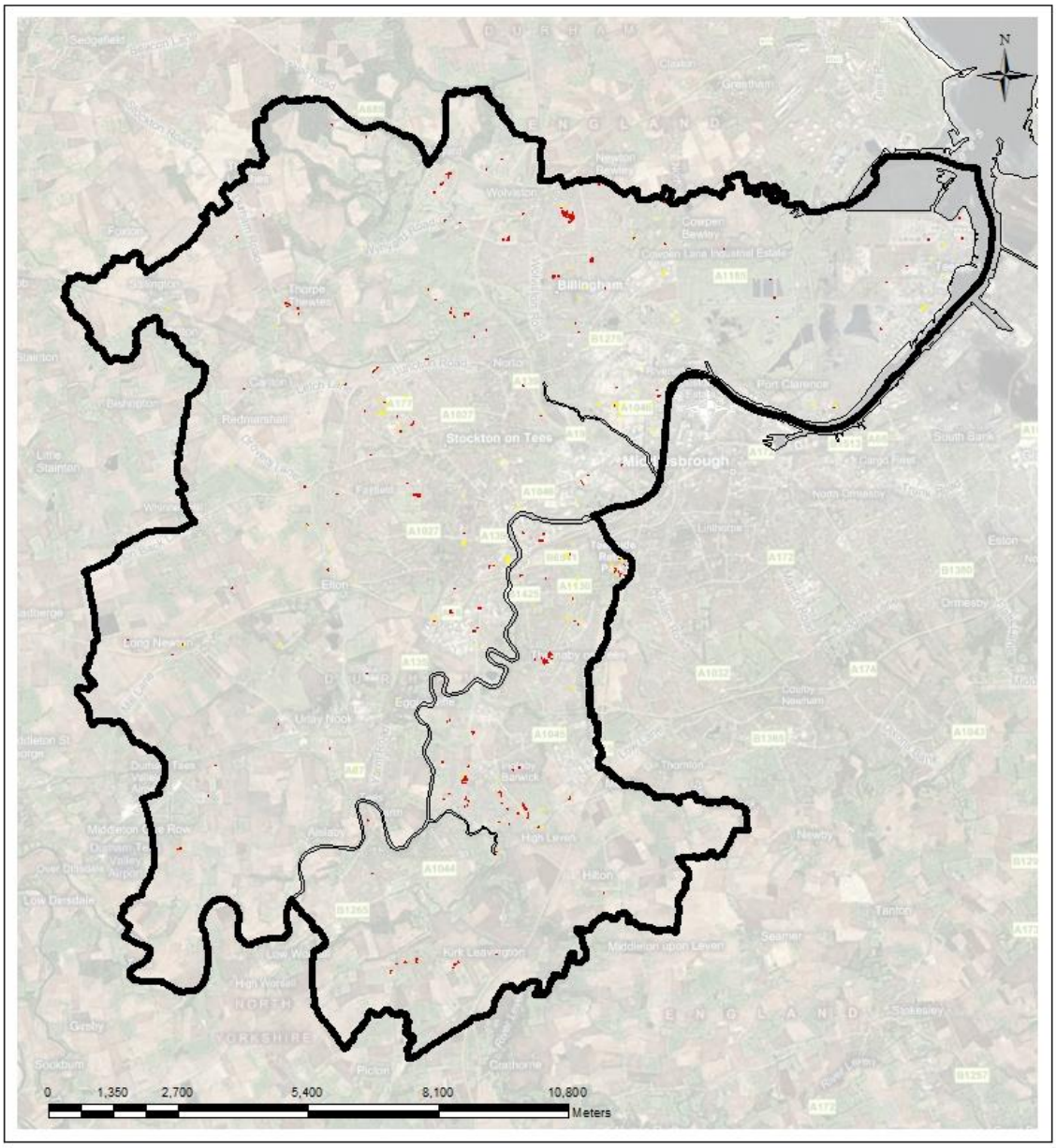
D1.5 Hull: change in buildings in areas susceptible to surface water flooding



Legend

- Hull: increase in buildings from 2001 to 2011 on pluvial land
- Hull: decrease in buildings from 2001 to 2011 on pluvial land

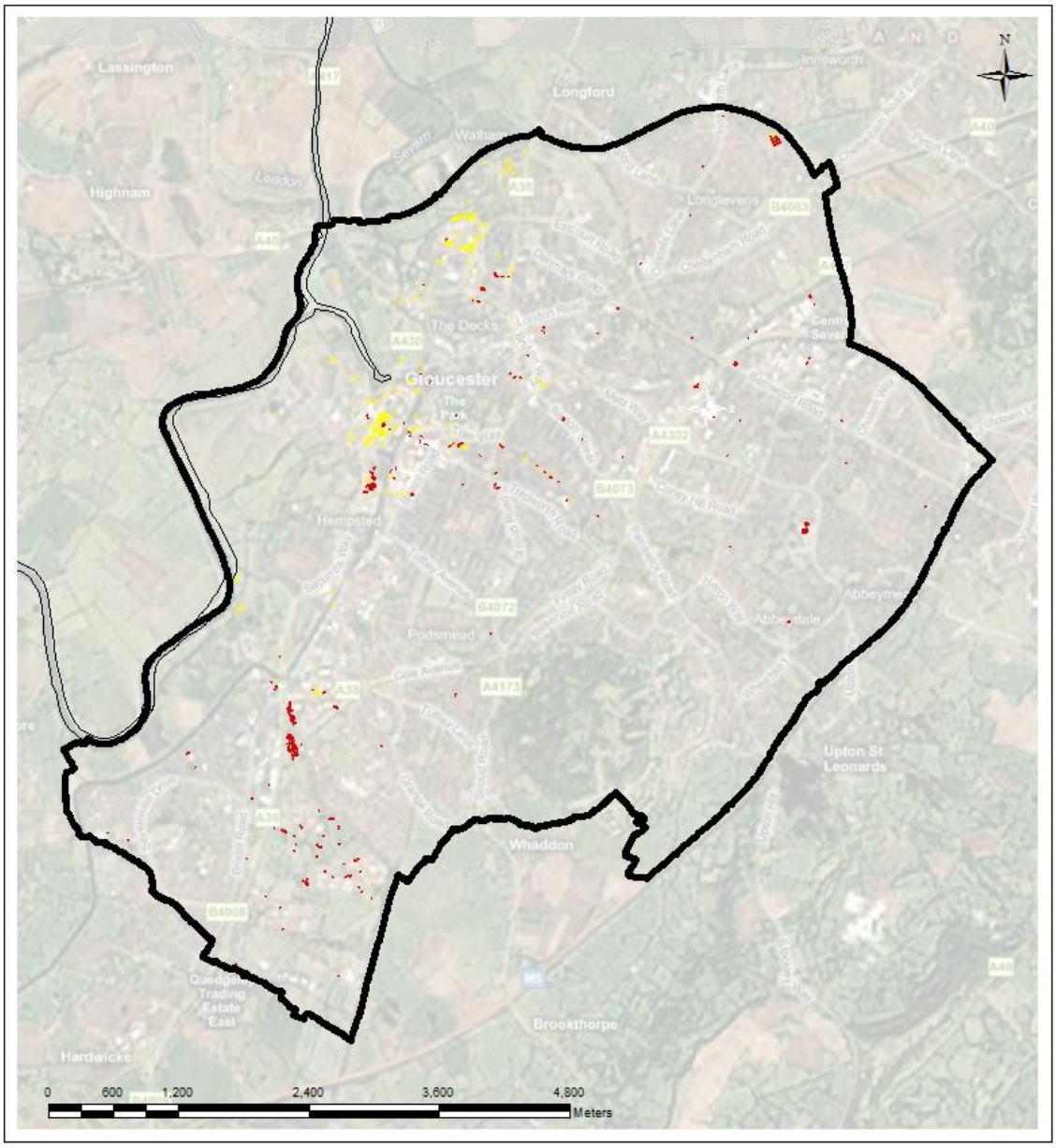
D1.6 Stockton: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)



Legend

- Stockton: increase in buildings from 2001 to 2011 on pluvial land
- Stockton: decrease in buildings from 2001 to 2011 on pluvial land

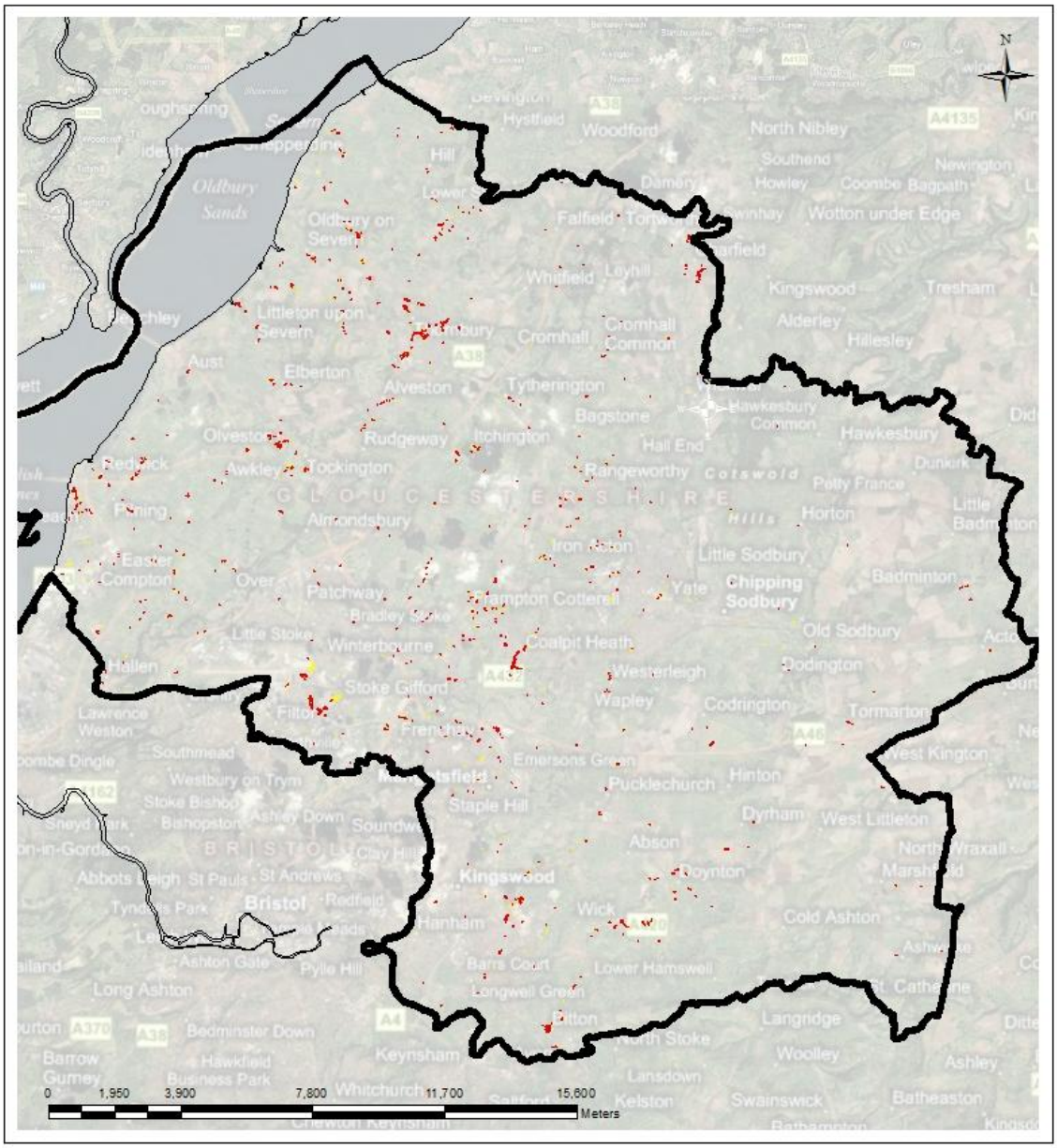
D1.7 Gloucester: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)



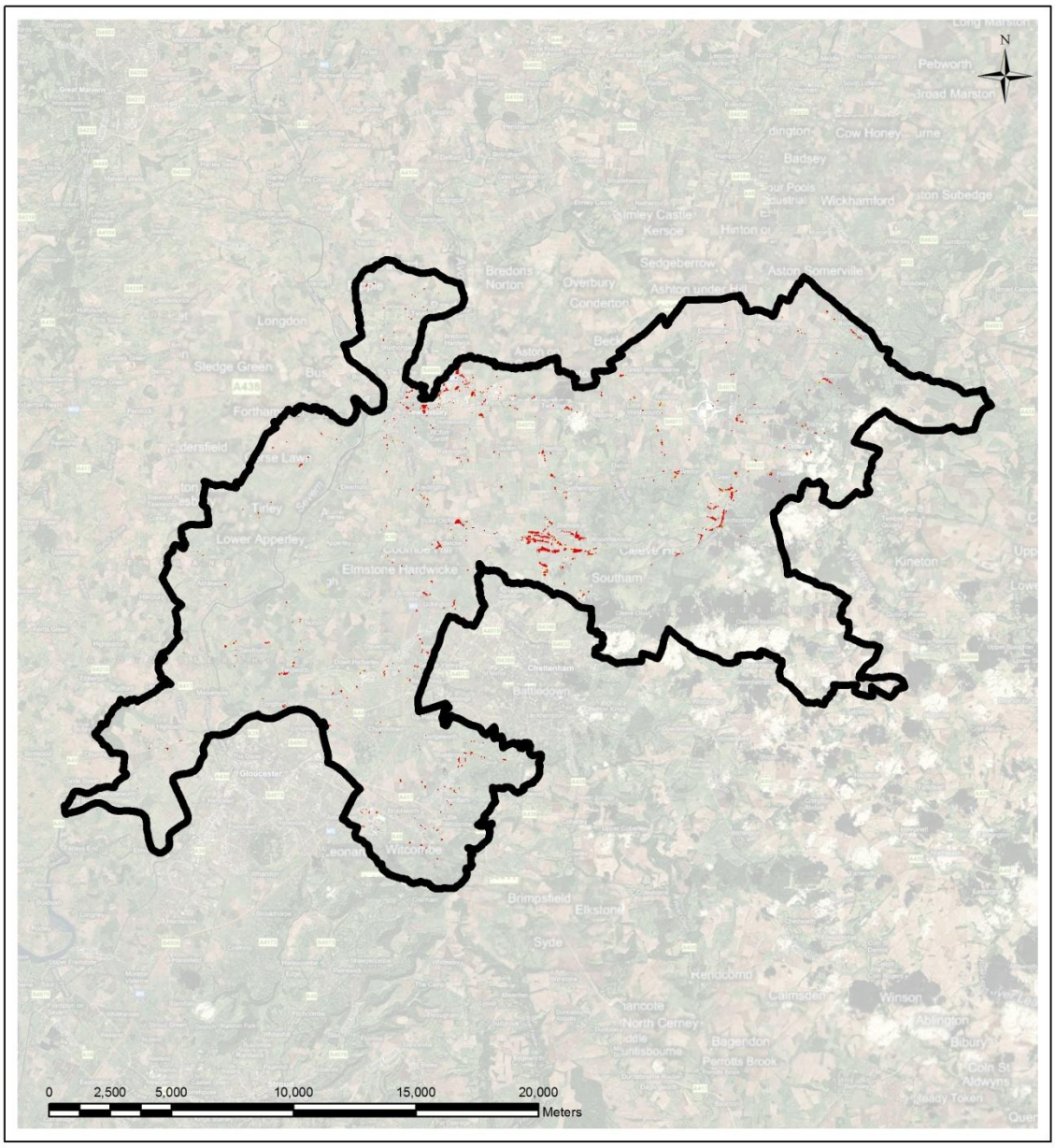
Legend

- Gloucester: increase in buildings from 2001 to 2011 on pluvial land
- Gloucester: decrease in buildings from 2001 to 2011 on pluvial land

D1.8 South Gloucestershire: change in buildings in areas susceptible to pluvial flooding, 2001 to 2011



D1.9 Tewkesbury: change in buildings in areas susceptible to pluvial flooding

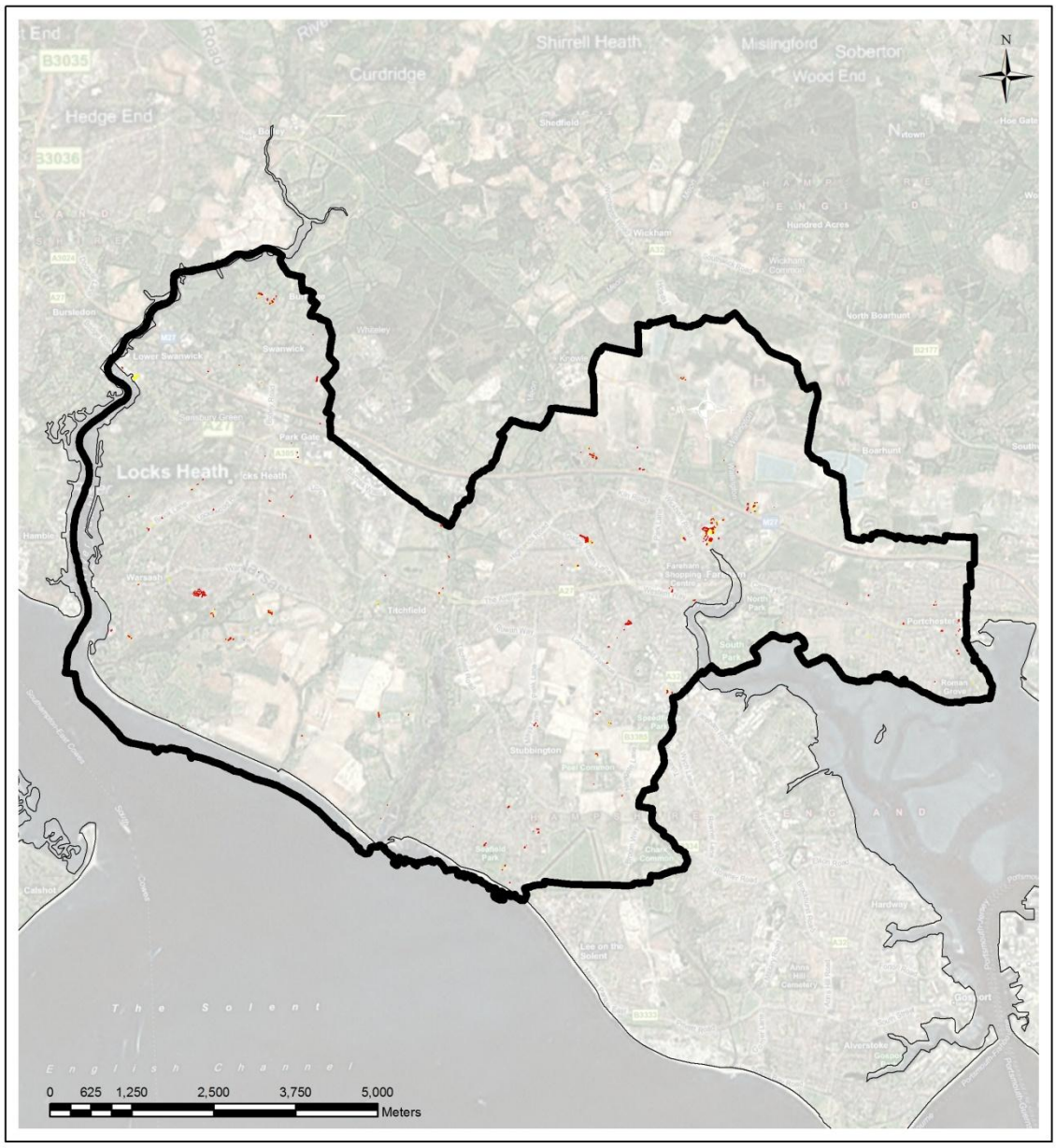


Legend

Tewkesbury: increase in buildings from 2001 to 2011 on pluvial land

Tewkesbury: decrease in buildings from 2001 to 2011 on pluvial land

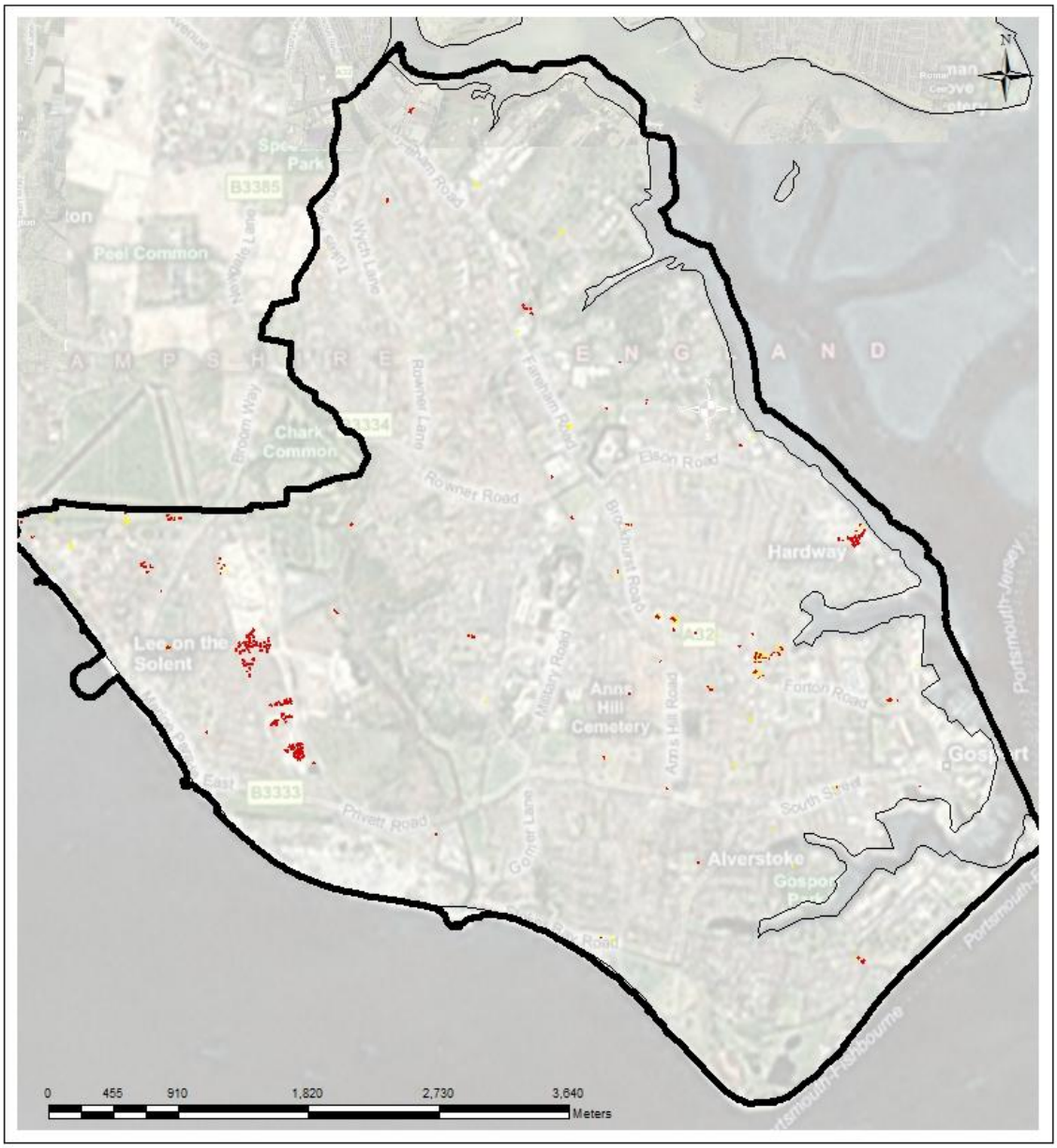
D1.10 Fareham: change in buildings in areas susceptible to pluvial flooding



Legend

- Fareham: increase in buildings from 2001 to 2011 on pluvial land
- Fareham: decrease in buildings from 2001 to 2011 on pluvial land

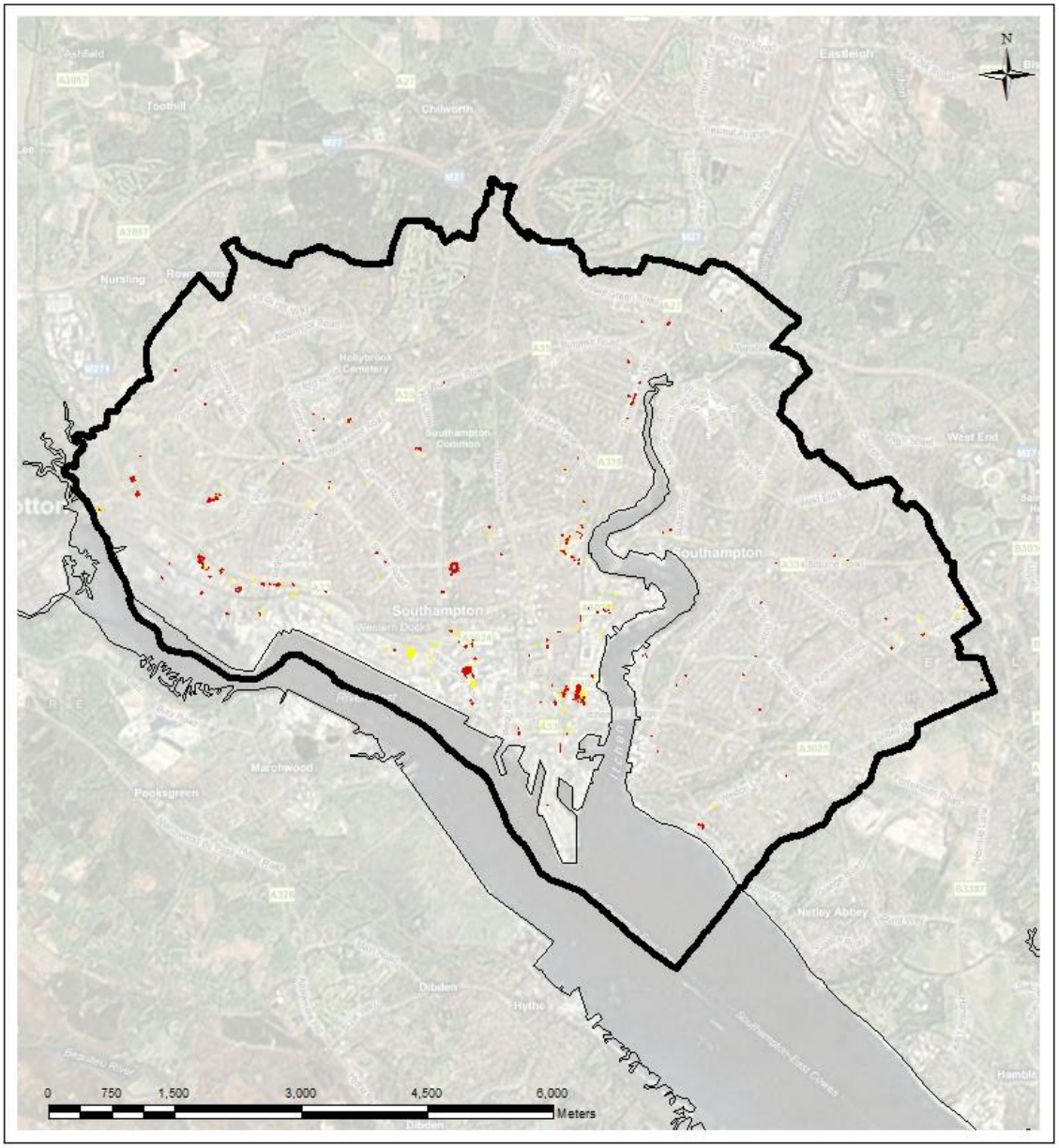
D1.11 Gosport: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)



Legend

- Gosport: increase in buildings from 2001 to 2011 on pluvial land
- Gosport: decrease in buildings from 2001 to 2011 on pluvial land

D1.12 Southampton: change in buildings in areas susceptible to pluvial flooding (2001 to 2011)



Legend

- Southampton
- Southampton: increase in buildings from 2001 to 2011 on pluvial land
- Southampton: decrease in buildings from 2001 to 2011 on pluvial land

Appendix E

Coastal Erosion

Contents

E1 Coastal Erosion

E1.1 Data Note

Note: Change in area of buildings between 2001 and 2011 within the pluvial data does not take into account positional accuracy improvements made within Ordnance Survey MasterMap data over this period. See http://www.ordnancesurvey.co.uk/oswebsite/pai/ and http://www.ordnancesurvey.co.uk/oswebsite/pai/faqgeneral.html#g1 for further details

E1.2 East Riding

Protected Eroding Coastline

Legend

East Riding: increase in buildings on protected coastline 2001 to 2011

East Riding: decrease in buildings on protected coastline 2001 to 2011

Unprotected Eroding Coastline

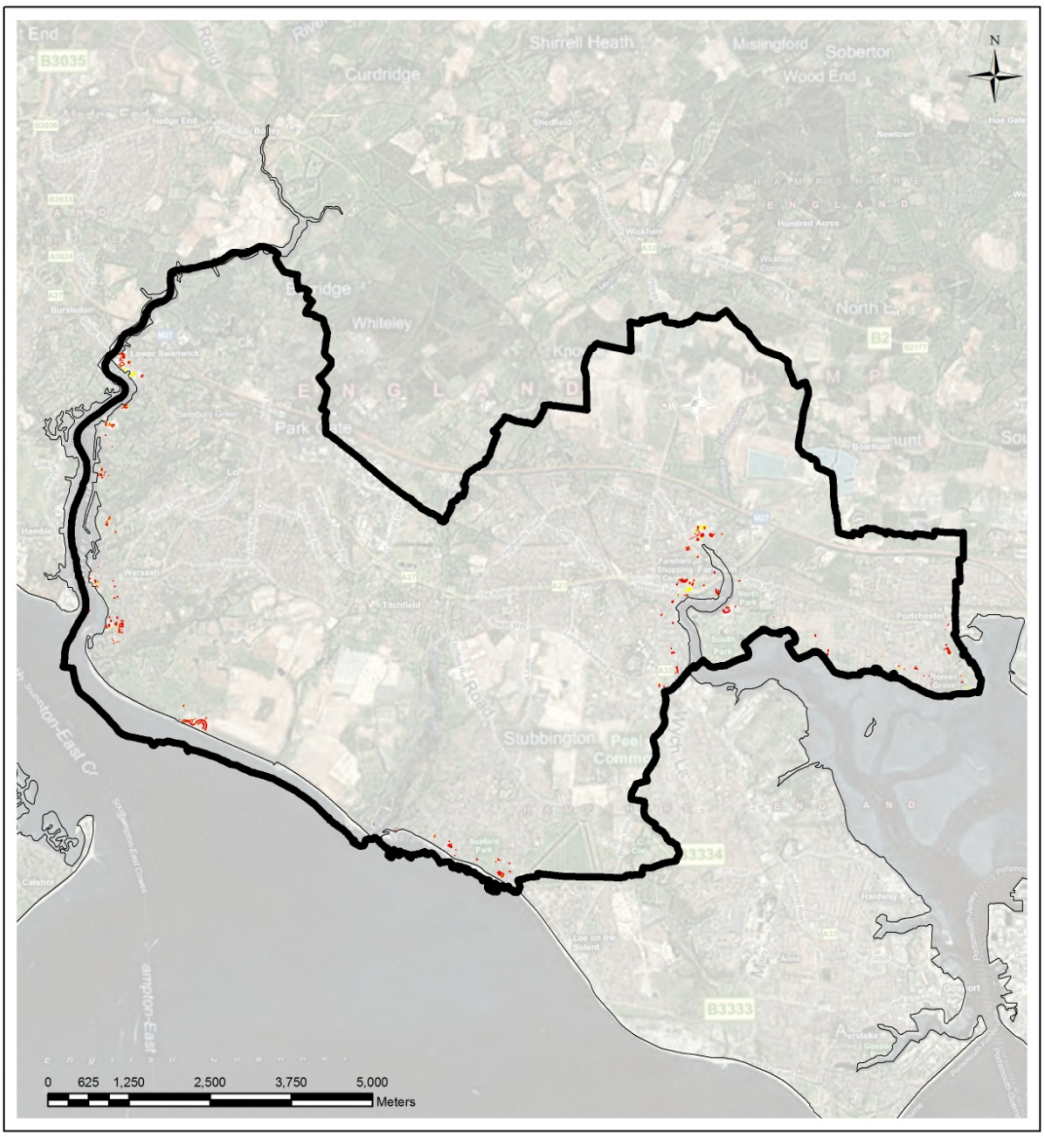
Legend

East Riding: increase in buildings on eroding coastline 2001 to 2011

East Riding: decrease in buildings on eroding coastline 2001 to 2011

E1.3 Fareham

Protected Eroding Coastline



Legend

- Fareham: increase in buildings on protected coastline 2001 to 2011
- Fareham: decrease in buildings on protected coastline 2001 to 2011

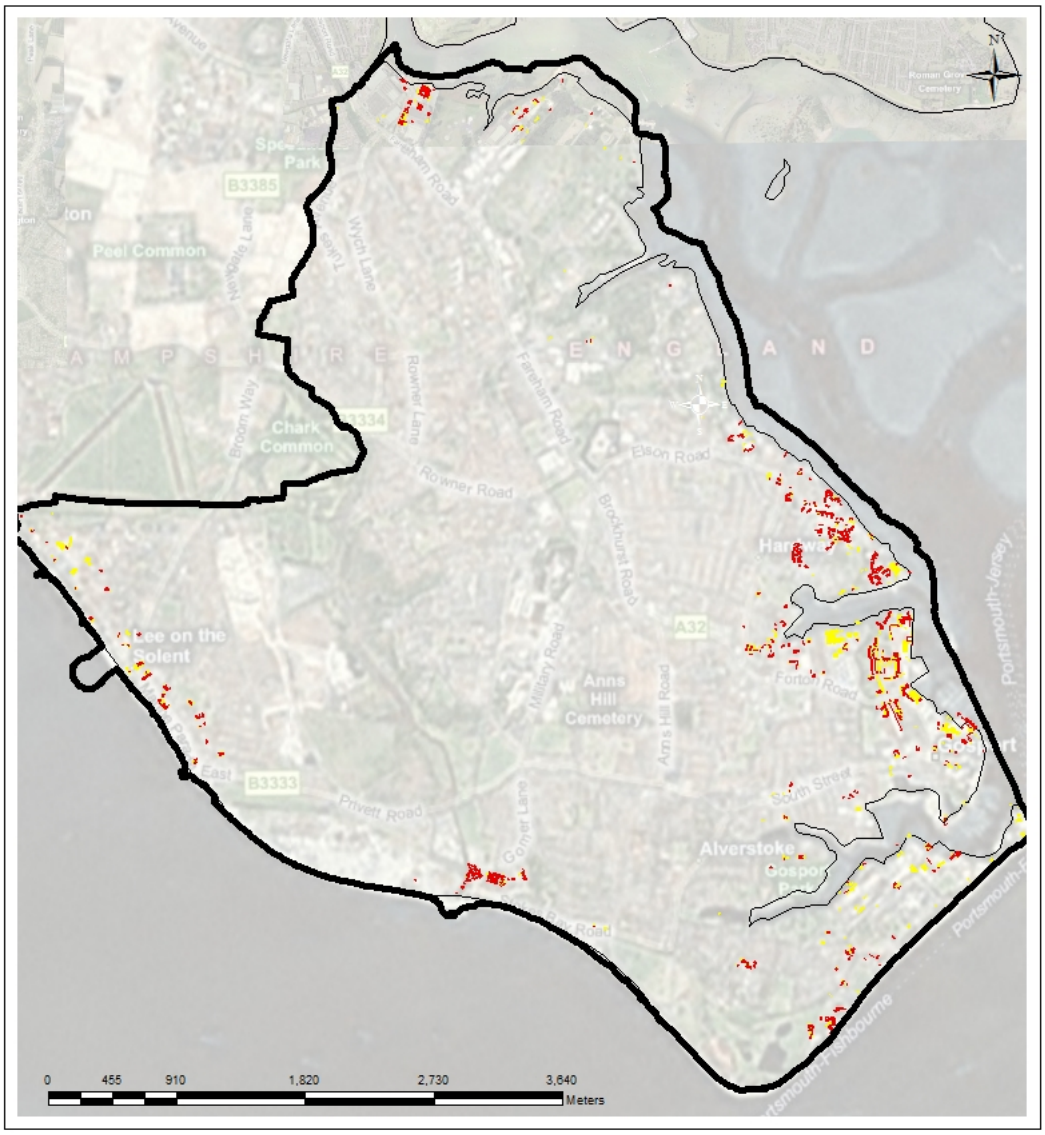
Unprotected Eroding Coastline

Legend

- Fareham: increase in buildings on eroding coastline 2001 to 2011
- Fareham: decrease in buildings on eroding coastline 2001 to 2011

E1.4 Gosport

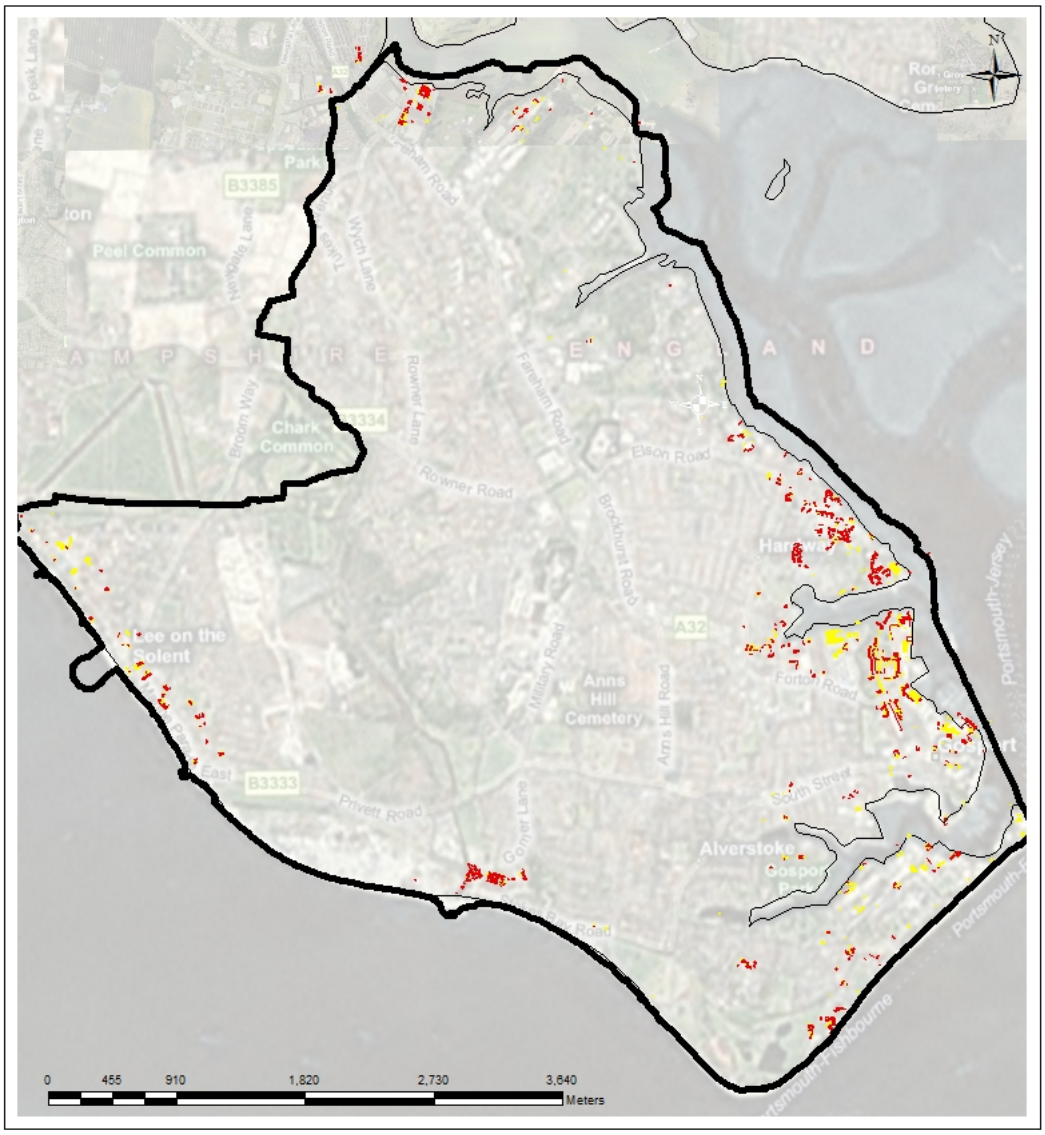
Protected Eroding Coastline



Legend

- Gosport: increase in buildings on protected coastline 2001 to 2011
- Gosport: decrease in buildings on protected coastline 2001 to 2011

Unprotected Eroding Coastline

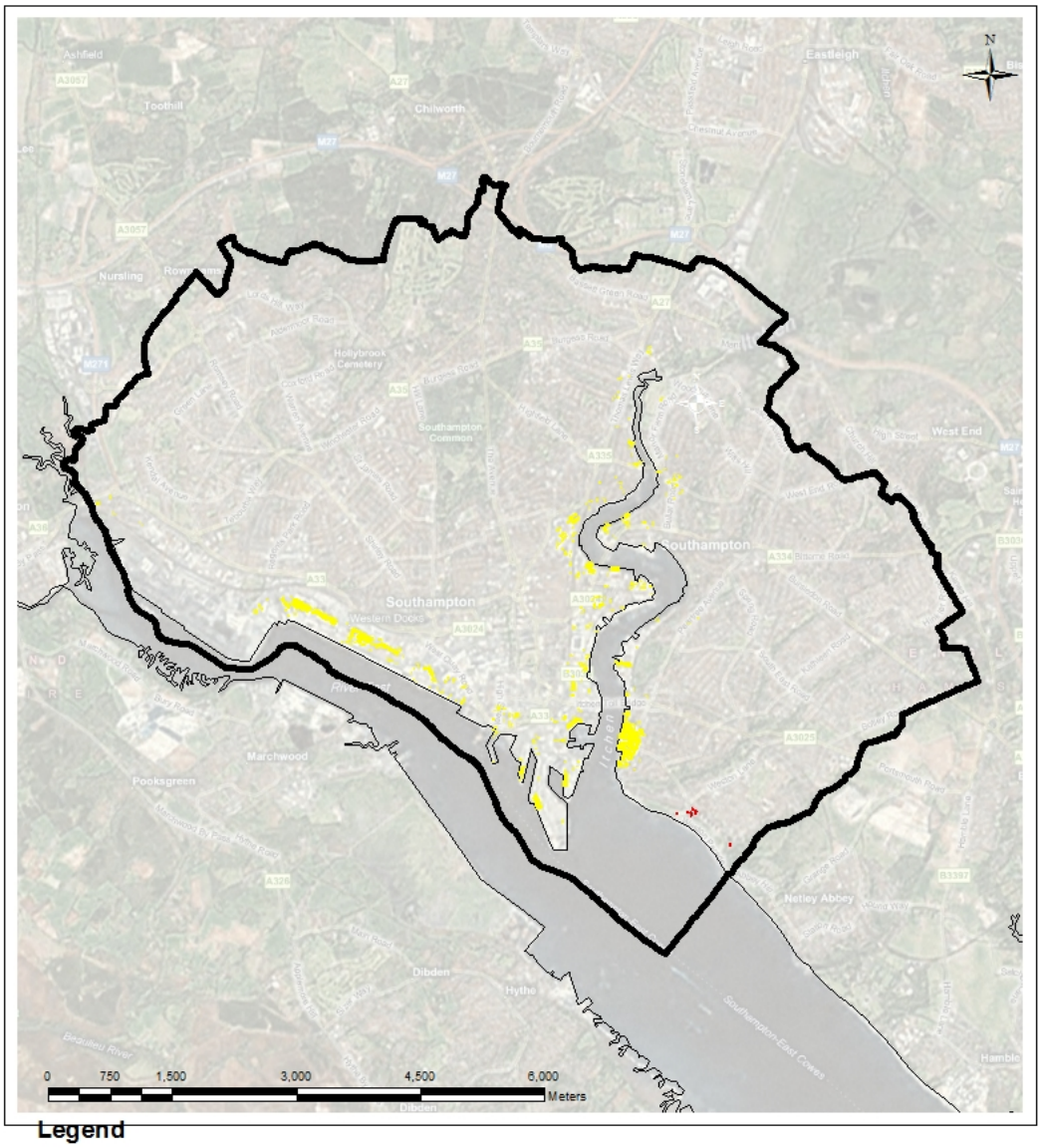


Legend

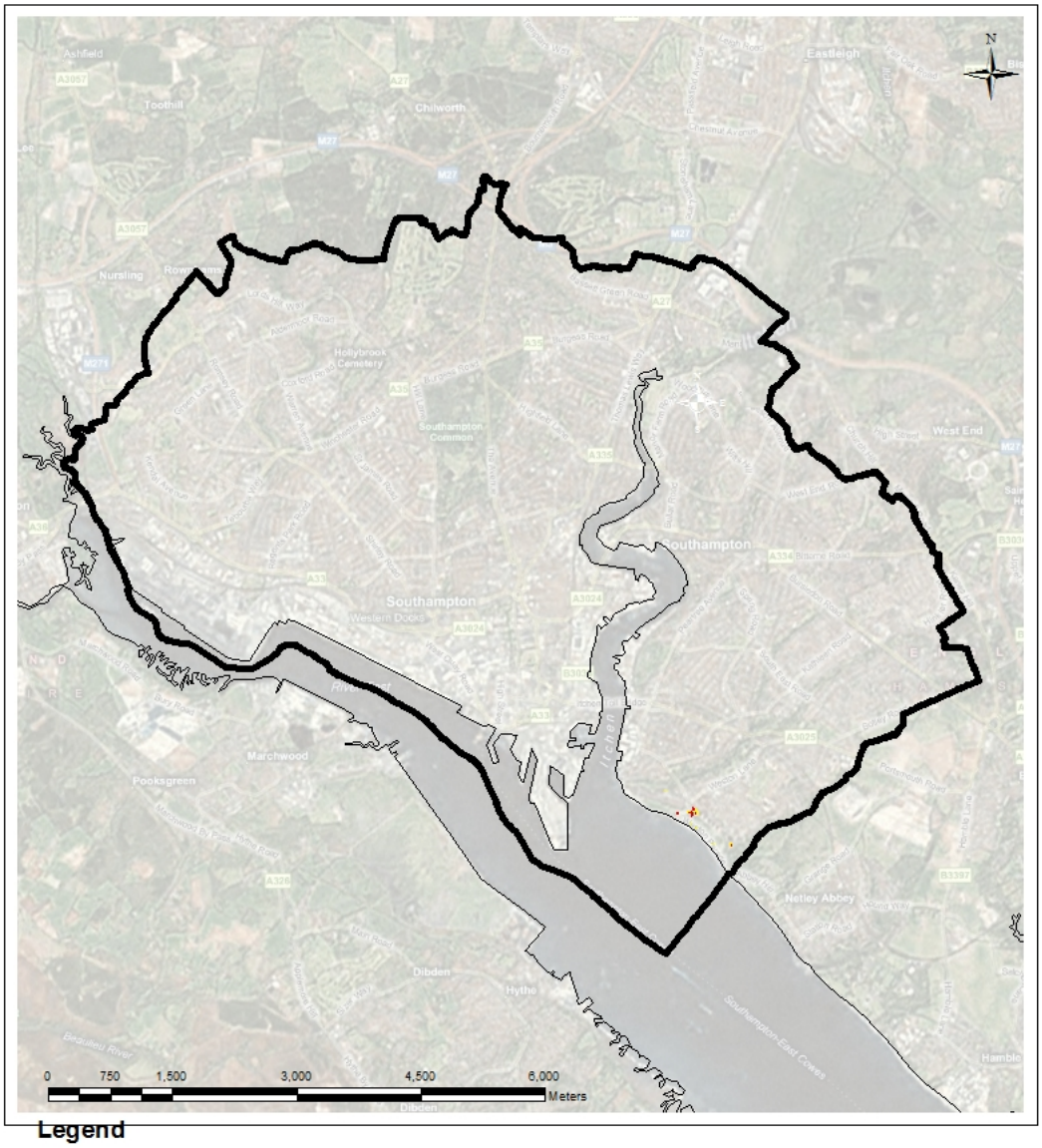
- Gosport: increase in buildings on eroding coastline 2001 to 2011
- Gosport: decrease in buildings on eroding coastline 2001 to 2011

E1.5 Southampton

Protected Eroding Coastline



Unprotected Eroding Coastline



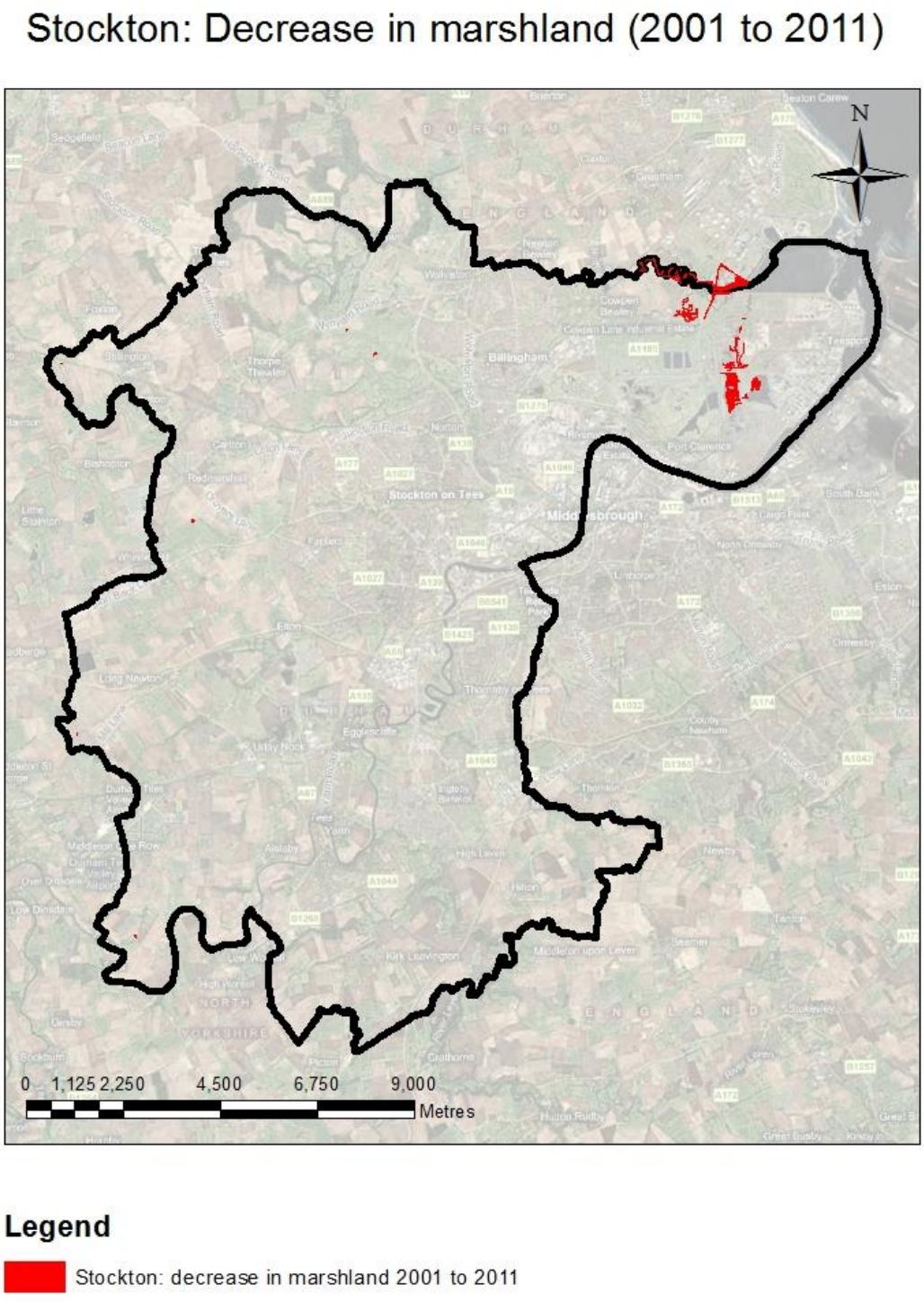
Appendix F

Biodiversity

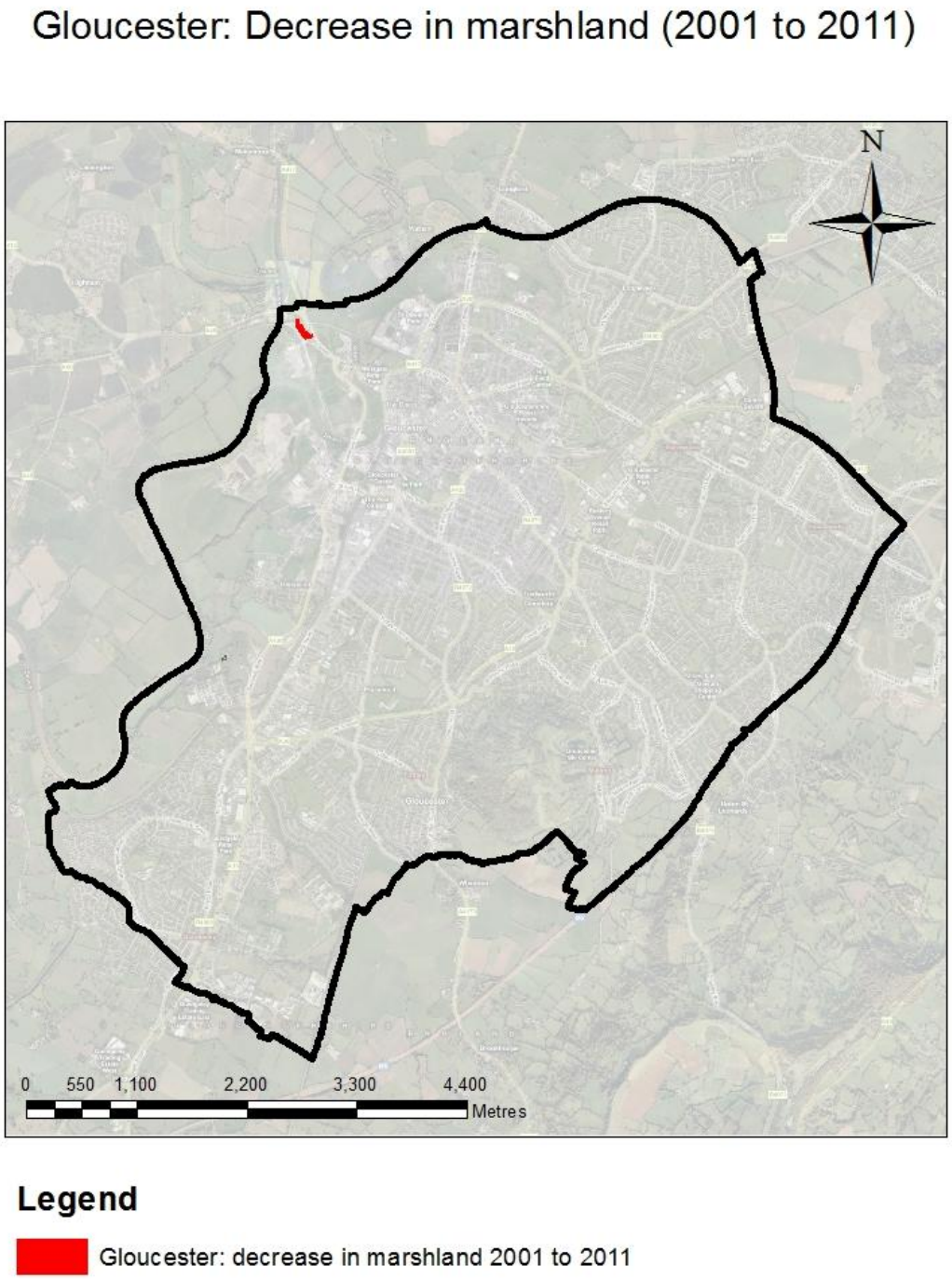
Contents

F1 Biodiversity

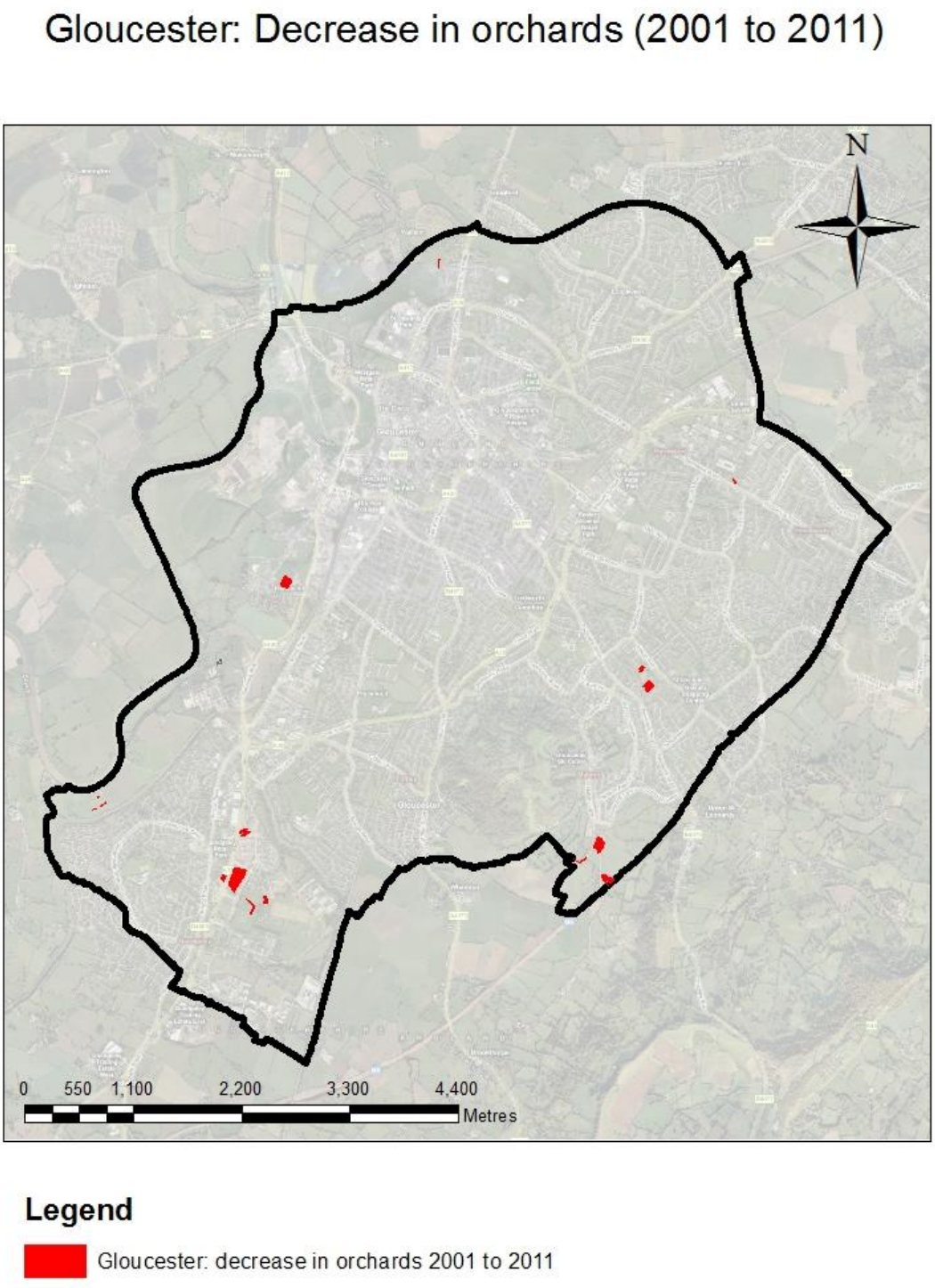
F1.1 Stockton Marshland



F1.2 Gloucester Marshland

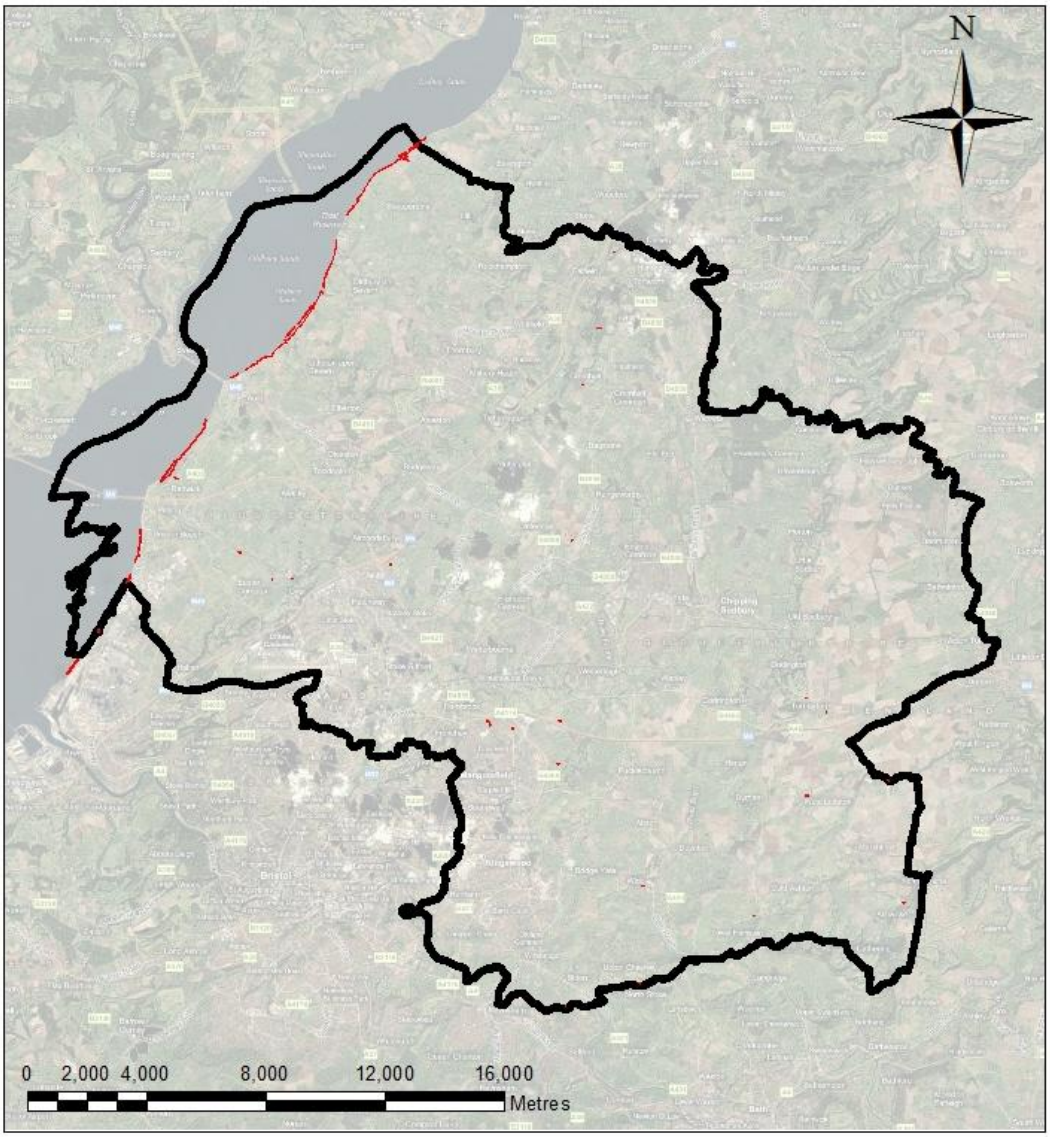


Orchards


Gloucester: Decrease in orchards (2001 to 2011)
N
0 550 1,100 2,200 3,300 4,400
Metres
Legend
Gloucester: decrease in orchards 2001 to 2011

F1.3 South Gloucestershire Marshland

South Gloucestershire: Decrease in marshland (2001 to 2011)

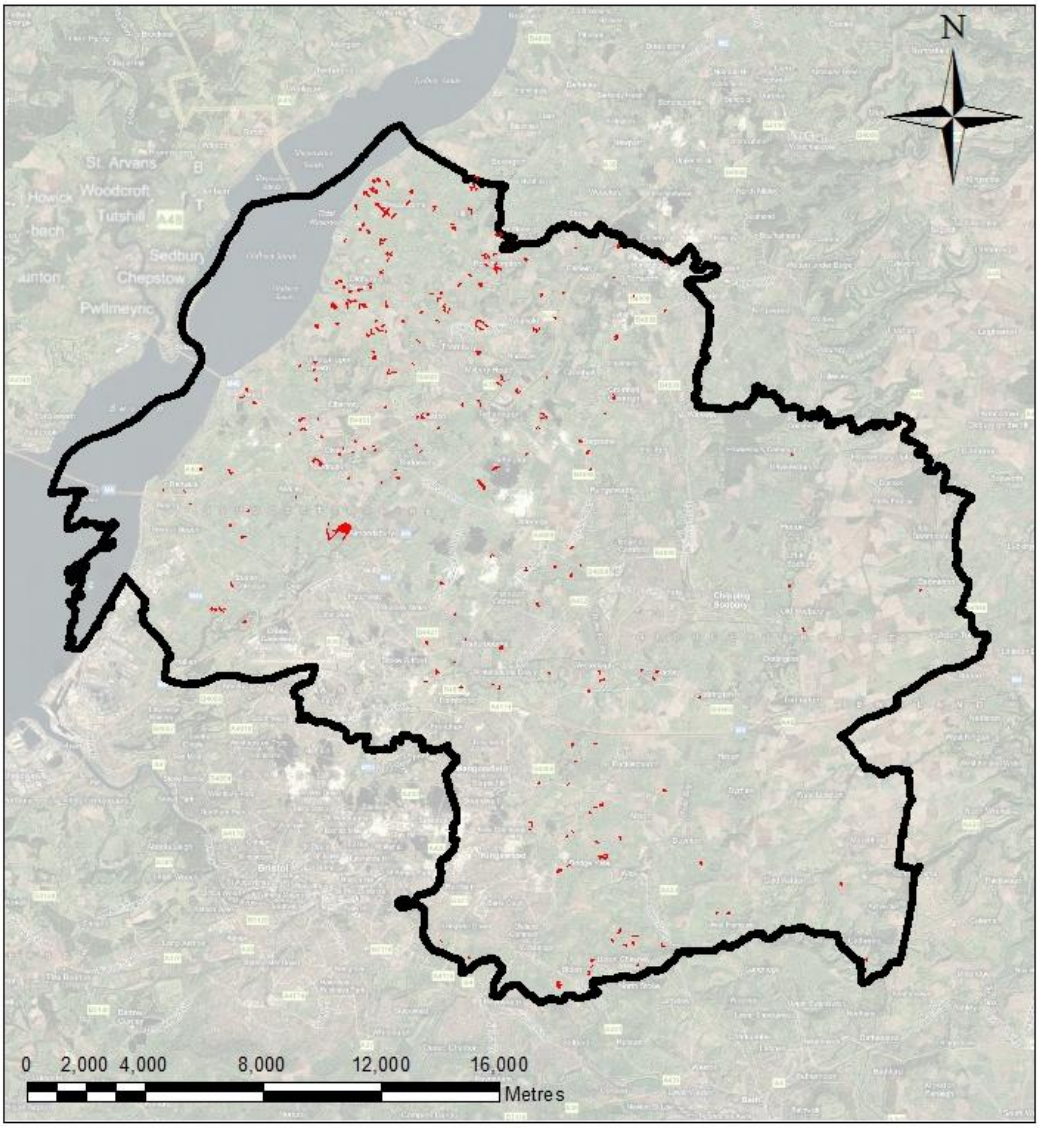


Legend

South Gloucestershire: decrease in marshland 2001 to 2011

Orchards

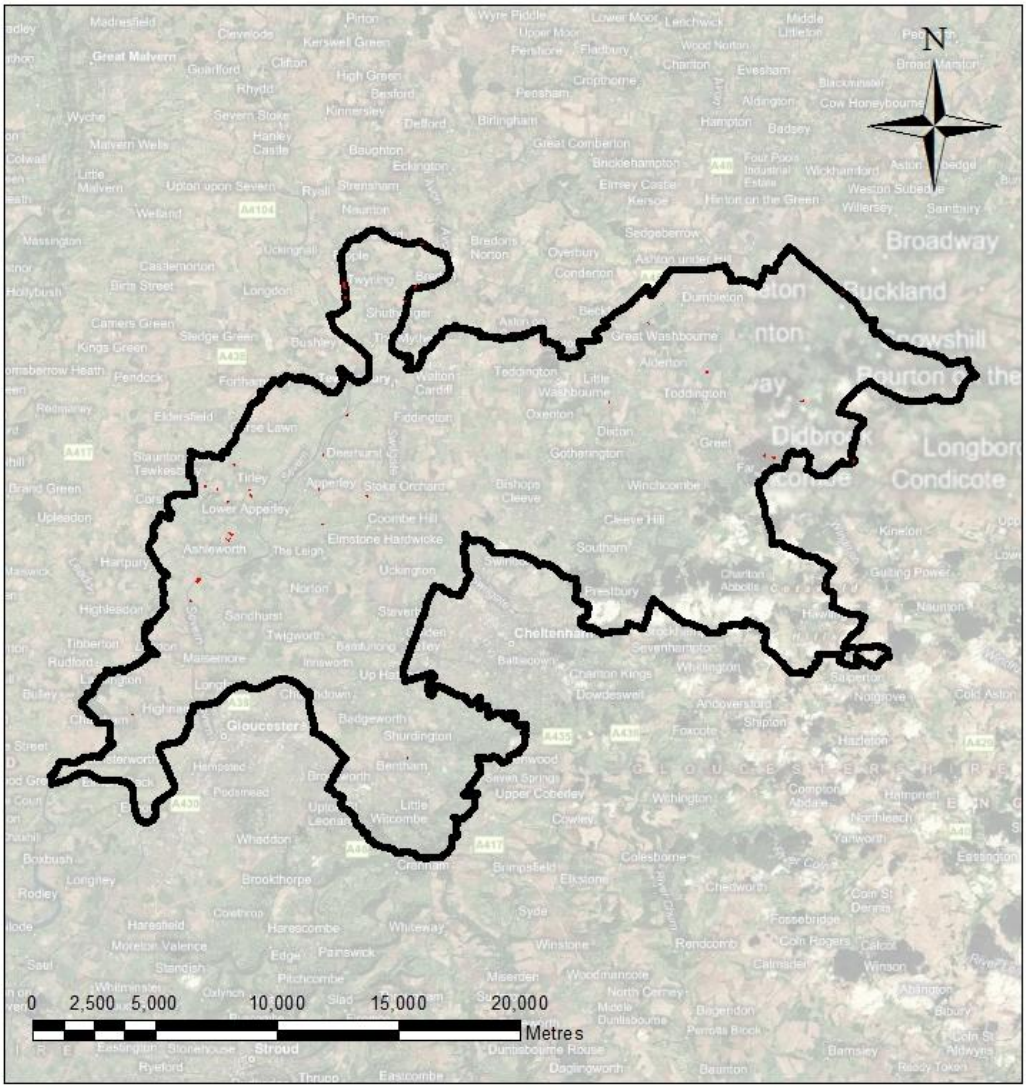
South Gloucestershire: Decrease in orchards 2001 to 2011



Legend

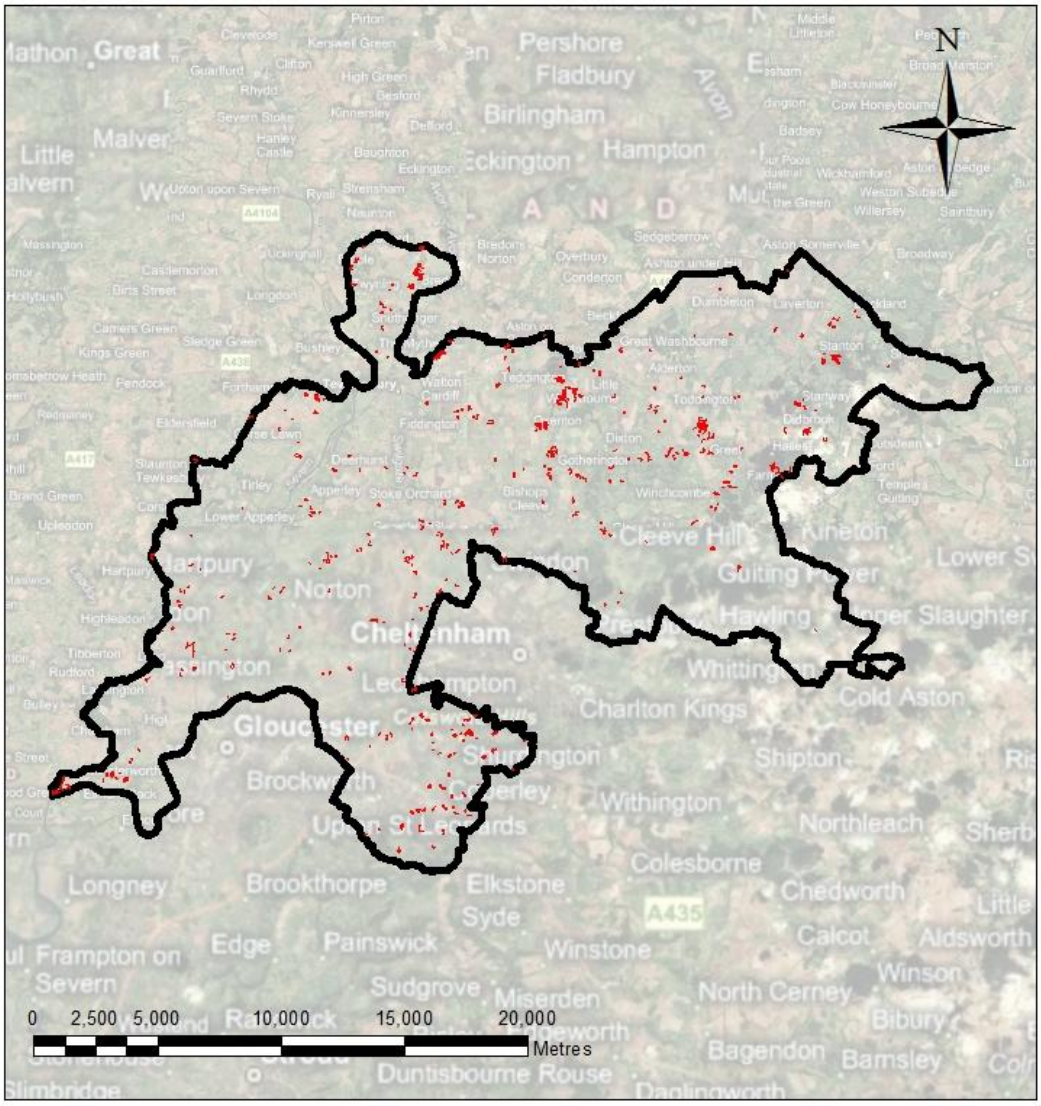
South Gloucestershire: decrease in orchards 2001 to 2011

F1.4 Tewkesbury Marshland



Orchards

Tewkesbury: Decrease in orchards (2001 to 2011)



Appendix G

LDF Analysis

Contents

G1 North East Lincolnshire LDF Analysis

Stage of framework	Relevant Document	Comment
Structure the problem		
	Core Strategy Initial Draft Issues Paper, 2005	There is no reference to climate change anywhere in the document Spatial portrait for the District identifies that large areas of land adjacent to the estuary are at risk of flooding – including valuable employment land and urban areas. Identified key issues make no reference to climate change; nor does the vision. Both these elements were lifted from the Sustainable Community Strategy (SCS). Legal requirements for LDFs specify that Core Strategies must be in line with the SCS; where the SCS has taken no account of climate change this can consequently have knock on impacts for LDF documents, particularly high level visions, objectives etc (NB NE Lincs produced a new SCS in 2010, which does make reference to climate change, although it is still not a central theme, identified in the vision or as a priority) Spatial Objective 1 is to Secure Sustainable Patterns of Development; it does not however make any reference to climate change risks/ adaptation, focusing only on giving priority to PDL and reducing the overall need to travel Spatial Objective 10 is to deliver safe, accessible and attractive environments that balance the protection of the natural and historic environment with the development and regeneration needs of the borough. This makes reference to addressing issues of flood risk, but no other elements of climate change. Flood risk is the only potentially climate change related issue identified in the document. However, there is no reference to it specifically in the context of climate change.
	Core Strategy Initial Sustainability Appraisal, 2005	The SA 2005 Includes only one sustainable development aim that makes any reference to climate change: *Minimal greenhouse gas emissions and a managed response to the effects of*

	Core Strategy Revised Preferred Options Sustainability Appraisal, 2008	*climate change* In response to this, the SA identifies that rising sea level and localised flooding is one of the main anticipated effects of climate change, and that policies KP1 and CP10 address these risks and will have a positive mitigating effect on climate change. The SA does report however that a specific link between the Core Strategy and reducing GHG emissions has not been identified. Overall, the SA identifies that there are weaknesses in the Core Strategy associated with climate change and recommends that additional text is added to Policy KP2 to read '*All new development should be achieved in ways which.....considers and responds to the causes of climate change and its effects'* 2008 SA includes the following indicator (as per 2005 SA) **EN4 Minimise greenhouse gas emissions and develop a managed response to the effects of climate change**. One of the criteria against this objective is *Will it plan and implement* ***adaptation*** *measures for the likely effects of climate change?* Adapting to climate change is one of the specific indicators.
Assessment of evidence base / Assessment of current and future vulnerability to climate risks?	Affordable Housing Viability Assessment, 2009 Employment Land Study, 2007	Assessment makes an allowance for costs associated with Code for Sustainable Homes requirements and on renewable energy requirements (10%) The ELS considers flood risk as part of the review, and adopts a sequential approach to identifying suitable employment sites. However, in some cases there are considered to be other issues that outweigh flood risk in the decision to allocate a particular site for development. The ELS identifies a potential conflict between suitable employment sites on the estuary and flood risk in that location. In particular, several of the uses that may be attracted to these sites and which would be encouraged to local there by previous the Local Plan, would not pass the PPS25 test. Less vulnerable uses – such as general industry and warehousing might however be appropriate. The ELS also identifies that several developments – such as a major pipeline project, which is a precondition for further industrial development in the area, may be hindered by the risk of flooding.

		Interestingly, the ELS refers to the potential conflict between the objectives of the emerging regional plan and national policy on flooding. The RSS appears to set out an approach that *'if economic priorities are strong enough to outweigh environmental considerations, then development of the estuary may continue, albeit cautiously'.* ELS recommends that '*the LDF should perhaps reserve the estuary sites for operations that can demonstrate a need to be close to the port or to existing occupiers and cannot be accommodated in sequentially preferable locations.'* Another key site – Europarc, is the only site identified for industrial/ warehousing capable of meeting the demand for premium-quality space. However, ELS flags up constraints relating to flooding. It recommends however that '*this site be made available for industrial development. Looking at flooding alone there are sequentially preferable sites. Land south of the motorway is less susceptible to flooding – being protected by the motorway itself or outside of the flood risk zone. But much of the land in less vulnerable locations is not suitable for the type of development we would propose on Europarc Phase 4 or is less preferable given other planning considerations.'*
	Retail and Leisure Study, 2005 SFRA, 2010 SHLAA, 2010	No reference to climate change adaptation or mitigation Study methodology makes climate change allowances The SHLAA reports that a decision was taken not to promote or encourage the promotion of greenfield sites for housing that fall entirely within flood zone 3. Where parts of the site fall within zone 3, their size was adjusted. Flood zone 3 is however based one existing flood levels and does not make any allowance for climate change. As a consequence of this approach, the geographic spread of sites clearly demonstrates that potential housing growth is being focused away from those areas sensitive to flood risk. In terms of sites within existing urban areas, the SHLAA recognises that much of Grimsby and Cleethorpes is sensitive to flooding, and as such, sites in these areas will need to be mitigated accordingly. In some instances, sites in flood zone 3 have been deemed suitable by virtue of their contribution towards other aims, such as regeneration.

		The suitability assessment takes account of flood zones, although this does not make any allowance for any changes in their extent/ increased flood risk in the future as a consequence of climate change.
Current and future vulnerability	Core Strategy Initial Draft Issues Paper, 2005	The Spatial Portrait for the District identifies that large areas of land adjacent to the estuary are at risk of flooding – including valuable employment land and urban areas. Identified key issues make no reference to climate change impacts/ adaptation or vulnerability – despite identified areas of flood risk overlapping with valuable employment land and urban areas. The Key Diagram identifies the extent of the indicative tidal flood mitigation zone
	Core Strategy Initial Sustainability Appraisal, 2005	The SA 2005 recognises that that rising sea level and localised flooding is one of the main anticipated effects of climate change.
	Employment Land Study, 2007 & SHLAA, 2010	Whilst both the ELS and SHLAA refer to the potential flood risk across potential sites, this is based on existing levels of risk, rather than future vulnerability that takes into account the impacts of climate change.
	SFRA, 2010	SFRA provides plans of the local authority area showing the main sources of river and sea flooding, Flood Zones (taking into account climate change) and areas at risk from other sources of flooding
Highlights links to other plans and policies	Core Strategy Initial Draft Issues Paper, 2005	The Core Strategy Draft Issues paper makes links to other relevant plans and strategies – such as the SCS, but nothing specific to climate change; this is however perhaps reflective of the existence/ lack of climate change strategies within the Borough/ Sub Region/ Region at that time.
	Core Strategy Preferred Options, 2007	The Core Strategy Preferred Options document identifies a number of related plans and strategies, including Flood Management Plans, SFRA etc. There are no specific links to Climate Change Strategies/ policies
	Core Strategy, Revised Preferred Options, 2008	Revised Preferred Options identify specific links between Core Strategy objectives, Corporate Plan objectives and the SCS
Define and characterise adaptation options	Core Strategy Initial Draft Issues Paper, 2005	The Environment Agency is reported to have undertaken to ensure that flood protection for land adjacent to the estuary is provided for at least the next 100 yrs for flood events with return periods up to 300 years Draft policies refer to addressing and minimising flood risk and incorporating flood mitigation measures in a number of instances. Passing reference is also made to energy efficiency and resource efficiency in

		various policies, but it is never elaborated on in the context of climate change Policy CP7 – Flood Risk – Does not state that planning permission will not be granted for development in the flood plain – rather that it **will** be granted where an FRA has been undertaken, development has had regard to the availability/ requirement for appropriate flood defences and incorporated flood mitigation and/ or warning measures. This policy does however pre date PPS25 and the sequential test. Supporting text states that 'The Council's Strategic Flood Risk Appraisal identifies the areas at most risk from such extreme events and, together with the Environment Agency, will help advise developers what measures to reduce the risks are most appropriate.' No climate change adaptation options relating to heightened flood risk are identified.
	Employment Land Study, 2007	The ELS adopts a sequential approach to identifying suitable employment land sites. Where sites are within flood risk areas, it encourages their use for employment purposes that are more compatible with flood risk – as identified in PPS25 (e.g. warehousing)
	SHLAA, 2010	SHLAA aims to avoid greenfield housing sites in flood zone 3.
Appraise solutions		
Assessment of potential use of adaptation options	Core Strategy, Preferred Options, 2007	Overarching Core Strategy policies make no reference to climate change adaptation; the only reference to climate change related issues is flood risk. Policy CP10 Environment makes reference to protecting water resources, water conservation and safeguarding flood protection schemes; no mention is made of climate change adaptation. Draft policies on design quality and greenspace make no reference to climate change adaptation.
	Core Strategy, Revised Preferred Options, 2008	The revised Spatial Portrait states that '*Promoting sustainable patterns of landuse, adopting sustainable building practices and sustainable transport choices; and promoting sustainable energy and waste management practices are all seen to be key to adapting to the uncertainties of future climate changes*.' The Revised Preferred Options also include a specific objective for Climate

Change:
'To mitigate and adapt to the effects of climate change; minimising use of natural resources and energy use, reducing waste, encouraging reuse and recycling, reducing pollution, responding to an increased threat of flood risk and promoting sustainable construction practices.'
Policy SP2 Sustainable Development Principles identifies the need to 'deliver quality built and natural environment that... is **adaptable** to climate change'
Policy DM4 Promoting High Quality Design encourages the adoption of sustainable construction principles and practices and addressing climate change. Supporting text goes on to identify the role of soft landscaping and tree planting in mitigating and adapting to climate change.

The Revised Preferred Options also include a specific policy on **adapting to climate change DM10**, although this appears to cover mitigation measures as well:
Developers will be required to adapt to the impacts of present and increasing threat of climate change by:
•Adopting a sustainable approach to development by;
◦Addressing flood risk by adopting a sequential approach to the identification, and development of sites
◦Incorporating appropriate flood mitigation and where necessary flood resilience measures; or flood warning measures;
◦Incorporating sustainable drainage systems; and where appropriate, green infrastructure;
◦Adopting sustainable building techniques (including selection and sourcing of materials) that promote water and energy efficiency and minimise waste through reduction and reuse; both during the construction and lifetime of the development;
◦Adopting sustainable design principles regarding the layout and form of development;
◦Ensuring consideration is given to the effect of development on biodiversity and its capacity to adapt to likely changes in the climate.
◦Supporting renewable energy proposals that contribute to meeting the renewable energy targets for North East Lincolnshire

Development of more than 10 dwellings or 1000m2 of non-residential floorspace, will as a minimum, be required to source 10% of their energy requirements from on site renewable or low-carbon energy sources unless it is demonstrated to be

		not feasible or not viable. Interestingly, the motivation for this policy stemmed from changes in national policy, rather than purely local decision making/ policy evolution.
	Consultation Feedback on Revised Preferred Options, 2008	Consultation feedback on Policy suggests that the policy should make reference to opportunities for CHP (although it is not clear that the Council has the necessary evidence base in place to deliver this).
Decision analysis to generate plans	Core Strategy, Preferred Options, 2007	Climate change does not occupy a very central position/ theme in the early sections of the draft Preferred Options document, which perhaps reflects its considered relative importance, and the role it may have played in decision analysis. Draft Spatial portrait makes no reference to the area's potential vulnerability to climate change. Coastal flood risk is identified as an issue, although the document reports that the EA has already undertaken to ensure that protection is provided for 1/300yr flood events – it is not clear whether this includes an allowance for climate change exacerbation. The Strategy for Development in NE Lincs has been framed around the question 'What could North East Lincolnshire be like?' at least 10 years post adoption. There is no reference to climate change in terms of what this means in the spatial context. However, the key issues have been amended from the SCS and now take into account the need to recognise issues of flood risk and climate change, although this is as a sub section to a more general issue of 'acknowledging the potential impact of the environment on proposed development'. The Vision for NE Lincs contains no reference to climate change; Spatial Objective 1 aims to **secure sustainable patterns of development'**, but only makes reference to limiting exposure to flood risk. Spatial Objective 11 **to protect and enhance the quality of the natural and historic environment** also makes reference to flood risk. The lack of a climate change related objective will potentially have knock on effects for whether or not climate change is really addressed in the remainder of the document, and whether it has influenced the spatial layout of development. In terms of identified flood risk, policies relating to housing and employment allocations require appropriate mitigation measures. There is no evidence of having

		taken climate change into account when making decisions and generating the plans
	Consultation feedback on Preferred Options, 2007	Consultation feedback on draft flood risk policies identify several adaptation measures, such as woodland planting & soft landscaping to reduce run off. Consultees also report that the policy should have been taken into account when framing the settlement hierarchy, identifying directions for growth and locating them outside flood risk areas.
	Core Strategy, Revised Preferred Options, 2008	The revised Spatial Portrait has been improved and now includes a summary of statistics which includes a section on climate change (statistics include figures such as the renewable energy target, recycling target, CHP capacity & flood risk). The Spatial Portrait also makes specific reference to the need to tackle climate change as a priority. Land adjacent to the estuary is specifically identified as being at risk of flooding, which is acknowledged as an important factor given this area's importance for commerce and industry. Flood risk is also identified in connection to the regeneration of key urban sites. The need to adapt to the uncertainties of future climate change is also recognised upfront in the document The Revised Preferred Options also include a specific objective for Climate Change: *'To mitigate and adapt to the effects of climate change; minimising use of natural resources and energy use, reducing waste, encouraging reuse and recycling, reducing pollution, responding to an increased threat of flood risk and promoting sustainable construction practices.'* There is also much clearer evidence that the issue of climate change has been taken into account in decision analysis; the document states that '*the sequential approach to site allocation and selection is recognised as being a fundamental tool in addressing flood risk, and this Core Strategy as part of the Development Plan will set the main strategic direction. In considering the options for development in this and successive Development Plan Documents choices will nearly always be challenged with minimising the risks of flood risk, sustaining existing communities and realising opportunities. Sequentially preferred sites for development that are at the least or no risk from flooding within the Borough also have to be assessed in terms of their own impact upon climate change as they will have environmental consequences in respect of drainage systems, CO2 emissions and increased need for travel to everyday facilities.'* The Spatial Strategy also states that '*Environmental and climatic influences have a significant bearing on*

		the future pattern of growth in the Borough.' As a consequence, policy SP1 Spatial Strategy clearly states that emphasis will be placed on steering development away from areas of flood risk. There is however still a conflict between addressing the impacts of climate change and other policy priorities – such as regeneration, and the policy seeks to strike an acceptable balance between climate change mitigation, wider sustainability benefits and application of the exception test. The Key Diagram still identifies a significant amount of Potential Urban and Service Village Expansion Areas within flood risk zones, but this is perhaps unavoidable given the existing settlement distribution and coastal location of the Borough.
	Consultation Feedback on Revised Preferred Options, 2008 Core Strategy Revised Preferred Options Sustainability Appraisal, 2008	Consultation feedback on the Revised Preferred Options suggests that there is still work to be done in being more locally specific about the application of PPS25 and the Sequential Test. The SA primarily makes reference to flood risk when assessing alternative growth options. Specific reference to climate change impacts is limited. SA identifies that proposals for development in the Estuary Zone must be retained for strictly controlled estuary related proposals due to its sensitivity to flood risk; it suggests alternative locations for employment land in areas less susceptible to flood risk. These recommendations appear to have been carried through into the Preferred Options document, which requires employment uses in the Estuary Zone to genuinely need to be located close to the estuary.
Independent examination and EiP	Core Strategy Submission Draft is yet to be published	
Implementation, evaluation, monitoring and review		
Implement plans		
Evaluate, monitor and review	Annual Monitoring Report 2010	The AMR makes no references to climate change adaptation or NI188 (although NI188 is referenced in the latest SA) **Core Indicator 1: Number of planning permissions granted contrary to the advice of the EA** No sustained EA objections on the grounds of flood risk **Flood defences NI189 Flood and Coastal Erosion risk management** 100% 2009-10

		Core Indicator 3: Renewable energy generation No completed installed capacity 2009-10, but several live and approved planning applications 3 applications granted for major schemes with 10% energy requirements from renewable or low carbon energy sources in 2009-10 **Recycling and composting NI192 % household waste sent for re-use, recycling & composting** Target: 100% Achieved 31.7% 2009-10

G2 Hackney LDF Analysis

Stage of framework	Relevant Document	Comment
Structure the problem		
Define relevant objectives	Core Strategy Issues & Options, 2005	The document is structured under the following themes: 1. The Sustainable Borough • Development and locational policy • Promoting the best in development and design • Regeneration and transport • Resource management. 2. Development opportunities 3. Neighbourhoods and communities 4. A dynamic and creative economy 5. Better homes 6. A safer and cleaner place The implications of climate change are one of the highlighted issues in the preamble to The Sustainable Borough. Despite highlighting climate change as an issue, there is however no specific reference to any climate risks in the document. The issues & options on development and design focus on energy efficiency/renewables. The section on development opportunities does not account for climate risks at all.
	Draft scoping report Core Strategy Strategic Environmental Assessment Sustainability Appraisal, Dec 2005	Relevant sustainability objectives include: Objective 17: To reduce emissions of greenhouse gases, and plan for further reductions, to meet or exceed national climate change targets Objective 28: To avoid development that will impact on areas at risk from flooding Objective 4 : To ensure that Hackney makes more efficient use of natural resources and in particular, soil, mineral aggregates, water and energy There are however no climate change related indicators or targets (unlike Stockton), and Climate change adaptation and climate risks are not identified as a key sustainability issue.
Assessment of evidence base /	Hackney Employment Growth Options Study Update, February	There is no reference to climate risks in the Employment Growth Options Study.

Assessment of current and future vulnerability to climate risks?	2010 Hackney Heat Mapping Study, June 2010	Heat mapping study makes no reference to climate risks or linking up with heat stress/overheating.
	Better Homes, Places and Opportunities, Hackney Housing Strategy 2010 – 2015 (Draft for Consultation), Nov 2009	Housing Strategy contains three core objectives (Mixed and sustainable communities; Attractive Neighbourhoods; Prosperous Communities). Addressing the challenges of environmental sustainability and climate change, as well as fuel poverty is identified as a priority area under Attractive Neighbourhoods. Resource efficiency measures carried out or piloted on Council properties so far include rainwater harvesting and reduction of water consumption
	Hackney Infrastructure Assessment, Nov 2009	Infrastructure Assessment section on **water supply** notes that Thames Water's average consumption per head is increasing and above the national average, which is blamed on increased use of power showers. However, it concludes that "on the basis of existing evidence, there is no significant capacity issue with water supply in Hackney at present". The section on future supply and demand makes no reference to climate change projections, only plans from Thames Water to increase supply (by desalinisation plant and a new reservoir) and upgrading pipelines. It does note however that Hackney's Climate Change Strategy is proposing a series of measures to help reduce water consumption and increase water recycling in the borough. The action plan sets out to reduce demand for water through awareness raising campaigns, and recycle water through greater rainwater harvesting including Sustainable Urban Drainage Systems, living roofs and walls and employing higher water efficiency standards in new buildings. Infrastructure Assessment section on **flood defences** notes that the River Lee Flood Relief channel was constructed in the 1970s and was built to accommodate a 1 in70-year flood event, and therefore no longer provides an adequate level of protection to the surrounding area. The assessment of future flood defence infrastructure does not however account for climate change. Infrastructure Assessment section on **green infrastructure** sets out the current level of greenspace and projected future demand for it. The role of GI in adaptation is however not recognised and there is no mention of GI in relation to the Urban Heat Island effect or SUDS.
	Regeneration Delivery Framework, 2009	The Regeneration Delivery Framework highlights climate change as one of the key drivers that will influence change in Hackney over the next decade: *"Global warming is considered by many to be the biggest single issue facing us at this time. New policies on reducing the country's carbon footprint will have a*

		significant financial impact, particularly on developers. It is forcing us all to focus on sustainability, the use of transport and environmentally sensitive practices. Hackney will be required to play its part in meeting this global challenge."
	Level 2 Strategic Flood Risk Assessment Final Report, Sept 2010	Hydrodynamic modelling of the Lower Lee Valley, undertaken by the London Development Agency shows that Hackney Wick is at actual risk of flooding from the Hackney Cut. During the 1 in 1000 year fluvial event for 2009 (including 1 in 20 year tidal influence), flood depths may reach 2m in Hackney Wick, with corresponding hazard classifications of Significant (Danger for most) and Extreme (Danger for all).
	Core Strategy Proposed Submission: PPS25 Sequential Test, 2009	This SFRA considers a 1 in 100yr fluvial + 1 in 20 year tidal flood event plus climate change. Notable impacts on flood risk as a result of climate change are identified and quantified for Hackney Wick. However, the SFRA reports that 'alternative areas have been considered to accommodate the development proposed for Hackney Wick and it has been demonstrated that the regeneration cannot be redirected to an area of lower flood risk in the borough. Regional and local policy provides substantial impetus for the regeneration and redevelopment of Hackney Wick in order to sustain the existing local community and sustain the industrial potential of the area. In the light of the flood risk posed to Hackney Wick it is highly likely that the Exception Test will be required for future development sites within Hackney Wick' It is notable that the impacts of climate change and the policy approach taken to dealing with them can be significantly influenced – and sometimes outweighed – by other policy priorities, such as regeneration.
Current and future vulnerability	LDF Options Map, 2008	The Options Map identifies flood prone land, but also waterfront development zones and strategic industrial locations that appear to coincide in a number of areas. The Map does not identify areas vulnerable to heat or water stress.
Highlights links to other plans and policies	Not included in notes	AMR makes links between several policies and strategies, including the Core Strategy, Sustainable Communities Strategy, Climate Change Strategy and Regeneration Framework, which are brought together in the monitoring indicators.
Define and characterise adaptation options	Climate Change Strategy for the London Borough of Hackney, Sept 2009	The Strategy reports that the issue of adaptation to climate change is not part of the Climate Change Strategy as this is expected to require a separate detailed assessment which will be carried out in accordance with action in response to National Indicator 188 (Planning to Adapt to Climate Change).

	Level 2 Strategic Flood Risk Assessment Final Report, Sept 2009	In order to ensure that future development proposed for the Hackney Wick AAP is safe and does not increase flood risk in adjacent areas, the SFRA recommends that a number of development control measures will need to be enforced, such as, the location and layout of different type of development according to vulnerability; setting of appropriate finished floor levels; provision of safe access and egress; the use of appropriate flood resistant and resilient construction techniques in accordance with expected flood depths; provision of safe refuge above the flood level; and identification of suitable evacuation procedures in the event of a flood.
	Regeneration Delivery Framework, 2009	The Regeneration Framework identifies Environmental Sustainability as a key principle in the approach to regeneration: *"In order to achieve high standards of quality, affordability and environmental sustainability, we need to accept that these come at a price. We will develop a Hackney specific 'Sustainability Guide'. When developed, it will require us, our partners and developers to commit to the costs of high quality design and public realm, and* ***climate proofed commercial and residential buildings.*** *What is crucial is that the full and agreed costs of achieving the sustainability standards set out in the Sustainability Guide are incorporated into development agreements at the inception of the project. This will inform how all new developments are planned, constructed and managed.****"*** Although there is no specific mention of climate-related risks or drivers, the Framework makes a commitment to "*ensure that in addressing the housing gap through the above means we also embed high quality design and management as well as* ***climate proofing*** *into our policies and delivery mechanisms*." The Action Plan also makes reference to "h*igh quality, affordable,* ***climate proofed housing*** *in town centres"*
Appraise solutions		
Assessment of potential use of adaptation options	Core Strategy Preferred Options	Adaptation and mitigation measures identified in Preferred Policy Option 15 include the prudent use of natural resources, on site renewable energy and climate proofing existing and new development. New development is also encouraged to 'seek innovative solutions to the challenges of flood mitigation' and incorporate sustainable construction methods such as rainwater harvesting, green roofs and greenwalls. Although reference is made to green walls and other sustainable construction techniques, there is no specific connection made to their value in adapting to climate change. There are no policies on addressing heat island effects, water shortage or the role of

		green infrastructure in adapting to climate change
	Core Strategy Preferred Options Sustainability Appraisal	SA framework includes objectives relating to the minimisation of flood risk and encouragement of SUDS; reduction of GHGs and promotion of energy efficiency; and promoting sustainable design. SA themes and sub-objectives are generally light on climate change adaptation (with the exception of flooding), although the Preferred Options Core Strategy itself has little to say on adaptation in the first place. The SA does however make reference to PPS1, and recommend that the Core Strategy reflects its objectives in relevant sections. In particular it notes that PPS1 advocates adapting to climate change impacts likely to occur.
	Core Strategy Proposed Submission Document	Core Strategy Submission Document sets out a much clearer set of policy principles aimed at mitigating and adapting to the impacts of climate change, including: - Reducing the risk of flooding by reducing surface water and locating developments away from flood risk areas - Reducing water consumption - Boosting renewable and low carbon energy production - Promoting energy efficiency - New green infrastructure to address heating and cooling issues and reduce CO2 emissions - Sustainable transport It is also more imaginative and comprehensive in identifying adaptation solutions, including: - High density urban form is identified as providing opportunities to respond positively to sustainability by providing opportunities for photovoltaic cladding, CHP, biomass and solar water heating systems and helping to kickstart decentralised energy production across the Borough. - Green infrastructure (inc living roofs) is more specifically identified as a way of reducing energy demand and moderating the urban heat island effect. - As well as considering new development, policies for resource efficiency and carbon dioxide emissions consider opportunities to retrofit existing buildings.

		- Reconciliation of the need to build new homes and flood risk within the borough (particularly in the east) through innovative solutions such as providing new flood water storage that also addresses open space deficiencies - Opportunities to move existing development from within the floodplain to areas with a lower risk of flooding should be maximised. This should include consideration of the vulnerability of existing developments and whether there is potential for land swaps with lower vulnerability uses and identifying, allocating and safeguarding open space for flood storage.
	Planning Contributions SPD, 2006	The SPD states that where planning contributions are required for the development to be acceptable in land use terms, these should be given priority over other contributions.
Decision analysis to generate plans	Core Strategy Preferred Options	Preferred Options preamble recognises that *'planning offers an immense opportunity for effective and cost efficient actions to reduce energy consumption, make more efficient use of energy, reduce energy take from carbon fuels through on site and off site renewable generation. Through the Preferred Policy Options Hackney can roll out programmes on the mass scale necessary to deliver cumulative and exponential impact required to produce CO2 reduction to global targets.'* The Preferred Options document also makes reference to the need to take into account the Government's agenda for combating climate change, through effective spatial planning and standards for new development. It also recognises that "*increasingly, high quality sustainable development will need to take account of climate change as one of the greatest challenges that faces the planet. Action is needed now to mitigate and adapt to the effects of global warming*." However, there is no evidence that these statements and the need to take account of climate change has been fundamentally taken into account when developing the policies and approaches set out in the Core Strategy.
	Core Strategy Preferred Options Sustainability Appraisal, 2008	<u>General</u> The SA identifies that a number of sustainability topics had not been canvassed properly at Issues and Options stage – including reductions in CO2 emissions and flood risk. It reports that these issues are however subsequently addressed in the Preferred Options document.

		The SA recognises that the scale of development and content of some of the Preferred Option Polices (e.g. residential development) raises uncertainties over negative and cumulative impacts, which will need appropriate measures to reduce / mitigate effects. For example avoidance of Lea Valley flood plain and measures to limit greenhouse gas emissions in new developments. The Preferred Options objectives are seen as contributing to socio-economic principles, i.e. generating employment opportunities, better homes, better public transport and infrastructural facilities for the people of borough. However, the SA emphasises that it is necessary to have a balanced approach in order to prioritise the needs of each land use and allocate it accordingly to minimize environmental and social nuisance. The SA also comments that is also important to understand the vitality and importance of environmental factors such as climate change. The SA makes several recommendations to contribute further to sustainability objectives, including reducing flood risk. The SA also recommends that plan objectives relating to flood risk are included in the Core Strategy. <u>Policy Specific Analysis</u> The general approach taken in the SA is to identify potential impacts arising from the policies (such as flood risk) and recommend mitigation measures to address these (e.g. SuDS) – rather than recommending a more fundamental change in policy. In terms of the cumulative effect of policies on flooding, the SA comments that the level of risk is uncertain. It does however note that the Core Strategy proposes development in the eastern part of the borough, which is likely to increase the threat of flooding in and around these areas.' The SA also quantifies the number of properties at risk in Food zone 2 (4076 properties) and Flood Zone 3 (1422). The total area comes under the two flood zones to 3.7 hectares. On biodiversity, the SA comments that 'the impact of climate change on the natural environment in Hackney is very difficult to predict. Some species will prosper in the changing conditions as others lose out. Policy will need to evolve as better climate change modelling is developed.' The SA emphasises that there is a need to promote sustainable design in Hackney

		including BREEAM very good or excellent rating for retail, industrial units, schools and the EcoHomes very good or excellent standard. Also the inclusion of SUDS, green roofs or the use of grey water within developments is required.
	Preferred Options consultation and Council responses	Consultation comments highlighting the weaknesses of draft policies relating to climate change, resulting in specific changes to policy, or highlighting the decision process in generating plans are set out below:

Consultation feedback	**Council response/ policy amendment**
Although the imperative of climate change has apparently informed the Preferred Options, the document provides very few policies to address the issue	Council recognises that there is a need to expand upon the impacts of climate change.
Contradiction between encouraging the use of SUDS whilst developing the flood plain.	Council will undertake a Level 2 SFRA to provide the evidence to underpin recommendations on mitigation measures.
Draft Plan does not incorporate all the London Plan climate change adaptation	Agreed – Sustainability Standards for the Built Environment SPD will provide more detail on the issue
Need for clearer guidance on London Plan mitigation and adaptation policies	
Flexibility of policies relating to climate change – not necessarily a good thing	Council notes the trade off in viability terms between delivering affordable homes and meeting Code level 4 for new homes. As a consequence, the Council supports a flexible approach to ensure that housing delivery and regeneration is not jeopardised.
Waterfront policies to be qualified to ensure that they are not misleading in terms of the scale of development that will be permitted in this area	Wording amended.

		Strategy ignores the environmental benefits of green and open space – such as preventing flooding and regulating temperature.
	SA of the proposed pre-examination changes to the Core Strategy Core Strategy Proposed Submission Document	The SA is explicit in stating that no new developments should be permitted in vulnerable flood risk areas. Joint working with the EA is required in Hackney Wick. Consultation feedback has resulted in a new and strengthened chapter on Climate Change and Environmental Sustainability, which opens with a list of overarching principles for addressing the impacts of climate change and sets out a more comprehensive approach to dealing with the issues, including a range of more detailed and specific policies that deal with individual elements of climate change impacts, adaptation and mitigation. Policy approaches are more specific in addressing the impacts of climate change – particularly in relation to dealing with issues of flood risk in the east of the borough, the circumstances in which development will be permitted and measures expected of developers to deal with potential impacts. The policies also make reference to the findings from the SA in directing changes in policy. Green infrastructure policies now make reference to the role of GI in mitigating the urban heat island effect and promoting urban cooling. There are also increased references to CHP and district heating. It should be noted that the London Plan, GLA and GOL provide a strong overarching framework for adapting to and mitigating the impacts of climate change, which provides a consistent basis for Core Strategy policies and content for London authorities, which is perhaps stronger than the regional context elsewhere in England.
	Core Strategy Proposed Submission Document, Sustainability Appraisal	This SA recommends that the Core Strategy should '*seek to **adapt** to climate change already underway'* The SA reports that '*the objectives for climate change and economic growth do raise some possible conflicts although the most sustainable options for growth are sought. Focus on forming sustainable patterns of development as part of the growth agenda would further align these objectives'.*

		The SA highlights the need to align growth locations in order to deliver decentralised energy systems and thereby mitigate / adapt to climate change. It also emphasises the importance of making sure that strategic policies setting out the growth agenda and locations of development take into account adverse impacts of growth, rather than leaving it to development management policies to deal with the resultant effects.
Independent examination and EiP	Environment Agency representations Report into the London Borough of Hackney Core Strategy	EA expressed general support for all the Core Strategy policies relating to flood risk. The Inspector was satisfied that the Core Strategy had had regard to national policy. Their only comment relating to climate change policies related to the Council's policy on District Heating, where the Inspector agreed that the policy wording as suggested by the Council was commensurate with the evidence base available at the time.
Implementation, evaluation, monitoring and review		
Implement plans	Core Strategy was adopted	
Evaluate, monitor and review	Annual Monitoring Report 2009-10	AMR monitoring indicators are more geared towards climate change mitigation than adaptation. NI188 (Adapting to climate change) is not included in the AMR. **Local Indicator 21 - Net change in open space** Target: no net loss 0.478ha increased over the period 2009-10 **Indicator 23 - % reduction in C02 (NI 187)** Target: 4% reduction 2009-10 Borough is on track to achieve a 4% reduction Climate Change Strategy has also set a target to achieve a 3% reduction by 2013; 15.9% by 2019; and 49.2% by 2035 **Core Indicator 25 – Renewable Energy Generation** Target: none 26 planning applications received – equivalent to 1m Kg C02 **Local Indicator 26 – All major development rated against CSH or BREEAM** Target: a) 100% development; b) number of dwellings completed above national minimum standards of CSH; c) number of zero carbon homes delivered Indicator will be reported from date of Core Strategy adoption

		Core Indicator 29 – Number of permissions granted contrary to EA advice Target: 0 permissions 4 permissions granted 2009-10 (no reason stated as to why, other than the pressure for development in the Borough) **Indicator 30 – Residual waste collected (NI191)** Target: 595kg 595kg 2009-10 **Indicator 31 – Percentage of household waste sent for reuse, recycling and composting (NI192)** Target: 24.74% 24.35% 2009-10 **Indicator 36 - Access to services and facilities by public transport, walking and cycling (NI175)** **Indicator 37 – Working age people with access to employment by public transport (NI176)** 86.3% 2008-09

G3 Stockton

Stage of framework	Relevant Document	Comment
Structure the problem		
Define relevant objectives	I&O report	Adaptation issues not considered in any of the above. Flooding is only mentioned in 'other issues' for more general development control policies in the LDF. No mention of any other climate risks apart from flooding. Flooding highlighted as environmental issue in I&O report. "Q35a What is the best way of protecting existing settlements and new developments from flooding? Should the policies and proposals set out in Local Plan Alteration No. 1 which seek to restrict development in areas which are at risk of flooding, be retained? Q35b Are there any other flood protection measures you would like to see implemented within the Borough?"
Assessment of evidence base / Assessment of current and future vulnerability to climate risks?	Employment Land Review Report to cabinet Nov 06 Employment Forecasts & Land Requirements Consultants Report Dec 07 Environment Development Plan Document Issues & Options Consultation Dec 2010 Housing Supply in the Borough of Stockton - Demonstrating a 5 Year Supply of Deliverable Site Infrastructure strategy Core strategy Development Plan Document Publication draft October 2008 Regeneration Development Plan Document Sustainability Appraisal Report September	No reference to climate risks in employment land studies Flooding accounted for in SFRA and clearly assessed as a risk within the SHLAA. That said, no climate risks are assessed within the Housing Supply report Green infrastructure, water and sewage are highlighted within the Infrastructure Strategy but no link made to climate change Environmental DPD pays more attention to climate risks and includes an overarching approach to Green Infrastructure and Climate Change. Highlights that Green Infrastructure solutions can play a key role in preventing and mitigating flooding and making space for water and slowing the rate of surface water run off. LPA is implementing a Surface Water Management Plan. Environmental DPD highlights links to Core Strategy (Core Strategy policy CS10: Environmental Protection and Enhancement New development will be directed towards areas of low flood risk, that is Flood Zone 1, as identified in the Borough's Strategic Flood Risk Assessment (SFRA). In considering sites elsewhere, the sequential and exceptions tests will be applied, as set out in Planning Policy Statement 25: Development and Flood Risk, and applicants will be expected to carry out a flood risk assessment), Regeneration DPD and Sustainable Design DPD. Although a climate change is a focus for the Environmental DPD, it is weighted

	2007 Strategic Flood Risk Assessment Volume I Understanding the SFRA Process June 2010 Strategic Housing Land Availability Assessment October 2008	towards mitigation and flooding. No other climate risks are discussed.
Current and future vulnerability	SA Scoping report sets out assessment criteria that Local Plan policies will be appraised against. These should be based on the area's current and future climate risks. The current and future vulnerability should be assessed within the evidence base e.g. the SFRA or Heat mapping report.	Relevant objectives/targets for adaptation: SA Objective 13 – To reduce the causes and impacts of climatic change Indicators and targets all mitigation/energy SA Objective 14 – Reduce the risk of flooding and the resulting detriment to people and property Indicators: 1. No of planning applications approved contrary to the advice of the Environment agency where objection was made on flood risk grounds 2. % of developments approved with conditions fully mitigating EA's concerns Targets: 1. No increase in the number of properties exposed to flood risk SA Objective 12 – To protect and enhance the quality of the Borough's ground, river and sea waters Indicators: 1. Average domestic water consumption (l/head/day) 2. Domestic leakage (l/property/day) No targets SA Scoping Report sets out criteria to assess current and future vulnerability Climate change is in the Sustainability Appraisal Framework but only in relation to mitigation.

		Flooding is only climate risk directly mentioned, although water consumption is included as part of water quality objective. Interesting target set on development and flood risk. Will need to see if this was incorporated into the LDF. Vulnerability to flooding set out within the SFRA but no other climate risks are covered.
Highlights links to other plans and policies	Not included in notes	
Define and characterise adaptation options	Environmental DPD Infrastructure strategy	Includes options for green infrastructure and open space and includes some discussion re spatial scale Some options for green infrastructure included in infrastructure strategy Potentially some coverage of options in the Sustainability Design DPD but would need to check
Appraise solutions		
Assessment of potential use of adaptation options	Sustainable design DPD, Climate Change Action Plan 2007-12 Infrastructure Strategy, Core Strategy Preferred Options Sustainability Appraisal	Sustainable design DPD clearly sets out options to incorporate adaptation options such as SUDS, green roofs and options for reducing solar gain. Climate change action plan clearly sets out climate risks to the local area and uses UKCIP. Discussion also included on what it means in terms of impacts on homes, business, transport infrastructure, wildlife etc. Actions include the following adaptation ones: • Produce a Parks, Open Spaces and Countryside Strategy (2007-12) that promotes integrated planning and delivery of green infrastructure, creating a setting for sustainable living (e.g. encouraging walking/cycling and local recreation). • Baseline data for woodland and tree cover within the Borough produced and targets set for increasing % cover by 2012. • Include sustainable urban drainage (SUD) policy to dispose of surface run-offs without enhancing the flood risk as part of Core Strategy DPD by October 2009 and the Environment DPD by August 2010. • Set out clear vision, objectives and strategy for flood protection as part of the LDF Core Strategy.

		• Develop and adopt appropriate planning polices within the environment policy element of the LDF process • Produce revised Parks, Open Spaces and Countryside Strategy (2007- 12) promoting the moderating influence of trees and other green space to reduce climate change impacts on people and buildings. • Encourage sustainable building design to maximise natural ventilation and utilise passive solar systems and thermal mass to reduce internal temperatures. • Work with Tees Valley Wildlife Trust to promote 'Gardening for Wildlife' to reduce the loss of biodiversity. • Produce new and revised management plans for urban parks, country parks and other green space take account of the need to adapt to climate change (e.g. to conserve biodiversity). • Identify climate risks to local authority services through a scoping review and highlight potential impacts. • Identify and prioritise climate impacts requiring adaptation responses. These actions are directly related to planning but do not appear to be as integrated into the LDF process as they could be. There is a clear case made in multiple documents as to the win-win case for green infrastructure (Sustainability Design SPD, Infrastructure Strategy, Core Strategy Preferred Options Sustainability Appraisal)
Decision analysis to generate plans	Core Strategy Preferred Options Core Strategy Preferred Options SA Core Strategy Preferred Options Consultation responses Core Strategy Publication draft Core Strategy Publication draft SA Infrastructure Strategy,	The Core Strategy Preferred Options SA sets out the use of SUDS in delivering SA12(protect and enhance the quality of the borough's ground, river and sea waters), SA14 (reduce the risk of flooding and the resulting detriment to people and property), Core Strategy policy 3 sustainable living (CS3) and the link between reducing flooding and economic regeneration (CS4). That said it states that there is no direct link between economic regeneration and SA12 which is perplexing. Generally however, there are a number of effects of policies over the short, medium and long term which are judged as uncertain but it is not clear how the evidence base has been used to arrive at these conclusions e.g. it states that economic

	Planning Obligations SPD Planning Obligations SPD SA	regeneration (CS4) and flooding (SA14) are uncertain in the short term but not in compatible in the long term but not clear why. It also sets out the need to balance urban development and flooding (states need to use SFRA to determine decisions). Clear link made to Core Strategy Preferred Option which sets out that SUDS should form part of all new development..."Developing a strategic approach to GI would recognise its multifunctional role and a 'joined-up' approach to its planning and management will address numerous environmental, social and economic objectives". Adaptation reference in the Core Strategy Preferred Options relates to the conforming to the RSS so it will be important to see what will drive adaptation now that CLG have abolished regional planning. . Core Strategy Preferred Options clearly sets out that the SA has shown that a market-led approach to development (option 4) is not compatible with sustainability objectives. Core Strategy Preferred Options states the wish to maximise the use of the River Tees but acknowledges the need to take into account the impact of climate change and flooding. Flooding is the only climate risk that is highlighted in the Core Strategy Preferred Options document although the Climate Change Action Plan does set out the need to review all climate risks (detailed above). The work was meant to be carried out in 2008 but it is not clear from the website whether or not it was completed – one would hope that once the assessment of all climate risks is completed the findings would be integrated into planning policy. The major comments in the responses to the consultations on the Core Strategy Preferred Options paper related to flood risk and green infrastructure. In relation to the later, a comment highlighted that SUDs and GI need to be incorporated into development in such a way that they maximise the benefit for wildlife and enable it to connect to wider networks for green space to ensure that local wildlife can adapt to climate change. In relation to the former, a major comment was that the flood risk assessment together with climate change throws doubts on the river corridor option for development – it is recommended that the Council revisits the SFRA and the cost of alleviation measures on the schemes. The main issue which is highlighted in the Boathouse SPD (includes maps) is that "almost the entire land

		served by Boathouse Lane lies within Flood Zone 3: High risk. In order to satisfy the sequential test requirements in draft Planning Policy Statement 25: Development and Flood Risk the Council is required to undertake a Strategic Flood Risk Assessment to assist in the preparation of the Local Development Framework. However, as the site at Boathouse Lane is already allocated in the adopted Stockton-on-Tees Local Plan (1997), the Environment Agency are in agreement that it would not be appropriate in this instance to consider alternative sites. A site specific Flood Risk Assessment will be required which addresses how the flood risk will be managed on site, to be submitted to and agreed by the Environment Agency." It is not clear that the SFRA has been use to drive decision making in relation to the site but instead the previous Local Plan has been used which predates the relevant evidence base. The Core Strategy Publication Draft SA picks up the points raised in the consultation and highlights the need to adapt to climate change in terms of flooding and providing GI that enables the natural environment to adapt. The win-win case for GI is made and links made to CS10 (Environmental Protection), SUDS, flooding, health and water quality. The Core Strategy Publication Draft SA sets out the need for SUDS if the volume of development increases. Climate change (including flooding) is incorporated in the SA as a separate issue due to its importance however this serves to separate it from other policies relating to housing etc and does not link them together. There are a number of reference to the Transport Assessment and Transport Plan but the measures included in the Transport Plan are mitigation focused e.g. Park and ride schemes designed to reduce emissions. The Core Strategy Publication Draft SA also includes a good section on trade-offs, particularly in relation to strategic sites (Core Area, Stockton, Billingham, Thornaby, Yarm and Eaglecliffe).It clearly states the need to balance the need for new development with flood risk and environmental protection and the need to deal with and mitigate against conflicts. Most are focused on mitigation but it includes potential measures such as SUDS, minimising energy consumption, considering how to make allowances for biodiversity in the development. Core Strategy Publication Draft SA does however again include some questionable conclusions that there is no strong relationship between CS5 (Town Centre option for development) and water quality on the basis that water quality is not referred to

		in the in the CS5 policy. Also, it states that although flood risk is an issues within both CS4 (Economic regeneration) and CS5 (town centres), it states that an increase in emphasis on sustainability will ensure it is taken into account....this could well be the case but it is not clear whether the SFRA has been used to arrive at this conclusion. Core Strategy Publication Draft SA does include the following indicators: 14.1 Number of planning applications approved contrary to the advice of the Environment Agency where objection was made on flood risk grounds or water quality. 2005/06 = 0 (out of 25 relevant applications). 14.2 Number of new developments incorporating Sustainable Urban Drainage Systems (SUDS). The Core Strategy Publication Draft continues in the same vain in relation to SUDS and GI, highlighting clearly that flooding and the quality of ground, river and sea water is an issue for the borough. The link to biodiversity is picked up but not in relation to climate change. It includes many references to climate change mitigation but few to adaptation and a good example of this is in relation to transport planning. The need to deal with surface water runoff from new developments is highlighted within the Sustainable Living policy (CS3) and clear links made to the Code for Sustainable homes. There is no discussion of adaptation in relation to housing viability and this is evident in relation to the potential development sites along the river where no mention is made of flooding despite the inclusion within the accompanying SA and the points raised in the consultation. The infrastructure Strategy (includes some maps) has a similar focus on GI and clearly highlights it's multifunctional / win-win nature but other types of infrastructure are not related to climate change adaptation even through impact on, for example transport services could be significant. Northumbrian Water was consulted in relation to water and waste water but there was no mention of climate change. The only reference to climate change adaptation in the Planning Obligations SPD relates to GI and open spaces. Although the accompanying SA makes the clear links to managing flooding, it includes some questionable conclusions that planning contributions relating to the public realm, highways/transport and affordable housing provision have no strong relationship with SA13 (to reduce the causes and impacts of climate change) and SA14 (to reduce the risk of flooding and the

		resultant detriment to people and property).
Independent examination and EiP	Examination into the Soundness of the Stockton-on-Tees Core Strategy Main Matters and Issues Draft Version - 10th August 2009	The questions that were raised by the Inspector did not focus on conformity with plans and policies relating to climate change adaptation. That said they included the following which picked up on the linkages between policy on flooding and policy on housing and employment land as follows: 5.1 Is there a conflict between the aim of directing development towards the abundance of unused or under-utilised previously developed land, focussed mainly within the river corridor (CS paragraph 6.5) and the policy of directing new development towards areas of low flood risk (CSP10.(9))? 5.2 To what extent are the following constrained by flooding; • the existing housing commitments; • the deliverable and or developable housing sites identified in the SHLAA (Core Document HO7 paragraph 4.5); • the employment land referred to in Policy CS4 (2) (5) and (6)?. 5.3 Policy CS10 (9) indicates that outside areas of low flood risk (Flood Zone 1) the sequential and exception tests as set out in PPS25 will be applied. How would these tests be applied to sites such as Tees Marshalling Yard which is identified as being deliverable or developable in the SHLAA (Core Document HO7) but which is partly within Flood Zones 2 and 3?
Implementation, evaluation, monitoring and review		
Implement plans	Core Strategy was adopted	
Evaluate, monitor and review	AMR 08/09 AMR09/10	The major indicators relating to climate change adaptation focus on flooding and the single indicator relating to GI is in place to ensure it accords with the RSS that was in place at the time. If the major issues for the Borough relate to flooding and water management then the indicators, whilst simplistic, are appropriate. The relevant indicators are as follows: **Core Indicator E1: Number of planning permissions granted contrary to Environment Agency advice on flooding and water quality grounds.**

		The 08/09 Environment Agency was consulted on 92 applications and in 09/10 on 129 applications. None of these were granted contrary to the agency's advice regarding either flooding or water quality although it is not clear that the EA advice always aligns with the SFRA ref. Boathouse SPD. **National Indicator 189: The percentage of agreed actions to implement long term flood and coastal erosion risk management plans that are being undertaken satisfactorily** The Environment Agency's regional Catchment Flood Management Plan (CFMP) identifies actions that local authorities need to take in order for the plan to be implemented. To meet year one requirements, Stockton-on-Tees assigned a lead officer for the long term management of NI 189, agreed to the three year Flood and Coastal Erosion Risk Management Plan (FCRM) process, developed detail around the individual actions with in the CFMP, and confirmed that internal awareness regarding the role of the relevant FCRM plans and strategies in influencing and affecting LA plans and priorities had to be increased. **100% of the actions agreed with the Environment Agency were completed.** Although the EA's regional Catchment Flood Management Plan should continue it is not clear whether there will be a replacement indicator. **Potential Local Indicator: Protection of Strategic Gaps and Green Wedges from Inappropriate Development -**This Potential Local Indicator is included in the Submission Draft Core Strategy Implementation Plan, however no target is set. This indicator is also required for the Regional Spatial Strategy AMR but again it may be dropped with the abolition of regional planning. During 08/09 year, no planning permissions were granted in strategic gaps or green wedges and in 09/10 2 applications were granted. **Potential Local Indicator: Percentage of Homes Constructed to Sustainable Homes Code Levels -** This Potential Local Indicator is included in the Submission Draft Core Strategy Implementation Plan, which sets out a target of 100% of completed dwellings reaching Level 3 until 2013 and 100% of completed dwellings reaching Level 4 after 2014. Although this indicator is not currently being monitored but could be incorporated into the Housing Database and data relating to surface water run-off could be extracted from it.