SFRA Review 2017
CONSULTATION DOCUMENT

Newark and Sherwood District Council

Prepared by WYG Engineering Limited

The River Trent at Cromwell Weir

Arndale Court, Otley Road, Headingley, Leeds, LS6 2UJ
Tel: +44 (0)113 278 7111 Fax: +44 (0)113 219 2317
Email: matthew .elliott@wyg.com Website: www.wyg.com

WYG Engineering Limited. Registered in England & Wales Number: 01959704
Registered Office: Arndale Court, Otley Road, Headingley, Leeds, LS6 2UJ

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1.0 SFRA Review Introduction

1.1 Overview

WYG Engineering Ltd has been commissioned to support Newark and Sherwood District Council (N&SDC) in the preparation of a Strategic Flood Risk Assessment (SFRA) Review to support the N&SDC Plan Review.

The review is necessary to provide the evidence base to support a review of the N&SDC local plan. Whilst the local plan review anticipates lower housing numbers, it is not envisaged that there will be any de-allocation of deliverable sites.

In addition to the Strategic Flood Risk Assessment (SFRA) review, concurrently reviews have been undertaken of the Infrastructure Delivery Plan and the Water Cycle Study.

The N&SDC Local Plan is currently supported by a level 1 SFRA that was produced by WSP in July 2009. Subsequent to the production of the level 1 SFRA a Level 2 SFRA (June 2010) was undertaken by WSP in two Phases: Phase One covered three strategic sites in the Newark Growth Point Area; Phase Two covered the remaining strategic development sites elsewhere within the district and was issued in May 2012.

This SFRA Review updates the Level 1 SFRA in the light of the following:

(i) The reduced housing numbers to be taken into account in the local plan review;

(ii) Revisions to the SFRA necessary to bring this into alignment with the National Planning Policy Framework (NPPF) introduced in March 2012 and the associated Planning Practice Guide (PPG) 'Flood Risk and Coastal Change' introduced in March 2013;

(iii) Other key policy documents published by the risk authorities (as established by the Flood and Water Management Act 2010 section 6 (13)) since the publication of the level 1 SFRA as follows:

(a) The River Trent Catchment Flood Management Plan (Environment Agency (EA) December 2010);

(b) Nottinghamshire Local Flood Risk Management Strategy (2016-21) (Nottinghamshire County Council (NCC), Final Draft for Consultation December 2015);

(c) Environment Agency Guidance on climate change allowances.

(iv) Updated river modelling and flood defence construction undertaken by the risk authorities and made available during preparation of the SFRA Review; and

(v) Significant flooding events that have occurred within the N&SDC administrative area since June 2010.

The SFRA review has not reviewed all information submitted in relation to either determined or validated applications awaiting determination.

In undertaking the SFRA review, for reasons explained in further detail below, modelling of the River Trent upstream of Cromwell Weir has been undertaken to identify the impacts of the new EA climate change allowances. Plans showing the results of the modelling are provided in Appendix D.

As far as possible replication of data publicly available elsewhere has been avoided. However, where it is necessary to explain the rationale to the process undertaken and the conclusions reached from this review, documents are quoted.

This report is structured as follows:

(a) Chapter 2 of the report consider the above items in turn and identifies where the Level 1 SFRA (2010) requires the provision of supplementary information in order to support the Local Plan Review;

(b) Chapter 3 sets out the methodological approach to the modelling and briefly discusses the implications of the recent modelling results (including that undertaken for this study);

(c) Chapter 4 covers a number of matters where Local Plan Policies might be considered as part of the Local Plan Review.

(d) Section 5 provides advice to developers in the production of FRAs that is supplementary to already available advice and specific to the N&SDC administrative area.

This SFRA Review Report therefore does not replace the existing SFRA documents but updates the Level 1 SFRA in the light of new data to provide a full evidence base in respect of strategic flood risk for the Newark and Sherwood Local Plan Review.

2.0 SFRA Review Scope Rationale

2.1 Section Introduction

In this section the various matters that have emerged since the publication of the Level 1 SFRA in July 2009 are reviewed systematically to identify what implications these may have for the Local Plan review flood risk evidence base. At the end of each sub section the specific matters identified are summarised. As compliance with the requirements of the NPPF (and PPG) is fundamental, this is considered first. As the individual topic areas in many cases generate the same review requirements, the section concludes by grouping together the identified items requiring further consideration which are then considered in subsequent chapters of the review report.

2.2 Legislative and Planning Policy Context

2.2.1 Flood & Water Management Act (2010)

The Flood & Water Management Act (F&WMA) (2010) established the EA as responsible for the national strategy for flood and coastal erosion risk management in England with responsibility for issuing guidance to the other risk management authorities. In addition the EA continue to have responsibility in relation to flood risks from main rivers. Nottinghamshire County Council (NCC) is Lead Local Flood Risk Authority (LLFA) in the area with responsibility for local sources of flood risk (that being from ordinary watercourses, surface water run-off and groundwater). Internal Drainage Boards (IDBs) are retained as risk management authorities.

2.2.2 National Planning Policy Framework

One of the objectives of the introduction of the National Planning Policy Framework (NPPF) (March 2012) and the supporting Planning Practice Guidance (PPG) (March 2013) was to replace 'over a thousand pages of national planning policy with around 50, written simply and clearly' (See NPPF ministerial Foreword). However, the core principles of the former PPS 25 were retained in the NPPF and PPG although the volume of supplementary guidance was drastically reduced and, to an extent, the emphasis of the guidance was modified to bring about a greater coherence with the roles and responsibilities of the new flood risk management authorities (RMAs) established by the Flood and Water Management Act 2010 (F&WMA 2010).

Para 100 of the NPPF identifies that 'Local Plans should be supported by Strategic Flood Risk Assessment and develop polices to manage flood risk from all sources, taking account of advice from the EA and other relevant flood risk management bodies such as LLFAs and IDBs'. The paragraph

goes on to state that LPAs should apply a sequential approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk taking account of the impacts of climate change by applying the Sequential Test (ST); if necessary applying the Exception Test; safeguarding land from development that is required for current and future flood management; use opportunities afforded by new development to reduce the causes and impacts of flooding and where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long term, seeking opportunities to facilitate the re-location of development, including housing, to more suitable locations.

2.2.3 Planning Practice Guidance

Para 009 of the PPG identifies that 'a Strategic Flood risk Assessment is a study carried out by one or more Local Planning Authorities (LPA) to assess the risk to an area from flooding from all sources, now and in the future, taking account of the impacts of climate change and to assess the impact that land use changes and development in the area will have on flood risk'.

PPG para 010 largely replicates NPPF para 100 but adds that the SFRA should be used in Local Plan making to inform the sustainability appraisal, identify the requirements for site specific Flood Risk Assessments (FRA) and 'determine the acceptability of flood risk in relation to emergency planning capability'. The suite of SFRA documents provide the evidence to permit the LPA to comply with the requirements of NPPF paragraph 100 and PPG paragraph 010.

Paragraph 011 of the PPG provides guidance on the preparation of an SFRA which places emphasis on the need for SFRAs to be prepared in consultation and collaboration with other risk authorities. In PPG paragraph 012 it is stated that a Level 1 SFRA will be adequate where all development can be allocated outside high and medium flood risk areas. A level 2 SFRA is only required if all development allocations cannot be located outside flood risk areas and evidence is required (to reduce unreasonable burden on developers) to allow application of the Exception Test. In view of the above, the reference to a SFRA in paragraph 102 in connection with the Exception Test logically refers to a Level 2 SFRA.

The PPG paragraph 013 provides specific guidance on how an SFRA should address surface water flooding issues. Particular attention is drawn to the EA surface water flood map, which was published in December 2012, and local flood risk management strategies (FRMSs). As noted above the Nottinghamshire County Council Flood Risk Management Strategy (consultation draft December 2015) is therefore a particularly relevant consideration.

It is noted in Paragraph 015 that 'a functional flood plain is a very important planning tool in making space for flood waters when flooding occurs' and that development should be directed away from these areas using the EA's Catchment Flood Management Plans (CFMPs) and LLFA Local Flood Risk Management Strategies (FRMSs). Importantly, an SFRA should identify areas of functional flood plain in their SFRA and that whilst this identification might be land that would flood during a 1 in 20 year event (5% AEP) it could include other parameters and land safeguarded for flood risk management (FRM) functions.

Finally, PPG paragraph 014 does require consideration of reservoir inundation. The EA published reservoir inundation maps in December 2012.

2.2.4 Summary

In summary, an SFRA provides important evidence for the Local Plan and has an ongoing purpose in providing guidance to developers. Therefore, whilst much of the information in the 2009 Level 1 SFRA remains relevant, the NPPF and PPG require the Level 1 SFRA Review to include the following:

(a) Renewed consultation and collaboration with the RMAs.
(b) Consideration of the key strategies of the relevant risk authorities: the EA Trent CFMP and the NCC FRMS;
(c) Consideration of climate change impacts;
(d) To take account of new information on flooding with an increased emphasis on the matter of Surface Water flooding;
(e) Information to allow identification of the functional flood plain and land to be set aside for FRM activities; and
(f) Information to allow the identification of where amendments to the approach to delivery of sites or the de-allocation of land should be considered due to increasing flood risks on account of climate change.

2.3 Flood Risk Authority Flood Management Plans and Strategies

2.3.1 The River Trent Catchment Flood Management Plan (EA; Summary Report December 2010).

The River Trent Catchment Flood Management Plan (CFMP) covers the entirety of the River Trent catchment and includes 6 policy options. The large Trent catchment is divided into ten sub catchments

of which the Shelford to Gainsborough sub catchment covers the Trent within the N&SDC administrative area and the Sherwood sub catchment covers the western part of the N&SDC administrative area that is drained by the River Maun and its tributaries which in turn drain into the River Idle.

Policy 3 of the Trent CFMP is applicable to 'areas of low to moderate flood risk where we (the EA) are generally managing existing flood risk effectively' and is relevant to the Sherwood sub catchment. The CFMP goes on to explain that 'this policy will tend to be applied where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future. However, we keep our approach under review, looking for improvements and responding to new challenges or information as they emerge. We may review our approach to managing flood defences and other flood risk management actions to ensure that we are managing efficiently and taking the best approach to managing flood risk in the longer term'.

Policy 4 of the Trent CFMP is applicable to 'areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change' and is relevant to the Shelford to Gainsborough sub catchment of the Trent. The CFMP goes on to explain that 'this policy will tend to be applied where the risks are currently deemed to be appropriately managed, but where the risk of flooding is expected to significantly rise in the future. In this case we would need to do more in the future to contain what would otherwise be an increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options'.

2.3.2 The River Witham CFMP (December 2009)

An area of land to the south east of Newark is drained by the River Witham and therefore lies in the River Witham CFMP rather than the Trent CFMP. The Witham has eight policy sub areas and the part of the N&SDC administrative area that lies within the Witham CFMP is in the 'Upper Witham, Berlings, Bain and Upper Till' sub area where policy 2 is applicable.

Policy 2 applies in 'areas of low to moderate flood risk where we can generally reduce existing flood management actions'. Policy 2 'will tend to be applied where the overall risk to people and property is low to moderate. It may no longer be value for money to focus on continuing levels of maintenance to existing defences if we can use resources to reduce risk where there are more people at higher risk. We would therefore review the flood risk management action being taken so that they are proportionate to the level of risk'.

An action specific to this sub area in conjunction with Policy 2 is to ensure planning policies are in line with PPS 25. However, whilst this now needs to updated to reflect the introduction of the NPPF and PPG, it does not appear to require more of the LPA than compliance with the NPPF and PPG in determining individual applications or the need for specific local plan policies.

2.3.3 The NCC Local Flood Risk Management Strategy (FRMS)

The final draft of the NCC FRMS was issued for consultation in December 2015. Five objectives for the strategy are identified at section 4.2 and the fourth objective is particularly relevant to this SFRA review: 'To integrate local flood risk management into the planning process and support sustainable growth'. Table 5.1 of the strategy identifies four measures by which this objective will be achieved which are: (i) encourage and promote the use of SuDS in all new developments and retrofit SuDS wherever possible; (ii) Ensure as far as practical, LPAs take full account of flood risk in Local Plan Policies and allocations, planning applications and supplementary planning documents; (iii) maximise opportunities to integrate flood management with other county functions and (iv) develop a better understanding of drainage maintenance requirements on public property.

It should be noted that the NCC FRMS includes a significant amount of information on historic surface water flooding within the N&SDC administrative area. Of particular note is the surface water flooding in Southwell in July 2013 (see section 3.2.1) and flooding due to ordinary watercourses, Potwell Dyke, Southwell in July 2013 (see section 3.2.3). A summary of flooding from historic sources is provided in Table 3-4.

2.3.4 Summary

The primary matters emerging from the review of the CFMP and the NCC FRMS to be taken forwards in the SFRA review are:

(a) The importance of reviewing the potential impacts of climate change, in particular, in relation to the River Trent emerges from the above review as a key requirement for the SFRA Review.
(b) Consideration of local flood risk in allocation of land in the N&SDC Local Plan Review
(c) Inclusion of information on SUDS techniques and maintenance options within new guidance to be provided to developers.

Whilst it is important to note that part of the N&SDC administrative area lies in the River Witham CFMP, Policy 2 of the CFMP does not generally promote extensive investment in analysis of risks and

in new flood defences because risks are considered to be 'low to moderate'. In addition, the only allocation lying within this catchment (NAP2C 'Land around Fernwood') has already been heavily scrutinised by means of the level 2 SFRA (Phase One), and extensive information submitted in connection with planning application 16/00505/OUTM, it is concluded that no further modelling to support this SFRA review is justified.

2.4 EA Climate Change Allowances

2.4.1 The New EA Climate Change Guidance

Following serious flooding in the north of England during December 2015, the EA issued new climate change guidance in February 2016. The guidance includes new peak river flow allowances by river basin district. The N&SDC administrative area lies largely within the Humber river basin district as the River Trent drains into the North Sea via the Humber. As noted above, a small part of the N&SDC administrative area to the south and east of Newark lies within the River Witham CFMP which is part of the Anglian river basin district.

Table 2.4.1: EA New EA Climate Change Allowances: River Flows (Fluvial Flooding)

River basin district	Allowance category	Total potential change anticipated **for the '2020s'** (2015 to 2039)	Total potential change anticipated **for the '2050s'** (2040 to 2069)	Total potential change anticipated **for the '2080s'** (2070 to 2115)
Humber	Upper end	20%	30%	50%
	Higher central	15%	20%	30%
	Central	10%	15%	20%
Anglian	Upper end	25%	35%	65%
	Higher central	15%	20%	35%
	Central	10%	15%	25%

The new guidance provides a range of allowances as set out in the table above. Guidance is provided on the allowance to be used based on the vulnerability classification of the proposed development (as set out in Table 2 of the PPG) and the location of the development in terms of flood zoning. In addition, the peak rainfall intensity allowances have been amended. Sea level allowances are retained on the basis of the anticipated rise in sea level for specific geographical area as set out in PPS 25. The Trent is tidal downstream of Cromwell Weir and lies in the 'East, east midlands, London and south east' geographical area.

Specific transitional arrangements are provided in the guidance. A development plan already submitted for examination would not require consideration of the new allowances nor would a validated planning application. However, even in these circumstances, the new transitional allowances should be applied if the 'development is particularly sensitive to flood risk or in a vulnerable location'.

In view of the above it is concluded that the new EA Climate Change Guidance is a relevant consideration for the Local Plan Review.

2.4.2 Summary

The primary matters emerging from the review of the new EA climate change allowances to be taken forwards in the SFRA review are:

1. The impact of the new EA climate change allowances on fluvial flows. This is to be restricted to the section of the River Trent upstream of Cromwell Lock where flows are not influenced by tidal effects. Modelling of other rivers and the tidally influenced section of the River Trent to determine the effects of application of the new EA climate change allowances as part of the SFRA review is not justified as (a) particular climate change sensitivities are not identified in other CFMP polices and (b) the number of potential allocations likely to be impacted in these areas does not justify the associated expenditure.
2. Inclusion of information on the application of the new climate change rainfall intensity allowances is to be provided within new guidance for developers.

2.5 Flooding

2.5.1 Recent Flooding Events

Since the publication of the SFRA in July 2009 there have been a number of flooding incidents within the administrative area of N&SDC. Table 3-4 of the NCC FRMS provides a full listing of the events, the locations affected and the source of the flooding.

The most significant event was the flooding from ordinary watercourses and surface water run-off in July 2013 which led to extensive flooding in Southwell and Lowdham. As a result of the flooding NCC commissioned URS to undertake the 'Southwell Flood Study' (September 2015) (SFS) which investigated the extent of flooding (around 250 properties suffered interior flooding (SFS para 3.4.8)), the risk of flooding in Southwell (SFS Section 5) and possible solutions (SFS Section 6). As a result of the studies significant effort has been expended in modelling the risks associated with local sources of flood risk as is discussed in more detail in section 3 below which covers the new modelling information.

The tidal surge which occurred on 5th December 2013 resulted in some of the highest ever recorded sea levels in the Humber Estuary. However, the NCC FRMS does not report any significant flooding as a result of this event on the tidally influenced sections of the River Trent downstream of the Cromwell Lock and Weir. Downstream of the N&SDC administrative area flooding did occur as a result of the tidal surge and in order to better understand the risks the EA have expended considerable effort in refining their model of the tidally effected section of the River Trent.

The NCC FRMS provides an updated list of flood events so it is not considered necessary to replicate this data in the SFRA review. However, in the developer guidance, signposting will be provided to the location of information on the extending record of historical flooding.

The significant flood events, have however, resulted in new modelling work which is considered below.

2.5.2 Section Summary

The primary matters emerging from the review of recent flooding in the area to be taken forwards in the SFRA review are:

(a) Consideration of the recent modelling undertaken following those events (see below); and
(b) Signposting is to be provided in the Level 1 SFRA Review developer guidance to the enlarged flood listing contained in the NCC FRMS.

2.6 Recent Flood Risk Modelling and New Flood Defences

2.6.1 Recent Flood Risk Modelling and New Defences

Since production of the Level 1 SFRA (July 2009) the following new modelling has been undertaken and audited by the relevant flood risk authority:

1. The tidally influenced section of the River Trent has been re-modelled by the Environment Agency. The River Trent is considered to be tidally influenced upstream to Cromwell Lock and Weir (see photograph on the front cover of the report);
2. Following the extensive flooding of Southwell in July 2013 NCC commissioned detailed investigations, feasibility and options which resulted in the publication of the Southwell Flood Study (URS) (September 2015). To support a scheme included in the 6 year Flood Defence Grant in Aid (FDGiA) programme further modelling has been commissioned by NCC and undertaken by JBA. This modelling, whilst at an advanced stage, is not available for public release. Therefore, the best currently available modelling of local sources of flooding in Southwell is that provided within the Southwell Flood Study (URS) (September 2015);
3. Modelling of the River Devon, which is a main river, has been undertaken by developers in conjunction with the development of land on the south of Newark. At this point in time, this modelling has not been used to modify the Flood Map for Planning;
4. New defences have been constructed and recently completed by the Environment Agency at North Muskham. These are shown on Dwg 027 'Flood Defences' in Appendix B along with the land that these protect.

2.6.2 Section Summary

Any RMA audited new modelling and the construction of new defences by RMAs is a relevant consideration for the evidence base to support the Local Plan Review. Therefore, these items are taken forwards within the level 1 SFRA review:

(a) The EA have provided outputs from the latest modelling of the tidally influenced section of the River Trent. This information allows some differentiation to be made between coastal and fluvial risks.
(b) Any modelling of the River Trent upstream of Cromwell Weir and Lock should take account of the latest information on flood defences provided by the EA and other RMAs.
(c) Only modelling audited by the EA and RMAs and made available for the Level 1 SFRA Review has been taken into account in the evidence base for the Local Plan review.

2.7 Summary of Items to be Considered in the SFRA Review

As noted in the introduction to this section appropriate consideration of the above items has been achieved through the following methodological approach:

1. A Steering Group has been established for consultation throughout the SFRA review process. The Steering Group has included representatives of the risk authorities established by the F&WMA 2010 where such attendance is proportionate to the review objectives. For this purpose, the Steering Group has met on two occasions and included attendees from the EA, NCC, N&SDC, the Trent Valley Internal Drainage Board (IDB) and the Upper Witham IDB. In addition, the Southwell Flood Forum has been represented on the Steering Group. The water utilities were consulted in respect of the SFRA review in conjunction with the WCS review, which have been undertaken concurrently, allowing any water utility concerns to be taken into account. In addition, the water utility companies have also been actively engaged as part of the Infrastructure Delivery Plan work. Notes of the Steering Group meetings are provided in Appendix A of this report. This approach addresses the requirement of the PPG (para 012) and has assisted in the collation of relevant data in respect of flood risk in the N&SDC administrative area;

2. The NPPF requires the consideration of climate change in application of the Sequential Test (para 100). In addition, the PPG (para 015) makes it clear that a SFRA should take account of the plans and strategies developed by the RMAs. Specifically, the River Trent CFMP requires that the impacts of climate change on the River Trent be kept under review. In addition, new EA climate change allowance guidance published in February 2016 would require consideration of the 1 in 100 year return period fluvial flow (or 1 % Annual Exceedance Probability (AEP) or Q100) on the River Trent, with the addition of a range of allowances as set out in the guidance. In discussion with the EA it has been agreed that to inform the SFRA Review the River Trent model (upstream of Cromwell Lock and Weir) be run with an allowance of 20%, 30% and 50%. In addition, the Q20 flow (1 in 20 year or 5% AEP) and Q1000 flow (1 in 1000 year or 0.1% AEP) has also been modelled. The modelling has included the latest information on defences as provided by the EA. Mapping arising from this modelling for each flow, includes flood levels, depths, velocities and hazard and is provided in Appendix D. This modelling provides the following evidence to support the Local Plan review:

    (i) The evidence base to allow the sequential test to be applied by N&SDC for land along and adjacent to the Trent Valley;
    (ii) The evidence base to allow N&SDC to undertake an assessment of existing allocations and development in the light of climate change as required by NPPF para 100;
    (iii) Information to support the identification of the functional flood plain along the River Trent upstream of Cromwell Lock and Weir.
    (iv) Information on River Trent flows with climate change to assist developers in the production of FRAs to support applications.

The approach to the modelling is briefly described and the outcomes reviewed in Chapter 3 below.

3. Subsequent to the publication of the Level 1 SFRA new information on surface water flood risk and risks associated with reservoir breach are available on the EA website. In addition, recent modelling of the local flood risk sources has refined the work undertaken in the Southwell Flood Study and should be used in application of the Sequential Test for allocations in Southwell and by developers when preparing FRAs for any new development as required by the NPPF and PPG as supplemented by Local Planning Policies in this locality. The implications of the modelling undertaken to date are also described in Chapter 3 below.

4. In the light of information emerging from the Steering Group and the modelling (both fluvial and local sources) a number of recommendations emerge that could be covered by means of specific flood risk and surface water drainage related Local Plan Policies. This topic is covered in Chapter 4 below.

5. In the light of the review, it is clear that the Developer Guidance provided in the Level 1 SFRA requires amendment and expansion. Accordingly, supplemental developer guidance is provided in Chapter 5 which has been prepared such that it could be released as a short supplementary note to the existing SFRAs.

The above allow all the items identified in the preliminary review described in this section to be addressed in the remainder of this report and its supporting appendices.

It should be noted that this report does not formally update the earlier Level 2 SFRA reports, however the new information provided in this report should be taken into account in any detailed consideration of sites previously considered in the earlier Level 2 SFRA reports.

3.0 Recent Modelling Review

3.1 Section Introduction

This section sets out the approach to the modelling undertaken specifically to inform the SFRA review and then considers the wider implications of this modelling, along with additional modelling undertaken by other parties since publication of the July 2009 SFRA.

3.2 Modelling Approach

In setting out the preliminary methodology to be adopted by the SFRA Review, it was proposed to investigate the impacts of the new EA climate change allowances (as set out in section 2.7 Item 2 above) on the River Trent upstream of Cromwell Weir and Lock as a priority, and on the River Maun, if this was an easily achievable and proportionate objective. Depending on the outcome of this modelling a more detailed level 2 SFRA assessment would be undertaken when the implication of the first stage of modelling had been assessed and then reviewed as part of the emerging Sequential Test considerations for the development scenario under consideration. This approach was endorsed by the Steering Group.

The model outputs from the River Trent upstream of Cromwell Weir and Lock cover the following flows: Q20, Q100 and Q1000; in order to assess the impacts of climate change the Q100 flow has been run with a 20%, 30% and 50% climate change allowance applied. For each of these flow scenarios flood depths (including by implication extent), velocities and hazards are mapped. In addition, to enable the changes to be more easily assessed, flood extent difference maps have been prepared.

3.3 Implications of Recent Modelling

3.3.1 Fluvial Modelling of River Trent (Upstream of Cromwell Weir and Lock)

Whilst climate change impacts are clearly a concern in relation to the River Trent upstream of Cromwell Lock and Weir, the actual increase in extent of the flood plain that arises on account of the increased flows is to an extent limited by the extensive flood plain width. As a result, significant increases in flow can be accommodated with relatively small increases in depth and relatively small increases in flood plain extent. As the increases in Q100 flow for the climate change scenarios do not result in flows in excess of the Q1000 flow the future increased extent of flood zone 3 does not exceed

the extent of the current flood zone 2 (which is defined as the extent of the Q1000 flood). The NPPF and PPG do not require the application of climate change allowances to the Q1000 flood (which defines the extent of FZ 2). As a result, the extent of FZ 1 is not altered by the application of the climate change allowances. The Sequential Test (when considering fluvial flooding) is not applied to sites within FZ 1 and therefore the extent of land in which the Sequential Test is required (for fluvial flooding) is unchanged.

The most significant future increases in flood zone 3 extent associated with the River Trent can be identified by reference to plan A098016/35/18/032 (River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 20% CC, 30% CC and 50% CC) which is provided in Appendix D. Whilst the two specific areas identified below are not a complete description of the future growth of FZ 3, these areas constitute the most extensive areas of expansion:

(i) Portions of the Trent Valley on the north-west side of the River Trent and to the south-east of the Lincoln-Nottingham railway line, which includes the settlements of Fiskerton, Morton and Bleasby. Whilst much of the affected land is agricultural, parts of the footprint of Staythorpe Power Station would move from FZ 2 to FZ 3.

(ii) To the north-west side of the River Trent and to the north of the A616 on either side of the A1. Whilst much of the affected land is agricultural it does include parts of the settlements of South and North Muskham.

The modelling produced is of sufficient accuracy to allow all sites under consideration within the local plan review, located along the River Trent corridor, to be subjected to Sequential Testing which takes into account the implications of climate change.

The implications for existing development are discussed in Section 4.3 below.

3.3.2 Tidal Modelling of River Trent (Downstream of Cromwell Weir and Lock)

The focus of the new modelling undertaken by the EA which extends upstream of Cromwell Lock and Weir to the point where the A1 crosses the River Trent flood plain was the new information on surge and tidal effects which emerged from the more detailed consideration of the December 2013 tidal surge event.

The modelling does not result in any significant intrusion of the flood footprints into Flood Zone 1 areas as the primary flood risk in this location is still that from fluvial flood risk.

However, in terms of flood warnings, it is important that those living and working in the tidally affected area are aware that there is an additional flood risk on account of tidal influences in addition to the dominant fluvial flood risk.

3.3.3 Fluvial Modelling of the River Maun at Ollerton

The current EA model has been examined to assess its suitability for the purpose of assessing the impacts of climate change. However, due to a number of technical issues which only became evident on closer inspection, the model was found to require a disproportionate effort in order to generate climate change allowance flood extent mapping which would ultimately be of limited reliability.

A more accurate determination of flood zones impacts on the deliverability of site reference OB/MU/1 was deemed necessary and for this reason, following the review identified in the methodology (see section 3.2 above) a Level 2 SFRA Assessment has been undertaken for this site. The Level 2 SFRA Assessment is the subject of a separate report which demonstrates the extent of the site available for development without consideration of the Sequential Test.

3.3.4 Southwell

Severe flooding in Southwell in July 2013 has resulted in extensive investment in modelling in order to understand the existing risk and to allow development of measures to alleviate the quantified flood risk.

Modelling of local sources of flood risk is currently being undertaken by JBA consulting on behalf of NCC building on earlier work undertaken by URS (Southwell Flood Study September 2015) which is available on the NCC website. The new work has included information provided by the Southwell Flood Forum and more detailed surveys of culverts and channels. It is anticipated that the new flood risk mapping of local sources of flood risk will be available for consideration in conjunction with new planning applications, subject to NCC agreement, in 2017.

However, although the current modelling is not yet complete, it is considered that the work undertaken to date in conjunction with the Southwell Flood Study September 2015 is of sufficient detail and accuracy for application of the Sequential Test, though it may become necessary to review this position in light of the publication of the new information in 2017. The proposed allocations in Southwell have been considered drawing on information from the following sources: (i) The EA Flood Map for Planning; (ii) The EA Surface Water Flood Map; and (iii) the URS Southwell Flood Study September 2015. For each existing site allocation in Southwell, Appendix C provides mapping

information drawn from the above sources which is summarised in Table 3.3.4 below by provision of the approximate estimated percentages of land within each site with a particular level of flood risk.

Table 3.3.4: Potential Allocations: Flood Risks expressed as a Percentage of the Site Footprint

% by Area	EA Flood Map for Planning			EA SW Flood Maps				NCC Modelling (Sept 2015)			
Allocation	FZ 1	FZ 2	FZ 3	High	Med	Low	Very Low	5% AEP	1% AEP	0.1% AEP	Very Low
So/Ho/1	100	0	0	5	<5	5.0	85	10	15	20	80
So/Ho/2	100	0	0	0	0	<5	95	<5	<5	5	95
So/Ho/3	95	0	5	5	0	45	50	10	15	25	75
So/Ho/4	100	0	0	<5	<5	<5	95	<5	<5	10	90
So/Ho/5	100	0	0	10	<5	5	85	5	10	15	85
So/Ho/6	100	0	0	5	10	20	65	15	30	35	65
So/Ho/7	100	0	0	0	0	5	95	5	5	15	85
So/Mu/1	85	10	5	<5	<5	10	85	5	5	30	70
So/E/2	70	30	0	30	20	25	25	30	50	60	40
So/E/3	100	0	0	<5	<5	<5	95	<5	<5	5	95

The columns highlighted green indicate the percentage of the site, where flood risk (due to fluvial or local surface water sources) is very low. As the NCC (Sept 2015 modelling) is a more detailed study that takes account of local information, it is likely to provide better evidence than that from the EA Surface Water Flood Maps.

Land at risk of flooding in a Q20 (5% AEP event) from surface water conveyance routes, or flood pools associated with surface water conveyance routes should be protected or compensated for within new development (See Section 4.4. below). It is recommended that the wording of site allocation policies be amended to reflect this. Details of the extent of risk to each site allocation can be seen in the red column of Table 3.3.4 above, and the mapping provided in Appendix C show the areas of the sites affected.

3.3.5 EA Surface Water flood maps

The EA surface water flood maps show the extent of land exposed to surface water flood risk as follows: 'very low' (probability of flooding less than 1 in 1000 year) 'low' (probability of flooding in the

range 1 in 100 to 1 in 1000 year) 'medium' (probability of flooding in the range 1 in 100 to 1 in 30 year) or 'high' (probability of flooding in excess of 1 in 30 year) flood risk.

As would be expected there are significant areas across the N&SDC administrative area exposed to a risk of surface water flooding and the maps allow all potential allocations in the development scenario to be assessed from this perspective.

3.3.6 EA Reservoir Breach Modelling

The EA 'Flood Risk from Reservoirs' maps show the extent of land which would be subject to inundation in the event of a failure of a 'large raised reservoir'.

Within the N&SDC administrative areas there is a strip of land, subject to such risk, along the River Trent floodplain upstream and to the south of the A1 crossing of the River Trent flood plain. This area is contained within the functional flood plain of the river.

Elsewhere there is a further extent of land along the River Maun where the reservoir breach inundation footprint is considerably larger than the 1 in 100 year flood extent (i.e Flood Zone 3). This is on account of impounded water upstream and outside of the N&SDC administrative area that would run along the course of the River Maun. In addition, Rufford Lake and the lakes within the Sherwood Forest Holiday Village would also inundate land alongside Rainworth Water. Rainworth Water is a tributary of the River Maun.

Finally, there are some areas of largely agricultural land that would be affected by an upstream reservoir breach along the River Witham and within the N&SDC administrative area.

The risk arising from a failure of a large raised reservoir is very low. In applying the Sequential Test, it would only be in very exceptional circumstances that reservoir breach would be a decisive consideration.

3.4 Conclusion

The modelling undertaken as part of this SFRA review, when taken with other modelling information available on the EA website and other audited modelling made available by the risk authorities (the EA and NCC) is sufficient to allow application of the Sequential Test.

In addition, a number of matters arise from the above that are relevant Local Plan Policy Considerations. These are discussed in more detail in Chapter 4 below.

4.0 Local Plan Policy Considerations

4.1 Section Introduction

This section sets out key local plan policy considerations in respect to Critical Drainage Areas (CDA), development relocation and functional flood plain definition.

4.2 Critical Drainage Areas

In the light of the extensive and severe flooding from local sources in Southwell and Lowdham in July 2013 (and recognition that there has been a history of flooding from local sources in Southwell) consideration was given by the Steering Group to the designation of these areas as Critical Drainage Areas (CDA). The intention of the NPPF in establishing a CDA is that it increases the number of planning applications which require the support of a Flood Risk Assessment (FRA), widening this to include 'all proposals for new development (including minor development and change of use)'.

The Steering Group concluded that whilst this increased requirement to consider flood risk in conjunction with all new development in a CDA can have benefits, it will result in a disproportionate burden on the regulatory authorities in conjunction with applications that have no flood risk implications. In addition, the Southwell Neighbourhood Plan has specifically developed local polices intended to improve the management of flood risk in Southwell, including guidance on the run-off rates from development requiring a Flood Risk Assessment These policies have been formally considered and subject to public consultation through the Neighbourhood Plan process.

It is concluded, therefore, that CDA designations would not be appropriate and that this issue is better addressed by means of a high level strategic policy within the Development Plan, which in the case of Southwell takes account of the content in the Neighbourhood Plan concerning run-off rates. The intention being that this would then allow for the subsequent introduction of a Supplementary Planning Document containing the more detailed measures to be considered for those types of new development that have a flood risk implication.

4.3 Development Re-Location

Paragraph 100 of the NPPF identifies that where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long term, then Local Plans should seek opportunities to facilitate the re-location of development, including housing, to more sustainable locations. More specifically the EA Catchment Management Plan identifies that in areas of low moderate or high risk 'further actions may be needed to keep pace with climate change'. In order to address this issue, the River Trent has been modelled using the latest EA Climate Change Allowances (February 2016). However, climate change impacts on other smaller watercourses are currently not available and the effort to generate this data would be disproportionate to this local plan review.

Gypsy and traveller pitches are classified as Highly Vulnerable according to Table 2 of the PPG. For this reason, such sites where flood risks will increase over time are a particular concern and require consideration within the Local Plan review. The Tolney Lane Gypsy and Traveller site provides the main location of gypsy and traveller accommodation within the Newark Urban Area. Critically the site is considered by the Environment Agency to be at high risk of flooding. In considering a recent appeal, the Planning Inspector concluded that the lack of available pitches elsewhere justified the granting of a temporary permission for pitches in an area of high flood risk. Consequently, the site clearly requires consideration in meeting the NPPFs requirements over the relocation of existing development. Considerations of the climate change allowances on flows in the River Trent indicate that there will be an expected increase in flood hazard at the site. However, to re-locate the site will require identification of a suitable available alternative site in an area of lower flood risk and no such site is available. Therefore, re-location through the Local Plan review is not currently a viable option. However, the possibility of relocating Tolney Lane residents to areas of lower flood risk should be undertaken in conjunction with the next SFRA review.

The climate change modelling outputs in respect of the River Trent do not justify any further consideration of development re-location through the Local Plan at this point in time.

4.4 Functional Flood Plain

The PPG defines the functional flood plain as land 'where water has to flow or be stored in times of flood'. Further guidance is provided as to how an SFRA should identify the functional flood plain as follows: 'land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood attenuation scheme)... should provide a starting point for consideration and discussions to identify the functional flood plain'.

The modelling of the River Trent upstream of Cromwell Weir and Lock has deliberately identified the 1 in 20 year flood footprint and this has been agreed with the steering group as being a reasonable definition of the functional flood plain.

Therefore, within the N&SDC administrative area the functional flood plain shall be taken as the land which would naturally flood with an annual probability of 1 in 20 (5% AEP) or greater in any year. A plan showing the footprint of the 1 in 20 year (5% AEP) fluvial River Trent flood event upstream of Cromwell is provided at Appendix B of this document. The 1 in 20 year (5% AEP) fluvial flood extent shall be taken as the functional flood plain of the River Trent in this area. This plan takes account of the effects of defences and other flood risk management infrastructure.

Elsewhere within the N&SDC administrative area applicants will be required to establish the extent of the functional flood plain by modelling and in consultation with the flood risk authorities taking account of the guidance provided at paragraph 015 of the PPG.

In undertaking the SFRA review the flood risk authorities have been asked to identify any land to be considered for setting aside for Flood Risk Management (FRM) activities. No land has specifically been identified for this purpose.

5.0 Developer Guidance

The Level 1 SFRA provided a 'SFRA Toolkit' as Appendix F.

The EA provide guidance which complements the NPPF and PPG setting out how and when to undertake a Flood Risk Assessment (FRA) to support a planning application.

The guidance provided below, which is targeted at Developers preparing planning applications, is supplemental to the published EA guidance. However, it does not replace the requirements of the NPPF and PPG, or the published EA guidance.

1. The EA provide guidance in conjunction with the NPPF and PPG setting out when an FRA is required to support a planning application. However, a further check should be made against the Newark & Sherwood Development Plan, and supporting information, to ensure that the proposed development is not located in area where, on account of known local flood risk issues, a more extensive approach to support a planning application applies.
2. The functional flood plain in the N&SDC administrative area is defined as follows:

    (i) The functional flood plain shall be taken as the land which would naturally flood due to either a main river or ordinary watercourse with an annual probability of 1 in 20 (5% AEP) or greater in any year. A plan showing the footprint of the 1 in 20 year (5% AEP) fluvial River Trent flood event upstream of Cromwell Weir and Lock is provided in Appendix B of the Level 1 SFRA Update document. This plan takes account of the effects of defences and other flood risk management infrastructure present at the time of its creation (July 2016).

    (ii) Elsewhere within the N&SDC administrative area applicants will be required to establish the extent of the functional flood plain by modelling and in consultation with the flood risk authorities taking account of the guidance provided at paragraph 015 of the PPG.

    (iii) Land within the footprint of the 1 in 20 year flood would not normally be regarded as functional flood plain where the exceptions identified in the version of the PPG current at the time of application determination apply. The exceptions taken from the PPG current at the time of the publication of this SFRA review are as follows: para 015 Ref ID 7-015-20140306: 'Areas which would naturally flood, but which are prevented from doing so by existing defences and infrastructure or solid buildings, will not normally be identified as functional flood plain'.

3. In preparing the SFRA (September 2016) flood risk authorities have been asked to identify any land to be considered for setting aside for Flood Risk Management (FRM) activities. Applicants are advised that no such land has specifically been identified for this purpose.
4. The EA now require the application of revised climate change allowances in respect of fluvial flood risks. Along the Trent Valley the new allowances have been modelled and the resultant maps are available in Appendix D of this Level 1 SFRA Update document. This information can be used to ascertain the impact of the new allowances on a proposed development. In other locations, the developer will be required to agree with the EA the impact of the new allowances for fluvial flows on the proposed development.
5. An FRA should consider historical flooding of the site and its immediate vicinity. Records of flooding are contained in the N&SDC Level 1 SFRA and also the NCC FRMS. Information on subsequent significant floods can be found in reports prepared by the RMAs as required by S19 of the Flood and Water Management Act 2010.
6. The EA require new climate change allowances to be considered when considering how surface water will be managed by new development proposals. In areas where, on account of known local flood risk issues, N&SDC have introduced specific polices the flows generated by the development (on application of the 'upper end' allowance on a 1 in 100 year critical storm event) should be contained within the site for eventual discharge to the agreed point of outfall, and at the agreed limiting flow rate.

Appendix A: Steering Group Meeting Records

Subject: Newark and Sherwood SFRA and WCS Review: Steering Group mtg 1: 18th June 2016

Dear Colleague,

Rather than provide a formal minute of the meeting as a separate document, the email below is intended to provide a short note of the meeting, identifying key decisions taken and a record of action points (shown in bold). I have also included some relevant post meeting feedback. If anyone considers that the record omits something of significant importance or to be incorrect, the please let me know.

Attendees were as set out below:

Matthew Norton	-	Newark & Sherwood District Council (N&SDC) (Policy)
Matthew Tubb	-	Newark & Sherwood District Council (Policy)
Matthew Elliott	-	WYG Project Director
Jenny Russell	-	WYG (WCS)
Bethan Young	-	WYG (SFRA Modelling: WaterCo)
Sue Jacques	-	Nottinghamshire County Council (NCC) (Flood Risk)
Guy Hird	-	Upper Witham Internal Drainage Board (UWIDB)
Andrew Dale	-	Trent Valley Internal Drainage Board (TVIDB)
Katie Todd	-	Southwell Flood Forum (SFF)
Naomi Doughty	-	Environment Agency (Planning)
Andrew Pitts	-	Environment Agency (Planning)
Dave Brown	-	Environment Agency (Water Quality)
Louise Glover	-	Environment Agency (Modelling & Forecasting)
Morgan Wray	-	Environment Agency (Flood Risk)
Karen Carter	-	Environment Agency (Flood Risk)

Apologies were received from the following:

Margarita Papadopoulou - Environment Agency (Water Resources)

The meeting took place at NCC Offices on Thursday 18th June 2016 between 1pm and 3.30pm and was chaired by Matthew Elliott (ME) on behalf of N&SDC. The attached documents were provided to the participants by way of a handout. The information provided should be regarded as confidential and is not for public distribution or discussion at this point in time.

Introduction

1. MN explained that the review was necessary to provide the evidence base to support a partial review of the N&SDC local plan. As such the review is not starting from a position of zero existing policy. Whilst the scenario to be tested is for lower housing numbers, it is not envisaged that there will be any de-allocation of deliverable sites. In addition to the Strategic Flood Risk Assessment (SFRA) and Water Cycle Study(WCS) review Newark and Sherwood have also appointed WYG to undertake a review of the Infrastructure Delivery Plan
2. ME explained that the meeting would be split into two halves with the first session focussing on the WCS and the second section the SFRA. Much of the meeting would focus on matters that have emerged from the document reviews (as per the meeting information pack) particular where decisions were required from the steering group. However, it was made clear that the meeting was open for comment and input from all parties.

WCS Review

3. ME noted that the current EA guidance on the production of a WCS is indicated as being 'archived'. It was confirmed by the EA that nonetheless, the archived guide, remained a valid document to inform the review process. Action WYG: Include a review of the EA guidance on WCS preparation in the document review.
4. ME stated that the NPPF and PPG ('Water Supply, Wastewater and Water Quality') emphasizes the need for catchment based approaches (based on the latest River Basin Management Plans- February 2016). It was noted that the N&SDC area sits mostly within the 'Lower Trent and Erewash' with land to the west being in the 'Idle and Torne' Humber RBMP sub catchment areas and a small area of land to the east of Newark being in the Anglian RBMP area.
5. It was noted that as the revised development scenarios are for reduced housing numbers it was unlikely that the impact of the reduction to be tested would result in increased 'harm'.
6. The issue of 'cross boundary' concerns, was discussed.
7. From a water quality perspective key impacts of the N&SDC development proposals are likely to be downstream impacts. Levels of dilution in the Trent suggest, that there are unlikely to be downstream impacts. RB did note however that there are water stress issues in the Retford Area of the 'Idle and Torne' sub catchment. Action: To be considered by WYG if this matter has any implications for the upstream development proposals and should be captured in the WCS Review. Reference should be made to the Catchment Abstraction Management Strategies (CAMS).
8. It was noted that as waste authority NCC would be required to approve any Severn Trent (STW) or Anglian Water (AW) WwTW extensions or upgrades. The EA are discussion with both STW and AW and agreed to provide to WYG details of where upgrade works are taking place as part of AMP 6 (2015-20). Action: EA to provide listing of sites in the N&SDC area where upgrade works are planned as part of AMP 6.
9. ME asked if the EA were aware of any water bodies within the N&SDC area that were failing WFD objectives and legally, measures to ensure compliance with the objectives was required. The EA confirmed that the only water body in this situation in the N&SDC area is the 'aquifer' that is largely within the 'Idle and Torne' sub catchment.
10. Other than where localised contamination may preclude the use of SUDS, it was agreed that SUDS should be actively promoted throughout the N&SDC area; clearly the use of infiltration techniques is only possible where the characteristics of the superficial deposits permit this.
11. It was noted that there is an active 'Idle catchment Partnership' who may be able to provide some useful inputs to the WCS and SFRA Review. Action: EA to provide contact details.
12. The form of the final WCS review document was mentioned briefly. Action: WYG to set out the proposed document structure for stakeholder review.

SFRA Review

13. It was agreed that the methodological approach to the SFRA review as set out in the WYG email to the EA and NCC dated 11th May 2016 was broadly acceptable (see information pack).
14. ME raised the matter of the new EA climate change allowances (Feb 2016) to ascertain if, in the opinion of the EA, these should be modelled to understand the future footprint of flood zone 3 within the N&SDC area in order to inform the Local Plan making process. It was agreed that this approach was the appropriate way forwards and that the 20%, 30% and 50% scenarios should be considered.
15. BY of WaterCo explained the proposed methodological approach. After some discussion it was agreed that for the Trent the defences should be included in the model and that for the Maun, the model (which is a 1D only) should be linked through the area where the allocations to be tested are located. It was noted that the SFRA review will need to state the baseline date for the modelling and include a clear statement, that future planned works will mean that the model will require updating again in about 5 years. Action: EA to provide information on

Trent Defences; Linked model required for Maun. WYG to proceed with Phase 1 modelling (SFRA Review Phase 2) as per submitted methodology as clarified above- as a matter of urgency.

16. It was noted that the Developer of land south of Newark is undertaking their own modelling of the River Devon. Action N&SDC and WYG to contact the developer to ascertain if the modelling can be used to inform the SFRA review.
17. AD of the TVIDB reported that the developer at Southwell Racecourse has been refining some EA modelling of the River Greet and Beck Dyke Main Rivers. The TVIDB considers village such as Lowdham, Caythorpe, Gunthorpe, Sutton-on-Trent, Egmanton as areas that require consideration of past flooding. The TVIDB have undertaken recent modelling at Thurgarton. Action: WYG to liaise with the TVIDB in respect of information to be included in the SFRA review. GW of the UWIDB confirms (post meeting) (i) that the UPWIDB have no available relevant modelling data and (ii) that if appropriate reference is made to identified flood risks to the east of the River Trent between Torksey and Spafford. Action: WYG to consider coverage in SFRA document.
18. The approach to the Level 2 SFRA work (SFRA Review Phase 3) was discussed. The EA indicated that a FEH guidelines have been updated and BY confirmed that she was aware of this update which would be taken into account in the proposed approach.
19. It was agreed that the number of sites to be modelled as part of the Level 2 SFRA work (SFRA Review Phase 3) would be agreed at or near the completion of the Level 1 SFRA work (SFRA Review Phase 2) (July). However, the approach to be adopted would need to be proportionate taking into account the sensitivity of the site to any increase in flood level.
20. ME indicated that on the basis of a review of the Southwell Flood Study documents, there was a clear case for identifying Southwell as a 'Critical Drainage Area'. However, ND expressed concern about the resource implications of such a designation as it would result in numerous planning applications requiring potentially unnecessary review; perhaps, there might be better ways of securing the same objective? Action: All relevant stakeholders to consider further the implications of CDA status and other means to secure the same outcomes if appropriate.
21. It was noted that of the sites under consideration in Southwell, opportunities do exist for development to be brought forward in such a way that flood risk benefits are secured. Consideration to be given to setting a prescribed rate of discharge in litres per second per hectare and approaches to ensuring benefits are realised. It was noted that as part of the review the sites will require considering individually and agreement reached on the method of control to secure benefits. Action: All relevant stakeholders to consider constraints on each of the sites in order to ensure flood risks in Southwell are not exacerbated, and preferably, reduced.
22. It was note that uncertainty in relation to SUDS adoption continues. Katie Todd of the SFF expressed concern at the reliability of management companies to adequately maintain SUDS. It was also noted that currently STWA require all developers to demonstrate that all relevant public bodies have been approached to ascertain the stance on SUDS adoption prior to consenting to S104 agreements on public surface water sewers discharging into SUDS maintained by private management companies.
23. It was noted that the stakeholders considered that the SFRA review document will ideally need to be a stand-alone document. Action: N&SDC and WYG to consider how the information can be presented and if the existing information can be provided to WYG for inclusion in a single document.
24. ND said that the EA would wish to have intellectual property rights in relation to the work undertaken using EA models. ME indicated that provided this was not an issue to N&SDC, it was unlikely to be a problem to WYG, subject to seeing details of exactly what was the detail of the EA request. Action: EA to clarify and N&SDC and WYG to review.

Next Steering Group Meeting(s)

25. It was noted that the next steering group meeting is to take place on the afternoon of 24th August, probably at Kelham Action: N&SDC to confirm venue.
26. However, it was noted, that a smaller meeting would be required in order to ascertain the number of sites to be considered in the Stage 2 SFRA. This meeting is to take place on Tuesday 26th July, the venue to be confirmed. Action: EA/N&SDC to confirm venue; ME to advise of WYG attendance (ME on leave at this date).

Best Regards,

Matthew Elliott
Director

Subject: RE: Newark and Sherwood SFRA and WCS Review: Steering Group mtg 2: 30th August 2016

Dear Colleague,

Rather than provide a formal minute of the meeting as a separate document, the email below is intended to provide a short note of the meeting, identifying key decisions taken and a record of action points (shown in bold). If anyone considers that the record omits something of significant importance or to be incorrect, the please let me know. For completeness the record from the 1st meeting is in the chain below.

Attendees were as set out below:

Matthew Norton (MN)	Newark & Sherwood District Council (N&SDC) (Policy)
Matthew Tubb (MT)	Newark & Sherwood District Council (Policy)
Matthew Elliott (ME)	WYG Project Director
Laura Smith (LS)	WYG (SFRA Modelling: WaterCo)
Tim Farr (TF)	Southwell Flood Forum (SFF)
Naomi Doughty (ND)	Environment Agency (Planning)
Andrew Pitts (AP)	Environment Agency (Planning)
Phil Sale (PS) -	Environment Agency (Modelling & Forecasting)
Jessica Morris (JM)	Environment Agency (Modelling & Forecasting)
Paul Hands (PH)	Environment Agency (Flood Risk Officer)

Apologies were received from the following:

Sue Jacques	-	Nottinghamshire County Council (NCC)
Andrew Dale	-	Trent Valley Internal Drainage Board (TVIDB)
Jenny Russell	-	WYG (WCS)

The meeting took place at N&SDC Offices in Kelham on Tuesday 30th August 2016 between 11am and 1pm and was chaired by Matthew Elliott (ME) on behalf of N&SDC. The attached documents were provided to the participants by way of a handout (to keep the file size down I have not attached the velocity and depth or hazard model outputs or the N&SDC development scenario for testing that was provided previously). The information provided should be regarded as confidential and is not for public distribution/discussion at this point in time.

1. The meeting commenced with introductions. Apologies were noted as above; it was noted that EA modelling input would be via Phil Sayles instead of Louise Glover.
2. Matthew Norton (MN) explained that the original intention had been to undertake a single consultation in respect of the Local Plan Review. However, due to delays in some of the supporting evidence (including the SFRA) strategy documents would be out to consultation at the end of September with a consultation on the individual sites planned for October. Submission is anticipated at the end of the year.
3. It was agreed that the previous notes (see email below) were a fair and reasonable record apart from the following: the initials 'RB' in the record should be replaced with 'DB' (Dave Brown) at item 7.
4. Quick Review of Actions identified in the previous minutes:
    - SG1, Item 3:WYG to include a review of EA guidance on WCS preparation as , although 'archived' it still is relevant guidance; Action WYG;
    - SG1, Item 7: WCS Review to reference the CAMS; Action WYG;
    - SG1, Item 8: Requested information provided by EA (email DB to ME 30/06/16)
    - SG1, Item 11: Primary contact Tim Farr;
    - SG1, Item 12: WCS review: WYG to provide outline doc structure by w/c 5th Sept; Action WYG;
    - SG1, Item 15: Model information provided by EA to WaterCo;
    - SG1, Item 16: N&SDC and WYG to contact developer on land adjacent to River Devon; Action N&SDC & WYG;
    - SG1, Item 17: TVIDB/WYG to finalise what if any extra information requires including in the SFRA; Action WYG;
    - SG1, Item 20: Agreed that Southwell not to be given CDA status but rather this matter is to be covered by means of Local Plan Policy which will set very clear requirements on allowable discharge rates etc. This information is captured in the Neighbourhood Plan but to be reviewed as part of the SFRA. Action NCC, N&SDC, WYG;
    - SG1, Item 21: TF explained that there is local concern about the number of planning submission coming forward; TF explained that JBA have undertaken further modelling that has refined the work previously done by AECOM and this will be complete by end of September. All agreed that as a matter of urgency a meeting is required with NCC, N&SDC and WYG to agree how the new information is to be captured in the SFRA. The EA to be informed of date of meeting. Action NCC, N&SDC, WYG;
    - SG1, Item 24: Whilst, the issue of intellectual property rights is not envisaged as being problematic, it is understood that there has been a further email exchange between the EA and Tom Beavis of WYG on this matter. Action; WYG to chase up and close out this matter.
5. WCS Update: ME indicated that JR is taking this forwards but to date, no further new significant issues had been identified and the work is on track to complete to coincide with the revised SFRA review completion. As noted above, WYG will set out the proposed WCS review structure in w/c 5th September.
6. SFRA Review Update- Project Stage 2: It was noted that the majority of the Stage 2 of the project was the modelling work. LS of WaterCo (on behalf of WYG) provided the following update:
    - Modelling of the River Trent (upstream of Cromwell) modelling using the new EA climate change allowances (CCA) had generally proceeded without problem. It had identified that the new CCA had not resulted in incursion of flows outside the 1 in 1000 year (0.1% AEP) footprint.
    - PH asked if a difference map could be prepared to show the increase in extent of the 1 in 100 year (1% AEP) flood when the CCA are considered. Action SG2 Item 6(b) ; WYG to prepare a difference map for possible inclusion in the SFRA appendices.

- LS reported that model instabilities had been identified in the area of site ref 10/01586/OUTM along the Devon and subsidiary tributaries. It was agreed that this was probably not significant, especially in the light of modelling done in relation to the application (see Action SG1 Item 16): Action SG2 Item 6(c): WYG (LS) to forward details to EA for review.
- PH reported that since the December 2013 surge event the impact of coastal flooding down the Trent had been investigated in more detail. This had shown that throughout the N&SDC area, in terms of extent of land impacted, fluvial risk (1% AEP and 0.1% AEP) predominates over coastal risk (0.5% AEP and 0.1% AEP); After discussion, it was agreed that the tidal only flood footprints should be provided in the SFRA: Action SG2 Item 6(d): EA to forward coastal outlines to WYG for incorporation in SFRA review.
- PS explained that a new scheme to improve defences at North Muskingham (benefits 35 properties) had recently been completed and this was now picked up as defended. Action SG2 Item 6(e): EA to forward revised defence outlines to WYG for incorporation in SFRA review.
- ND noted that the SFRA would need to differentiate between the flood zones upstream of Cromwell (where the new EA Climate change allowances had been modelled and downstream of Cromwell where this had not occurred. Action SG2 Item 6(f): WYG to incorporate boundary in SFRA review.

LS explained that the original methodological assumption for undertaking modelling of the Maun was based on the assumption that the EA possessed a 1D/2D linked model. However, the model is not 'geo-referenced' which will require further work to allow the EA climate change allowances to be assessed. As there is only one site directly impacted by the Maun (Ollerton) ME suggested, a way forwards might be to undertake a Level 2 SFRA just for this site including consideration of the new CCAs. (The Thoresby Colliery site is not significantly impacted as it is several metres above the river). See further below under item 8.

7. Application of Sequential Test (ST): Following a short discussion about the contents of the SFRA (for a 'de minimis' compliance with the NPPF and PPG stated requirements: see below) the EA (ND) stated that their preference is for the SFRA to not actually include the ST itself, but to provide the information for the Local Planning Authority (LPA) to undertake the ST as this needs to consider not only flood risk, but other potentially over-riding planning issues.
8. Extent of Level 2 SFRA: See also item 6 above. The sites being considered were briefly reviewed and it was agreed that the only site where delivery of outputs might be at risk due to a present inadequacy of flood risk data was the site at Ollerton alongside the Maun. Whilst the EA were not insistent that this be the subject of a Level 2 SFRA, N&SDC considered that the importance of this site merited progression of a Level 2 SFRA review. Action SG2 8: WYG to progress Level 2 SFRA work for site in Ollerton alongside the River Maun
9. ME briefly presented the SFRA review structure (see attached document) by considering the items that are required for a 'de minimis' compliance with the NPPF and PPG stated requirements. It was agreed that repetition of volumes of standard SFRA text was not helpful and that the structure outlined on the attached document was largely acceptable.
   (i) Specifically, it was noted that it would be necessary for the SFRA to identify functional flood plain and land for future FRM activities. Action SG 2 9 (i): EA, NCC, IDBs to forward outlines of land considered to be functional flood plain (or required for future FRM activities) for review by N&SDC and final incorporation in SFRA
   (ii) Although not listed on the above outline, ME pointed out that the NPPF (para 100 5th bullet) does require identification of areas where existing development should- where appropriate- re-locate on account of growing and unacceptable exposure to flood risks. The only likely location where this issue is likely to arise is in relation to the Tolney Lane caravan site. N&SDC consider that there are compelling reasons why this cannot be moved. Action SG 2 9 (ii): N&SDC to review text to be provided by WYG in SFRA Review Report.

10. Revised Completion Programme: It was agreed that, provided a timely meeting can be obtained with NCC (in particular in relation to Southwell) the completion of a draft report by the end of September is an achievable objective. (EA review to be ongoing after release of the draft).

Best Regards,

Matthew Elliott
Director

Subject: RE: Newark and Sherwood SFRA and WCS Review: Steering Group: Mtg with NCC

Dear Sue,

Rather than provide a formal minute of the meeting as a separate document, the email below is intended to provide a short note of the meeting, identifying key decisions taken and a record of action points (shown in bold). If you consider that the record omits something of significant importance or to be incorrect, then please let me know. For completeness the record from the 1st and 2nd Steering Group meetings are in the chain below.

Attendees were as set out below:

Matthew Tubb (MT)		Newark & Sherwood District Council (Policy)
Sue Jacques	-	Nottinghamshire County Council (NCC)
Matthew Elliott (ME)		WYG Project Director

Apologies were received from the following:

Matthew Norton (MN)	Newark & Sherwood District Council (N&SDC) (Policy)
Tim Farr (TF)	Southwell Flood Forum (SFF)
Naomi Doughty (ND)	Environment Agency (Planning)
Andrew Pitts (AP)	Environment Agency (Planning)

The meeting took place at N&SDC Offices in Kelham on Monday 12th September 2016 between 1pm and 3pm and was chaired by Matthew Elliott (ME) on behalf of N&SDC. The meeting notes follow the agenda provided. The meeting was required as a result of action SG1 Item 21 (see SG 2 notes in the email chain below)

1. Introductions ad apologies: see above
2. Review of identified Steering Group actions which are of relevance to NCC as LLFA (most of these are covered by the agenda below):
   (i) SG1, Item 20: Agreed that Southwell not to be given CDA status but rather this matter is to be covered by means of Local Plan Policy which will set very clear requirements on allowable discharge rates etc. This information is captured in the Southwell Neighbourhood Plan (SNP) but to be reviewed as part of the SFRA (Action NCC, N&SDC, WYG). The key policies of the SNP were discussed (Polices E1 and E2). It was noted that these polices whilst capturing many key features of good flood risk management and surface water control were rather unstructured and restate information in the NPPF and PPG. The polices may leave some gaps that should be covered by specific N&SDC polices for Southwell the detail of which is to be based on

technical data to be provided by WYG in conjunction with the SFRA. It was agreed that a check be made to see if the EA had reviewed the SNP policies. (Action WYG SG3 2(i): Technical support to flood risk/surface water drainage polices for the N&SDC Local Plan policy for Southwell; check with EA on consultation in respect of SNP polices)

(ii) SG1, Item 21: covered by meeting.

(iii) Action SG 2 9 (i): EA, NCC, IDBs to forward outlines of land considered to be functional flood plain (or required for future FRM activities) for review by N&SDC and final incorporation in SFRA. (a) SJ indicated that 'functional flood plain' at Southwell should emerge from the finalised JBA modelling. JBA contacts provided to WYG. (b) Land required for FRM activities: SJ to provide details of schemes on the 6 year Flood Defence Grant in Aid programme as promoted by NCC in the jurisdictional area of N&SDC. Currently no obvious needs for land to be specifically set aside for FRM works. Action WYG SG3 2(iii): Contact JBA for info to consider for specifically identified functional flood plain at Southwell. Action NCC SG3 2(iii): NCC to provide details of FDGiA 6 year programme of schemes in N&SDC area being promoted by NCC

3. Review of proposed overall SFRA Review structure: No issues raised regarding overall structure. Post Meeting Note: agreed that the SFRA review only include site specific site assessments for the sites in Southwell and the Petersmith Drive site in Ollerton (level 2 SFRA investigation).
4. Coverage of Southwell (and any other areas where NCC consider local sources of flooding require specific coverage in the SFRA)

(i) Use of Local Planning Polices rather than designation of Critical Drainage Area; See discussion above under item 2(i). It was agreed that specific N&SDC Local Plan Polices covering flood risk and surface water drainage be provided for Southwell AND Lowdham. SQ pointed out that there are significant issues also in Thurgarton, Farnsfield and other areas; however, it was agreed that the problems in these locations do not justify specific Local Plan Policies (bearing in mind that the Local Plan Policies are intended as an alternative to designation of a Critical Drainage Area). (Action WYG SG3 2(i) see above)

(ii) SW flood mapping to be provided in the SFRA for Southwell and timing of the release of this data (i.e JBA modelling may not be available for end of September) It was noted that the AECOM data should not be incorporated into the SFRA as this would be superceded by the better JBA modelling data. However, this will not be available for the consultation version of the SFRA which is to be issued in early October. Therefore the SFRA (consultation version) will make it clear that the new data will be incorporated when released later in the year. (Action WYG SG3 4(ii) Include note in SFRA (consultation release) and update with JBA verified model when complete)

(iii) Review of potential allocations in Southwell (and Lowdham) under consideration;

(a) So/Ho/1: An application is expected; site is impinged by an overland surface water flood route on its northern frontage;
(b) So/Ho/2: Application pending: no major flood risk to the site; effective control of development run off required;
(c) So/Ho/3: Under construction;
(d) So/Ho/4: Site is impinged by a watercourse and surface water flood route on its southern boundary;
(e) So/Ho/5: Small part of site subject to outline consent for 12 dwellings. Site is impacted by overland surface water flood routes and a watercourse on its eastern boundary;
(f) So/Ho/6: Under construction;

(g) So/Ho/7: no major flood risk to the site; effective control of development run off required;
(h) So/MU/1: Not to be taken forward;
(i) So/E/2: Has major flooding issues;
(j) So/E/3: no major flood risk to the site; effective control of development run off required;

(iv) Identification of functional flood plain and land to be set aside for Flood Risk Management activities (Covered under 2(iii) above)

5. AOB: None

Best Regards,

Matthew Elliott
Director

Appendix B: Recent EA Modelling: The Tidally influenced section of the River Trent

List of Appendix B Contents

N

Legend

- Growth Site Locations
- District Boundary
- Tidal Q200 and Fluvial Q2

Cromwell Lock and Weir

0 1 2 3 4 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client: NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent Tidally Influenced Zone:
Q200 Tidal with Q2 Fluvial; Flood Extent

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	033	-

N

Legend

Growth Site Locations

District Boundary

Tidal Q1000 and Fluvial Q2

Cromwell Lock and Weir

0 1 2 3 4 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Tidally Influenced Zone:
Q1000 Tidal with Q2 Fluvial; Flood Extent

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	034	-

N

Legend

Growth Site Locations

District Boundary

Fluvial Q100 and Tidal Q5

Cromwell Lock and Weir

0 1 2 3 4 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Tidally Influenced Zone:
Q5 Tidal with Q100 Fluvial; Flood Extent

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	035	-

N

Cromwell Lock and Weir

0 1 2 3 4 Km

Legend

- Growth Site Locations
- District Boundary
- Fluvial Q200 and Tidal Q5

CONSULTATION ISSUE

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EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent Tidally Influenced Zone:
Q5 Tidal with Q200 Fluvial; Flood Extent

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	036	-

N

Legend

Growth Site Locations

District Boundary

Fluvial Q100 and Tidal Q5

Cromwell Lock and Weir

0 1 2 3 4 Km

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e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Tidally Influenced Zone:
Q5 Tidal with Q1000 Fluvial; Flood Extent

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	037	-

N

Cromwell Lock and Weir

0 1 2 3 4 Km

Legend

- Growth Site Locations
- District Boundary
- Fluvial Q100 and Tidal Q5
- Fluvial Q200 and Tidal Q5
- Fluvial Q100 and Tidal Q5

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

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EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

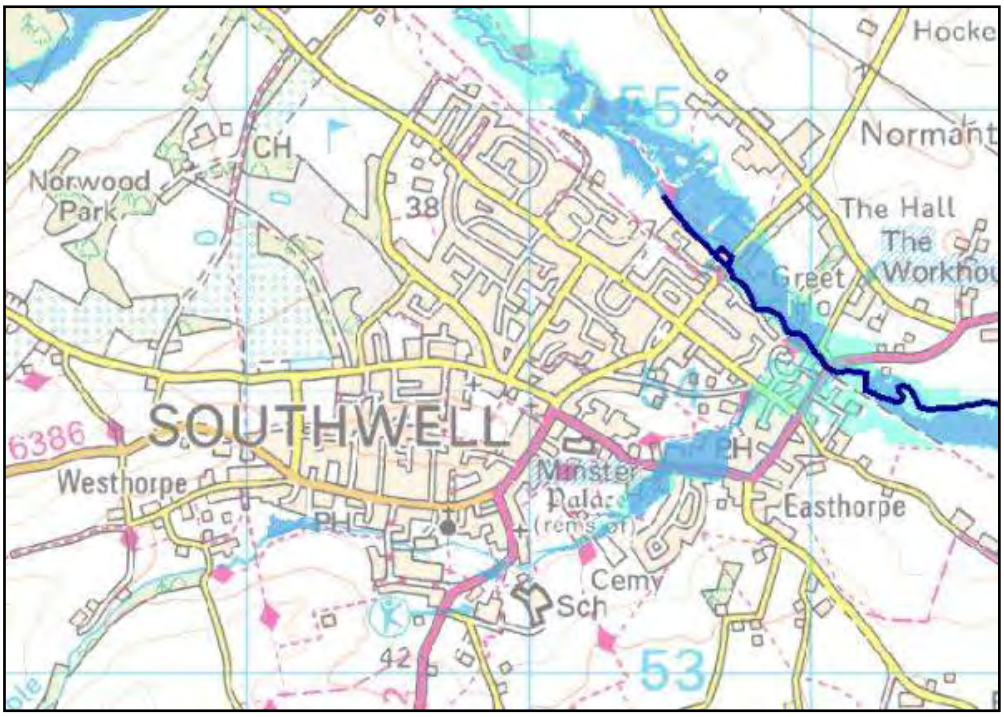
Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent Tidally Influenced Zone:
Flood Extent Difference Map: Q5 Tidal with Q100, Q200 and Q1000

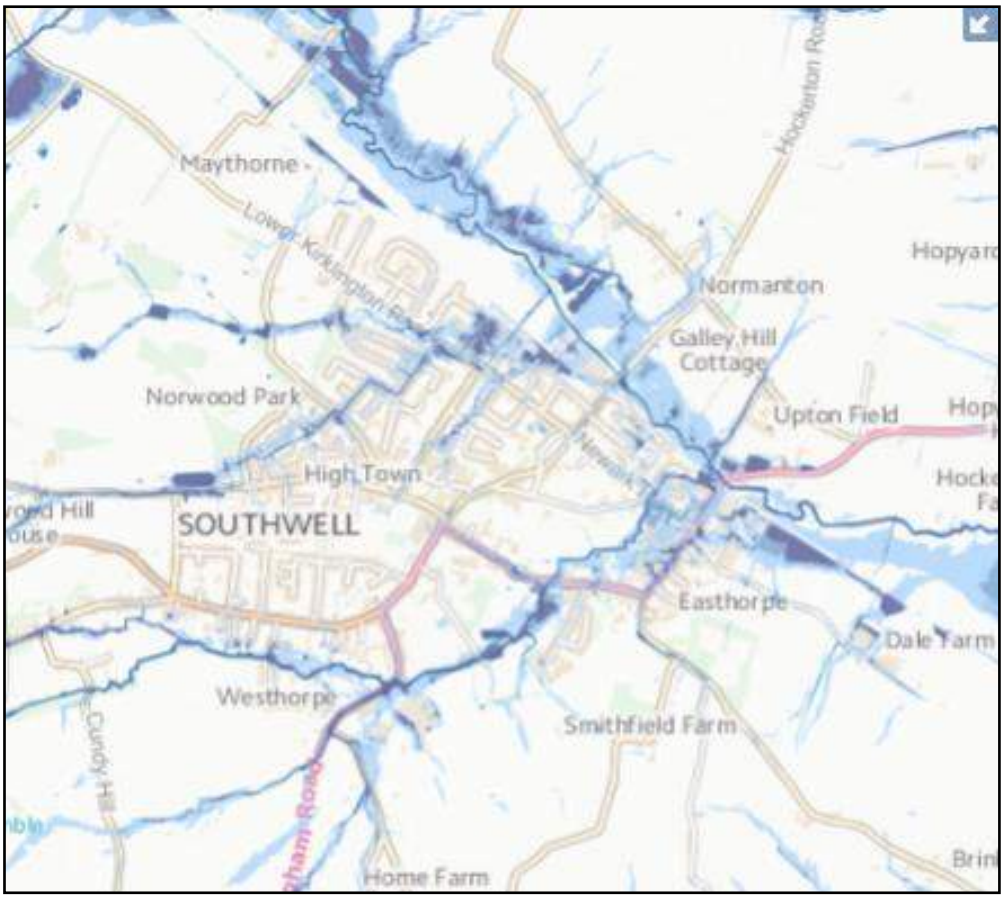
Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	038	-

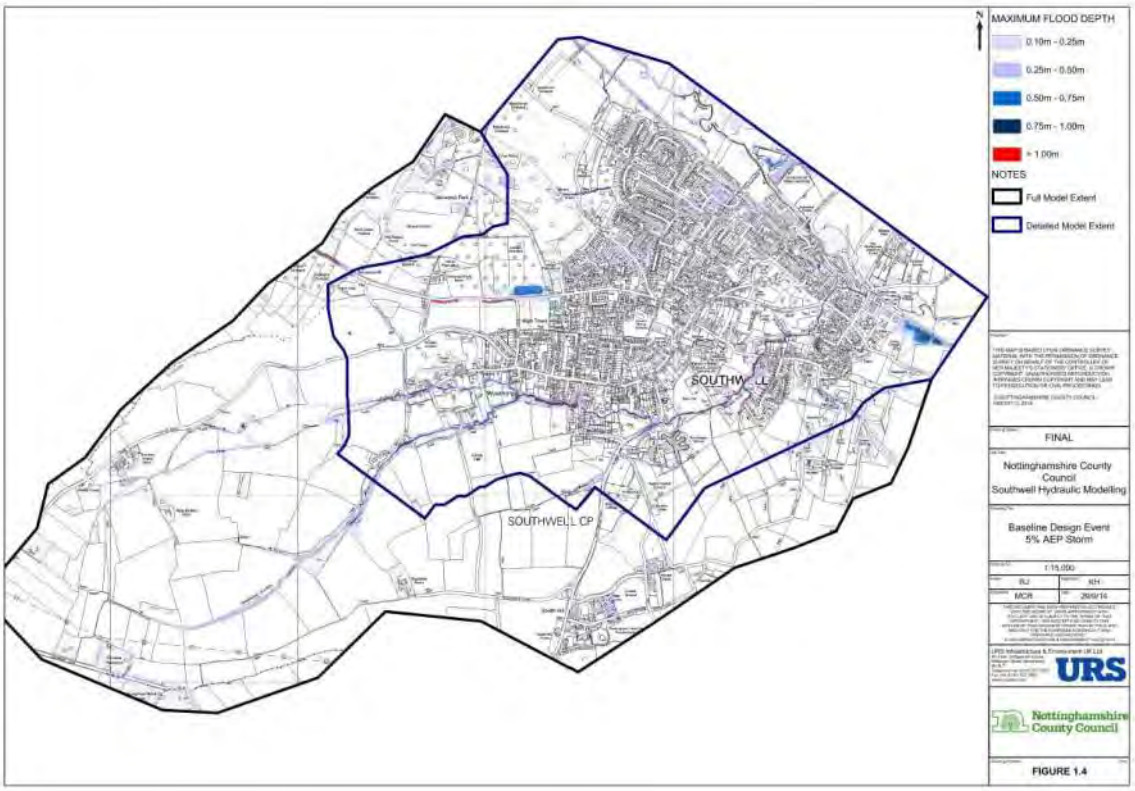
Appendix C: Southwell: Fluvial and Local Flood Risk Sources



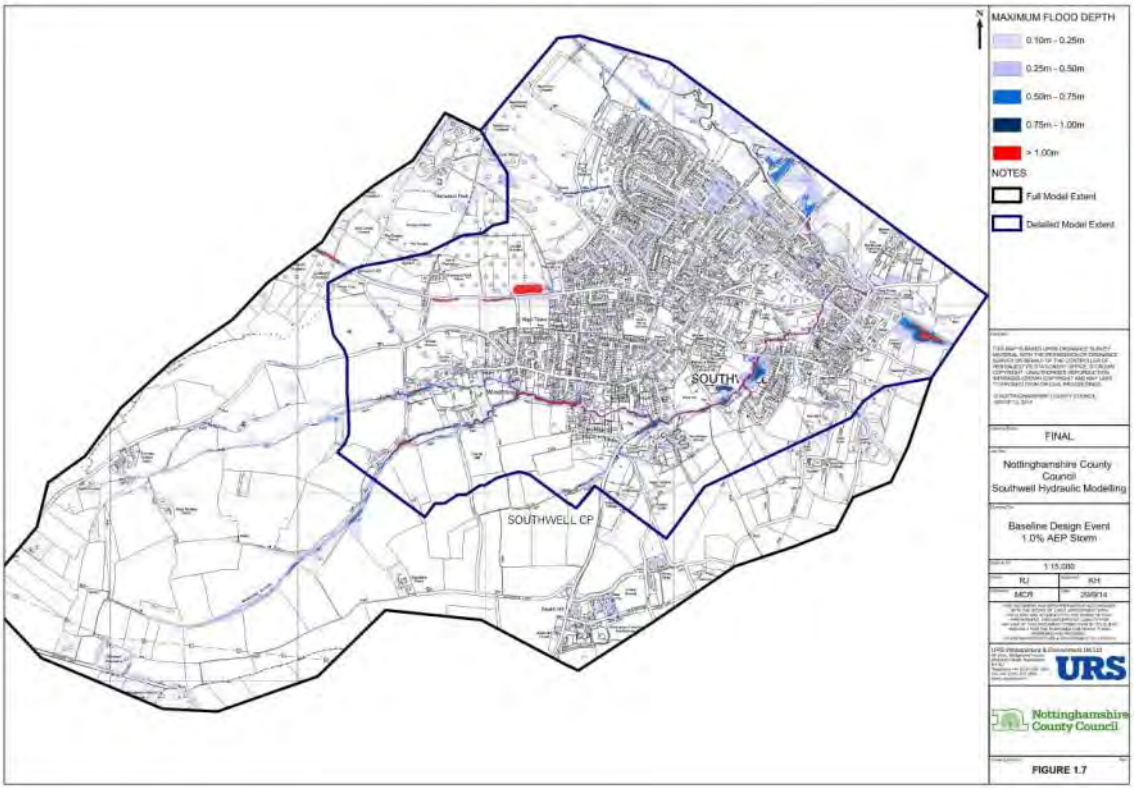
Southwell: Excerpt from EA Flood map for Planning



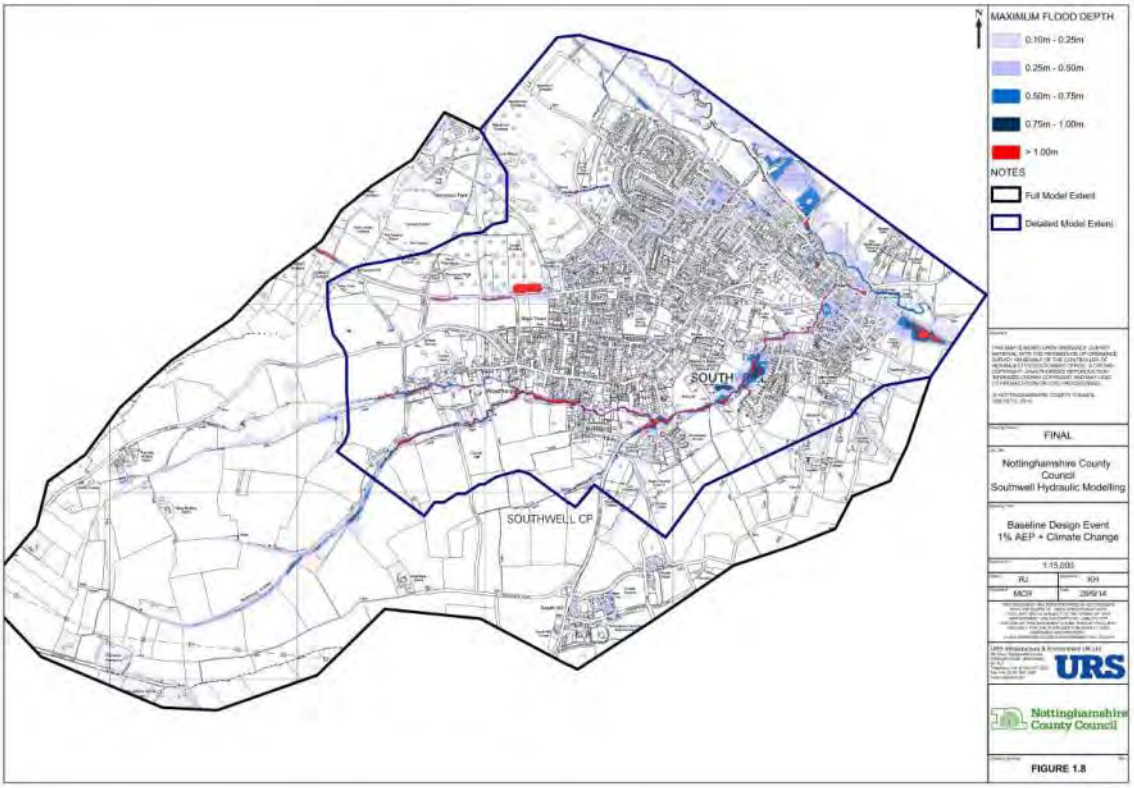
Southwell: Excerpt from EA Surface Water Flood Map



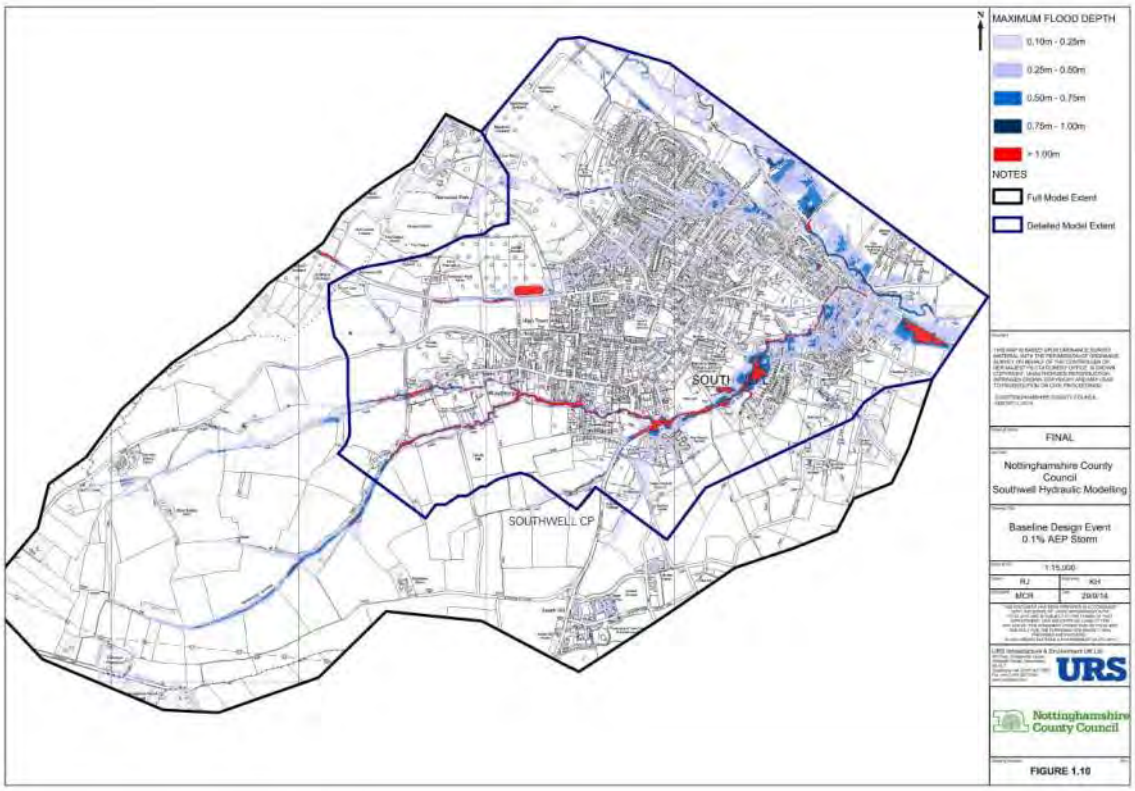
1 in 20 year return period (5% AEP)



1 in 100 year return period (1% AEP)



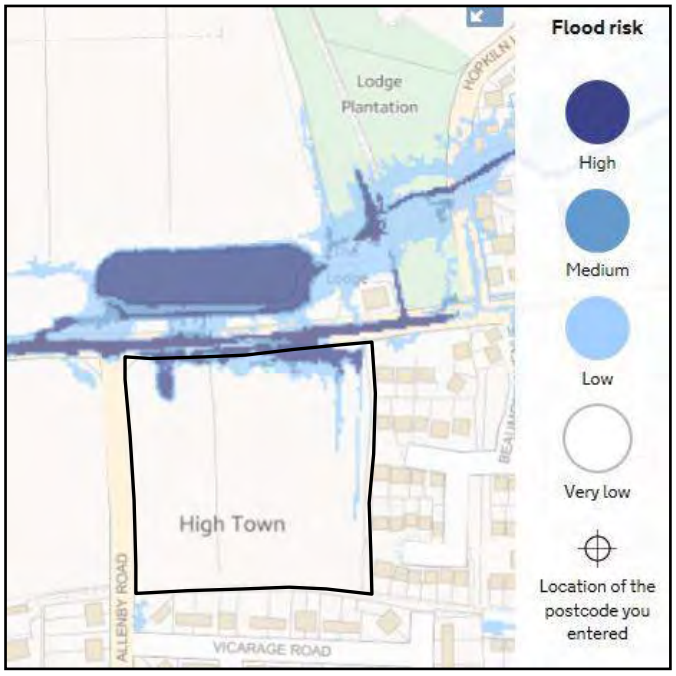
1 in 100 year return period plus climate change (20%) (1% AEP plus 20% CC)



1 in 1000 year return period (0.1% AEP)

So/Ho/1: Land to the East of Allenby Road

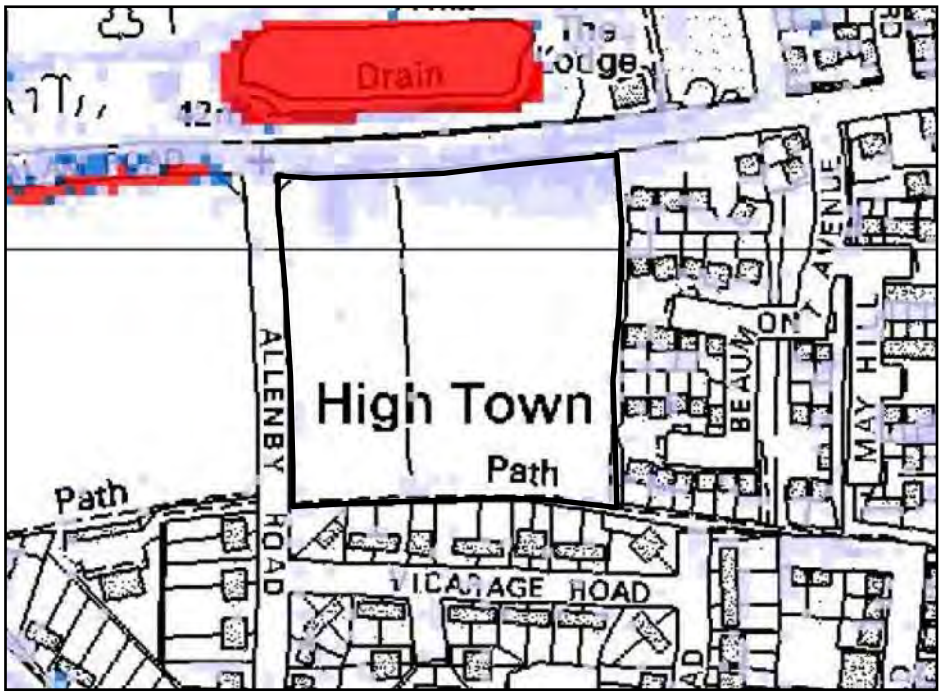
EA Flood Map for Planning



EA Surface Water Flood Map for Planning

NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP

NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP

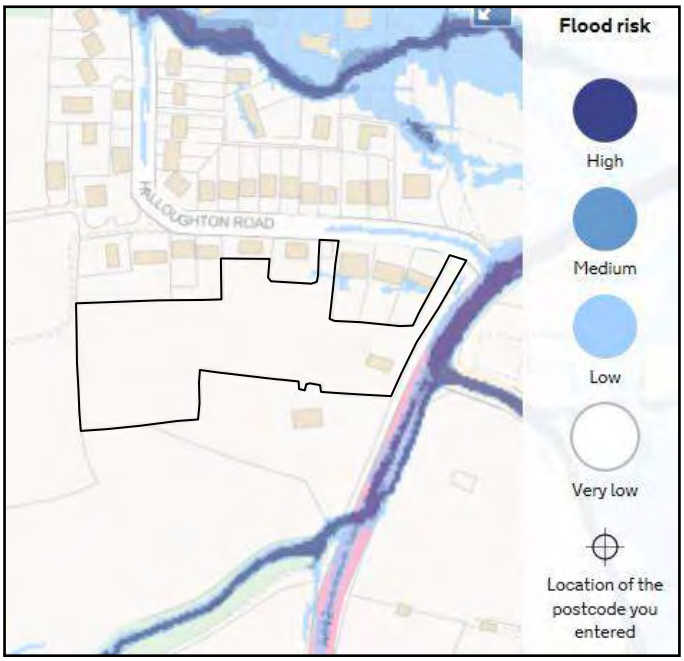


NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC

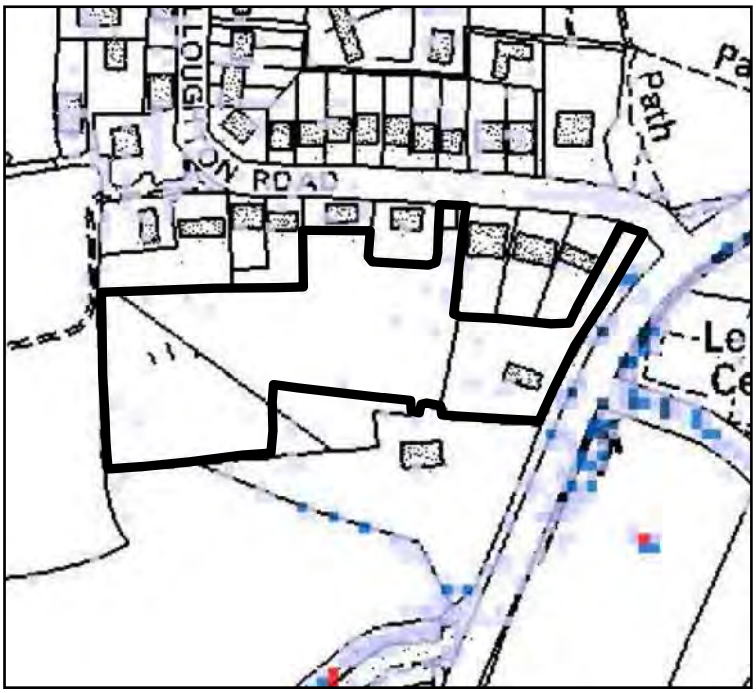
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/Ho/2: Land South of Halloughton Road

EA Flood map for Planning



EA Surface Water Flood Map for Planning



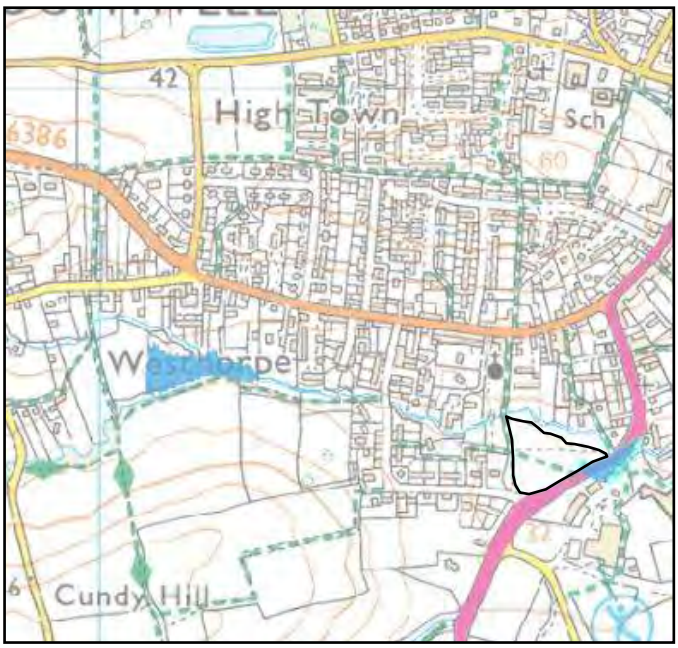
NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP

NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP

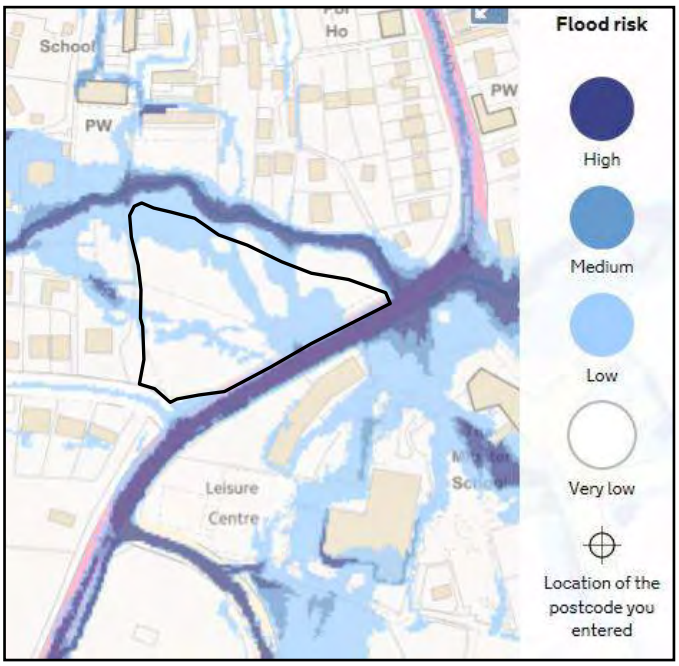
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC

NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

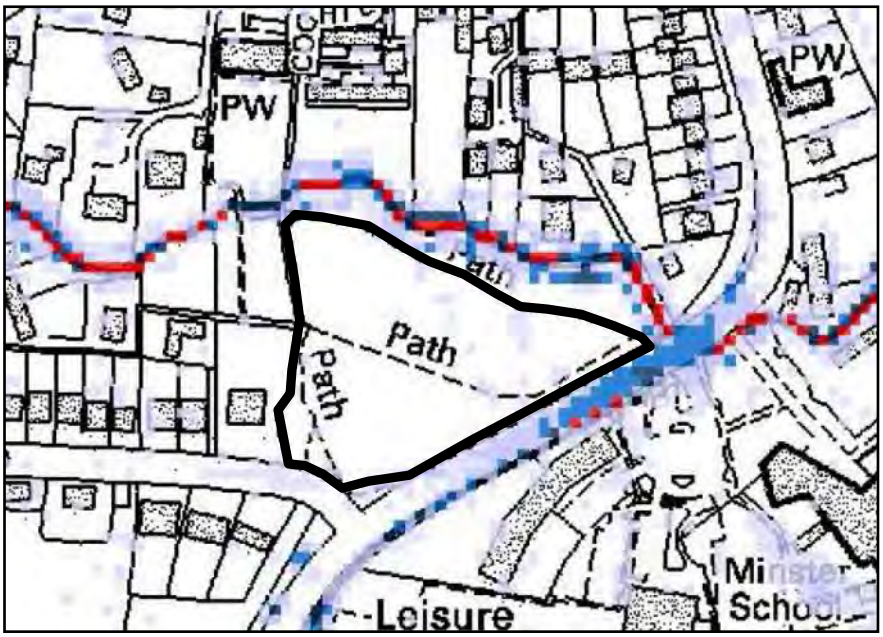
So/Ho/3: Land at Nottingham Road



EA Flood Map for Planning



EA Surface Water Flood Map for Planning



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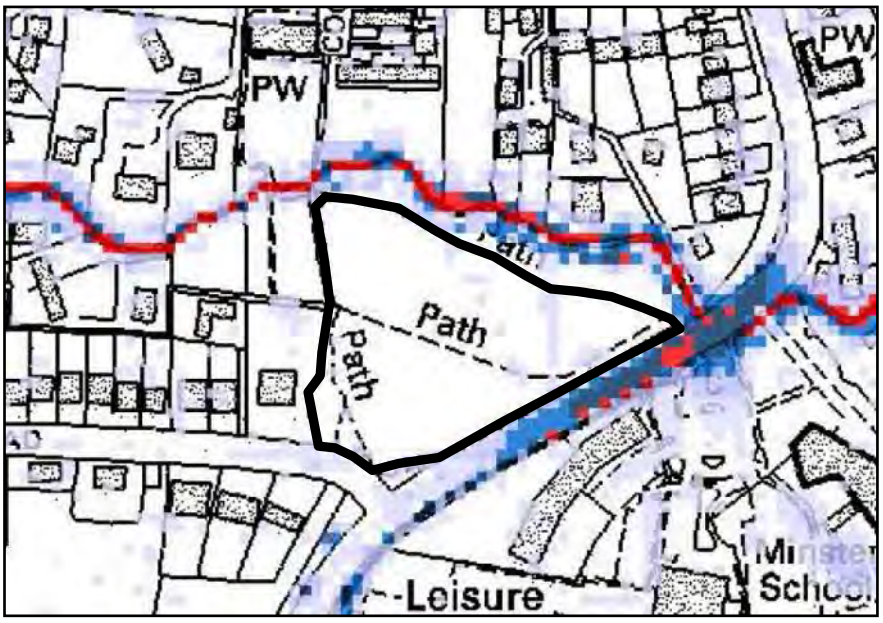

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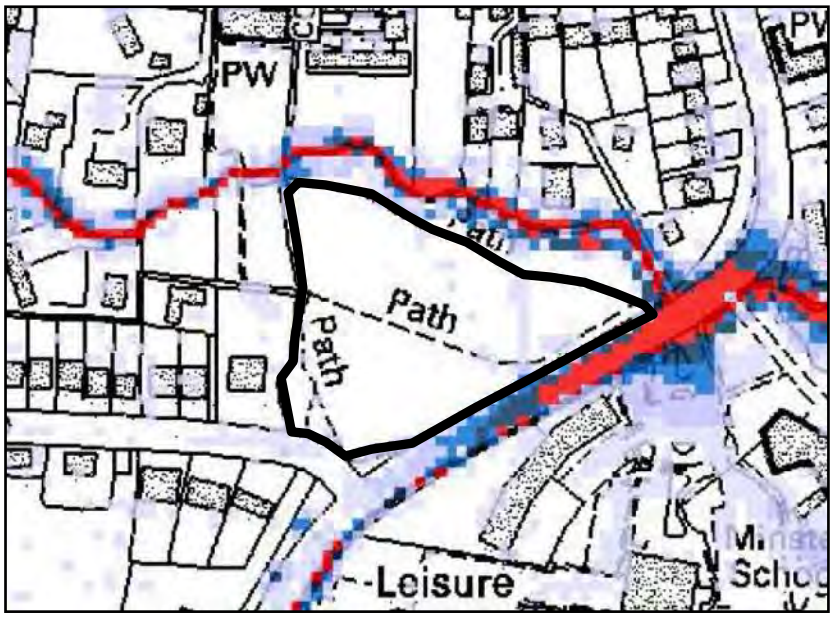
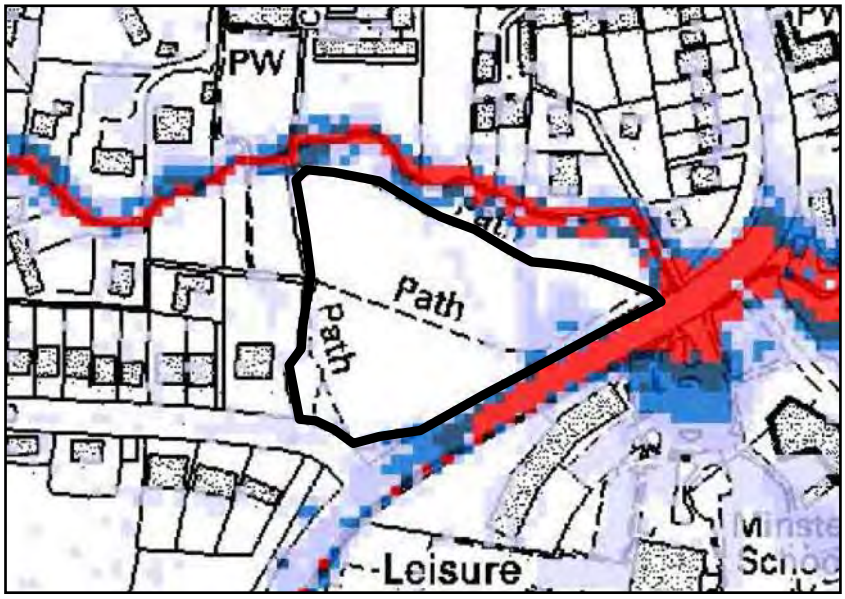


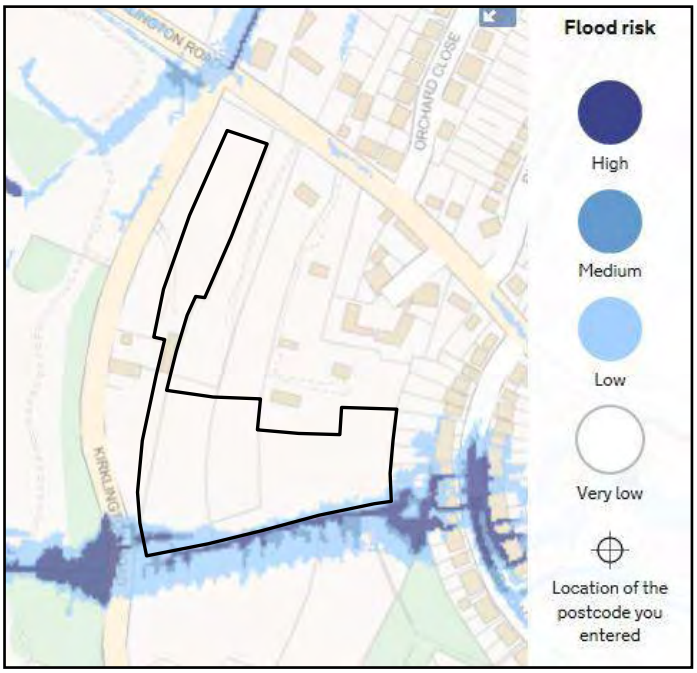
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



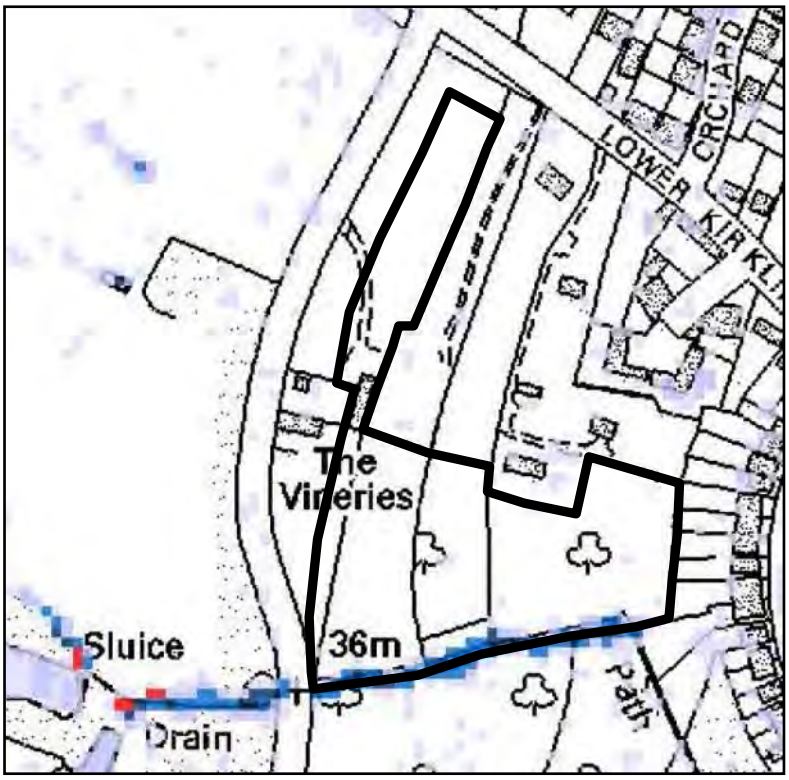
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/Ho/4: Land East of Kirklington Road

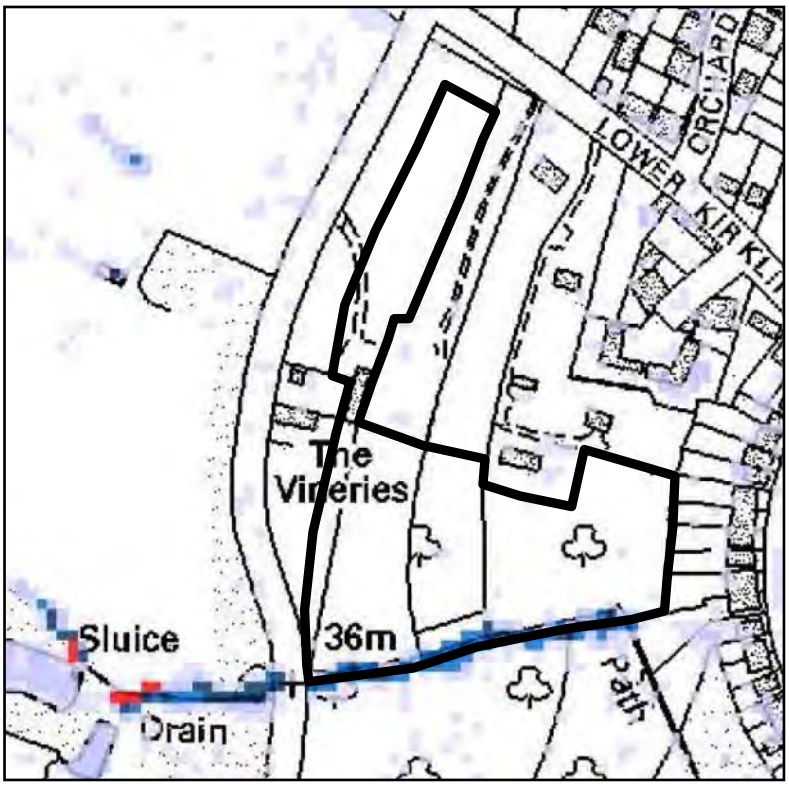
EA Flood Map for Planning



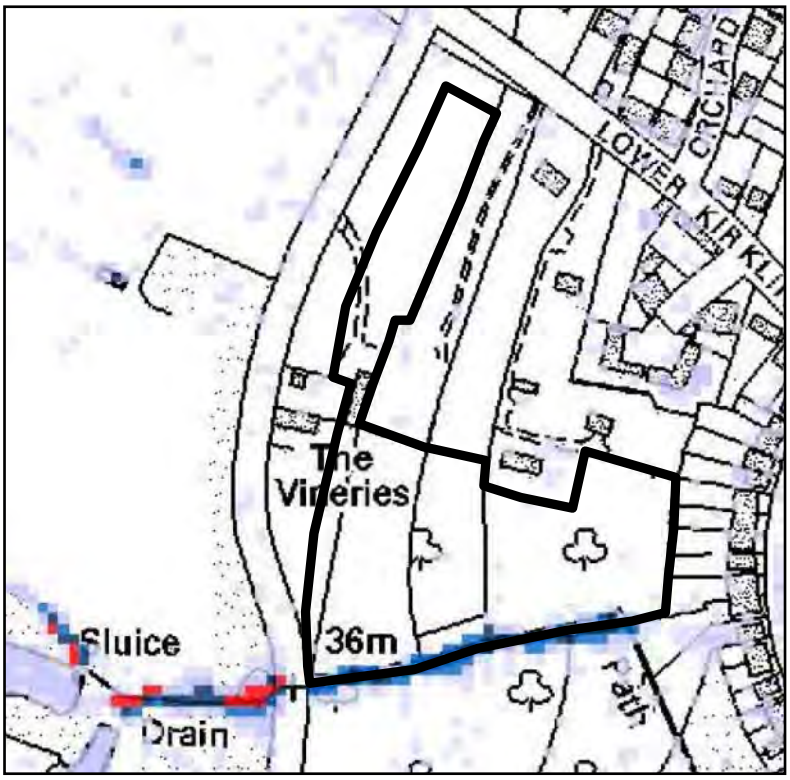
EA Surface Water Flood Map for Planning



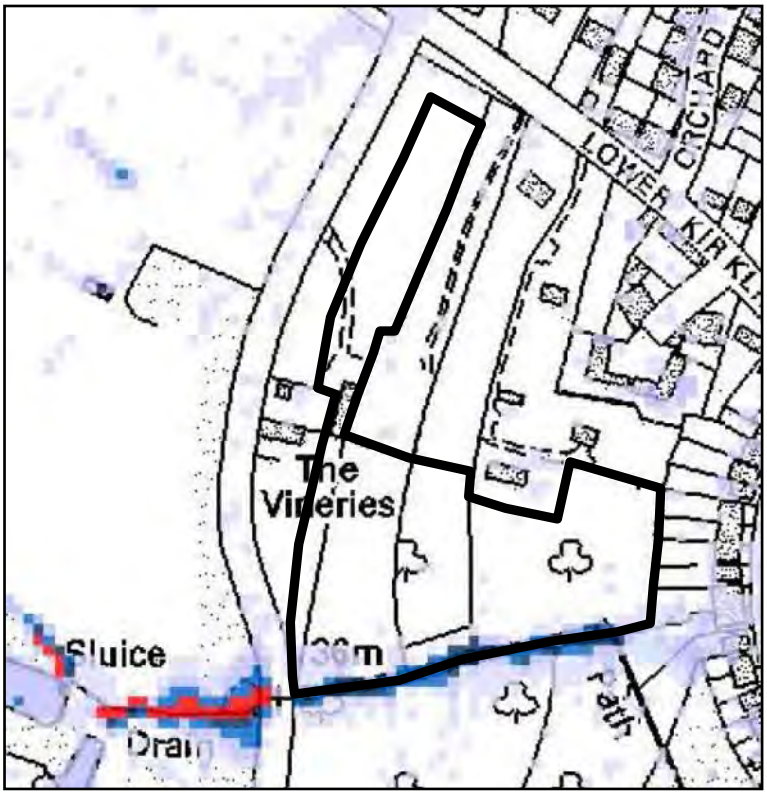
NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP



NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP



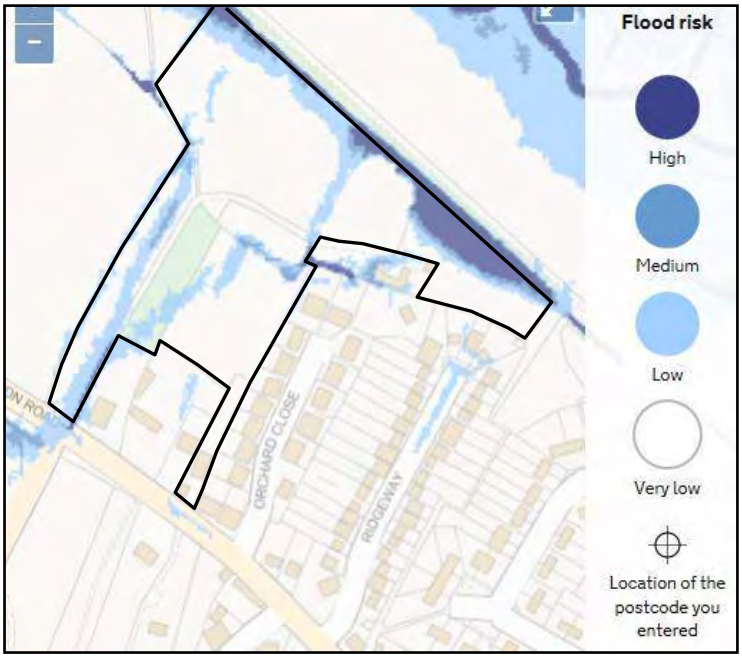
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



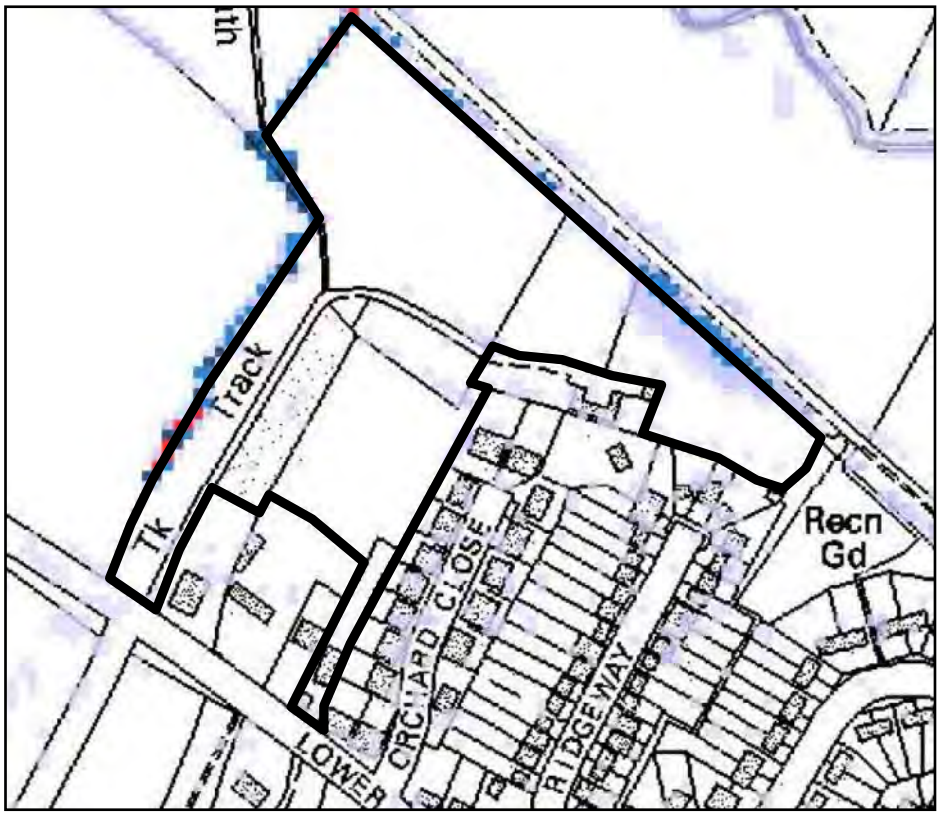
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/Ho/5: Land off Lower Kirklington Road

EA Flood Map for Planning

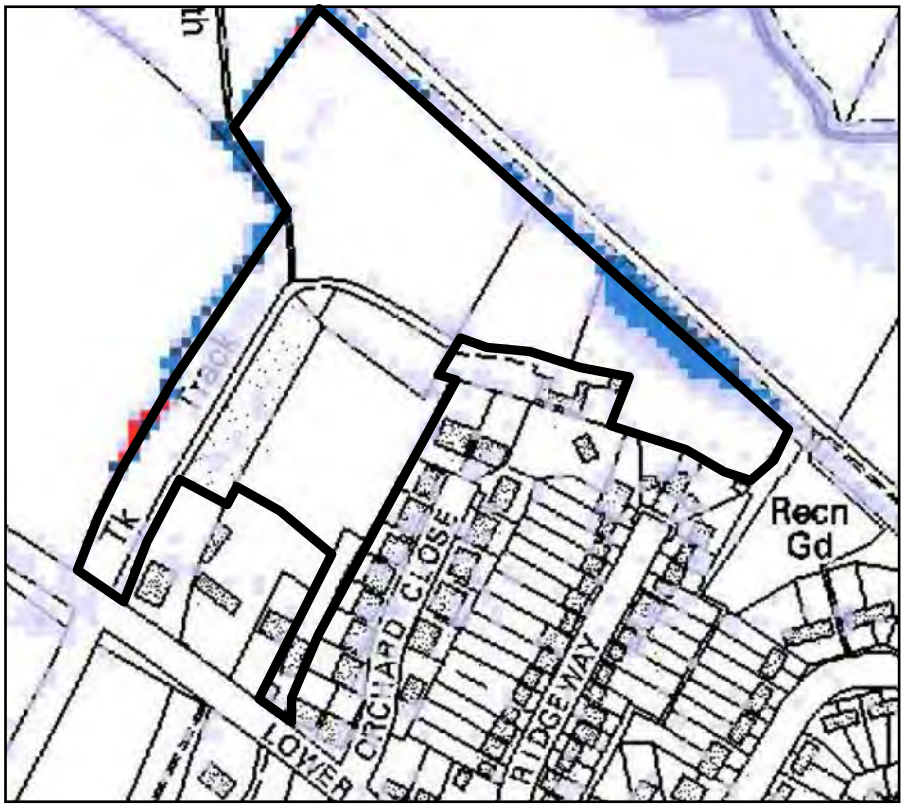


EA Surface Water Flood Map for Planning



NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP

NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP



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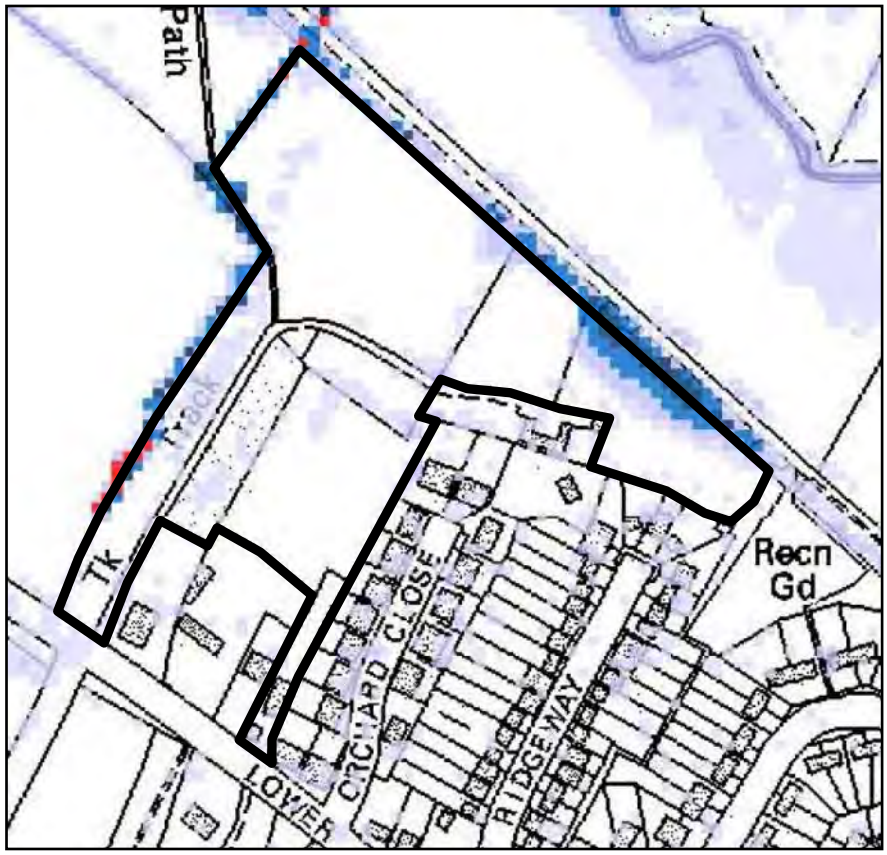
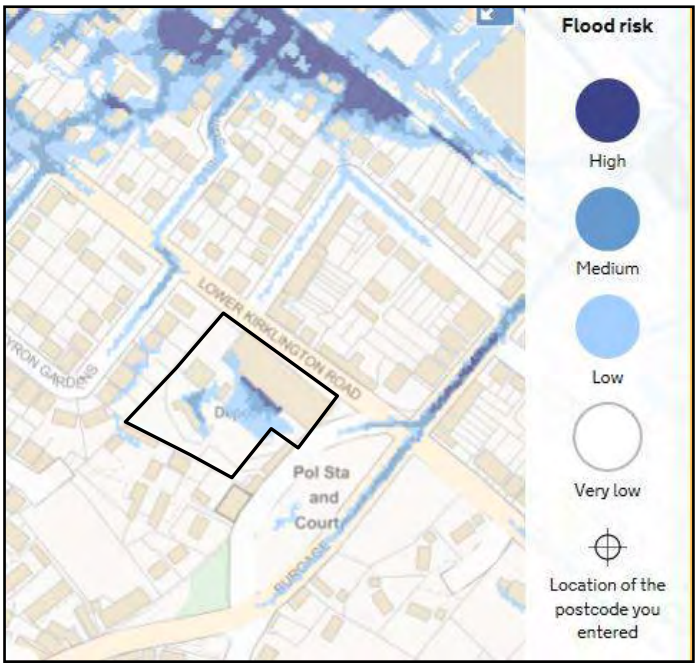


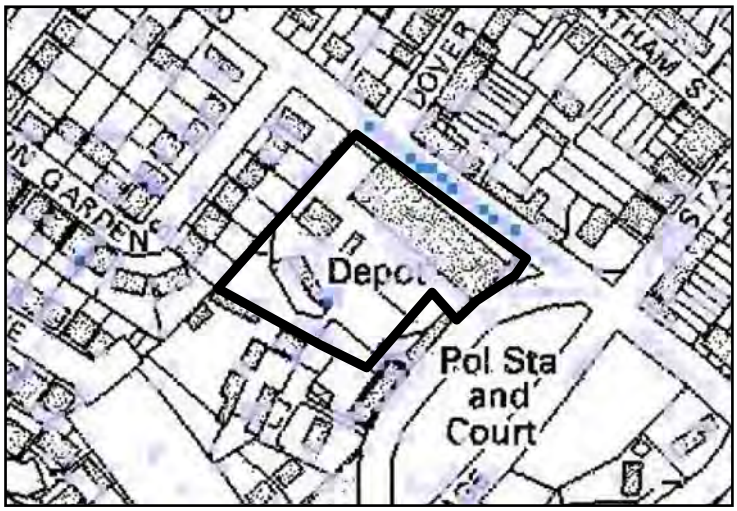
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/Ho/6: Land at the Burgage (Rainbows)

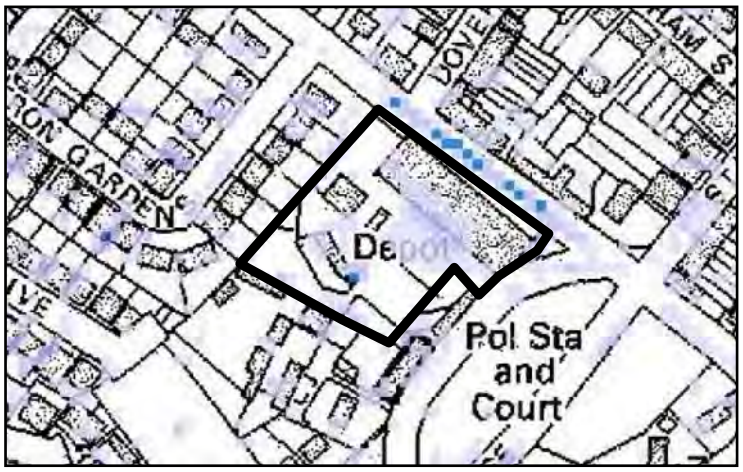
EA Flood Map for Planning



EA Surface Water Flood Map for Planning



NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP



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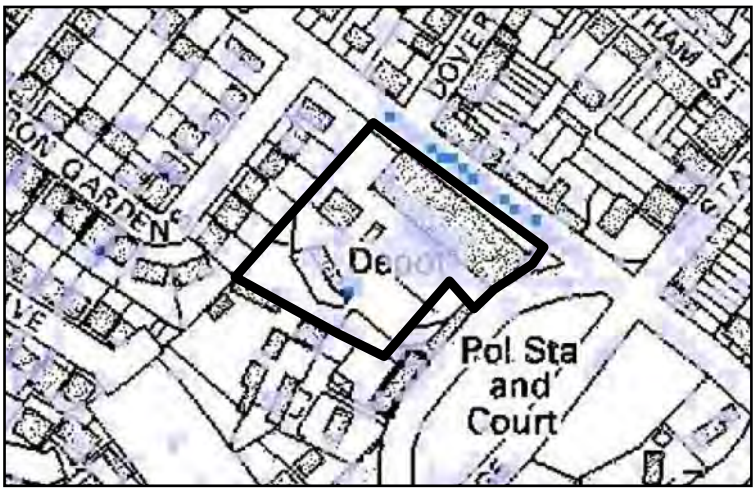
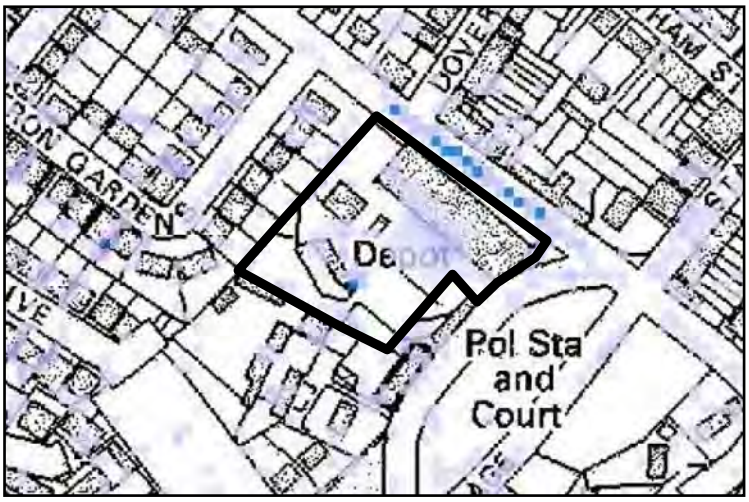


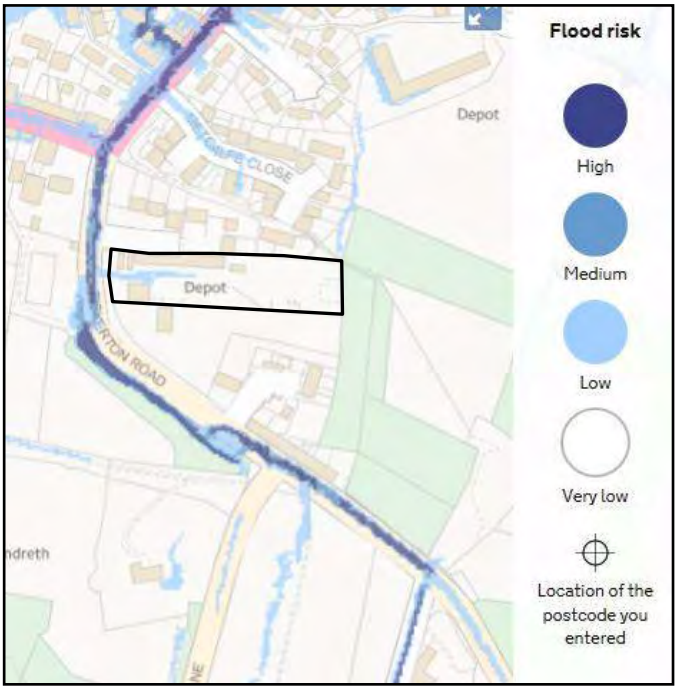
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



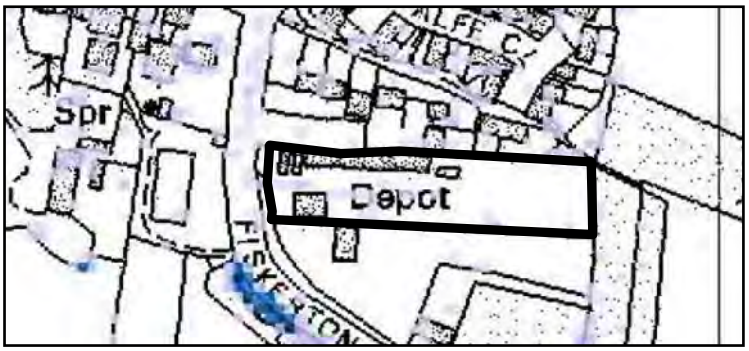
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/Ho/7: Southwell Depot

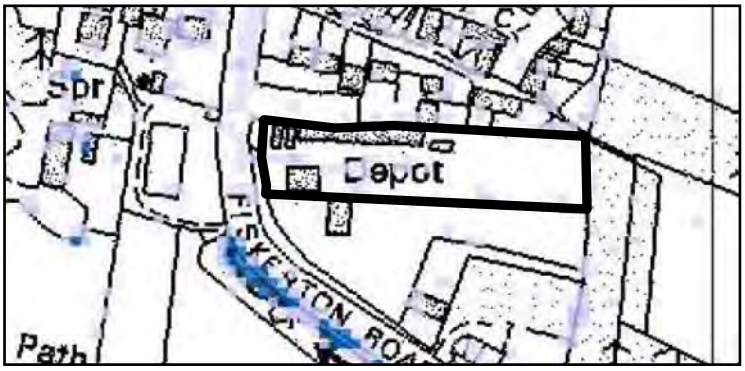
EA Flood Map for Planning



EA Surface Water Flood Map for Planning



NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP



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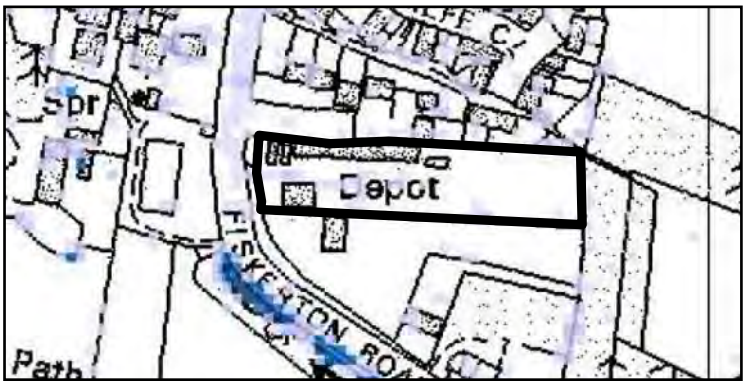
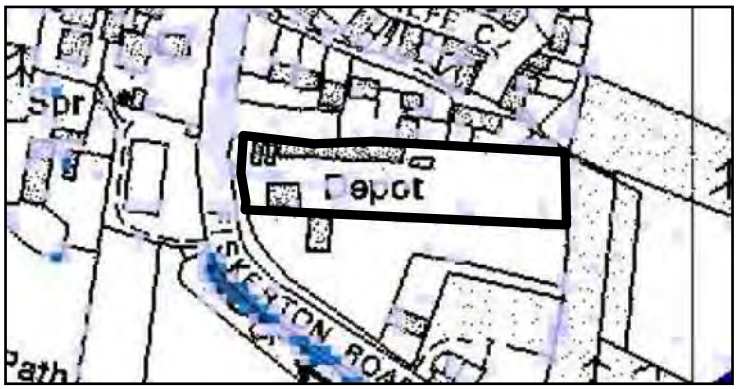


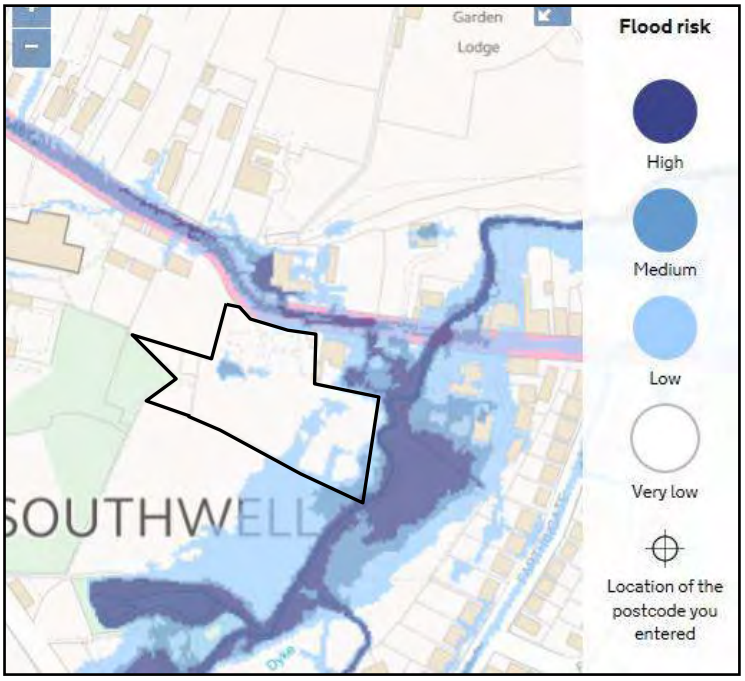
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



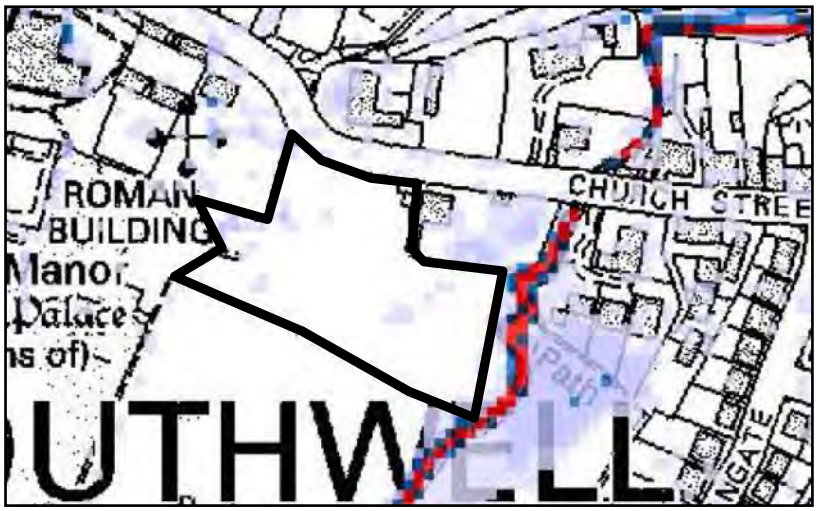
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/MU/1: Land at the former Minster School

EA Flood Map for Planning



EA Surface Water Flood Map for Planning



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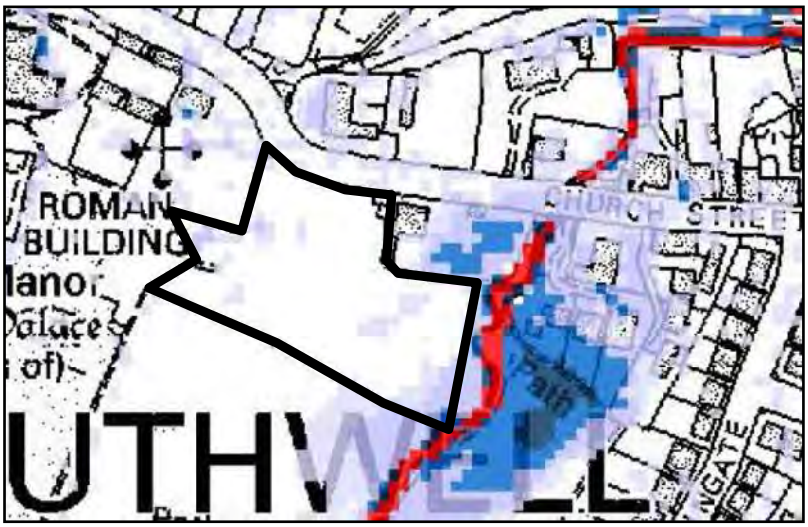

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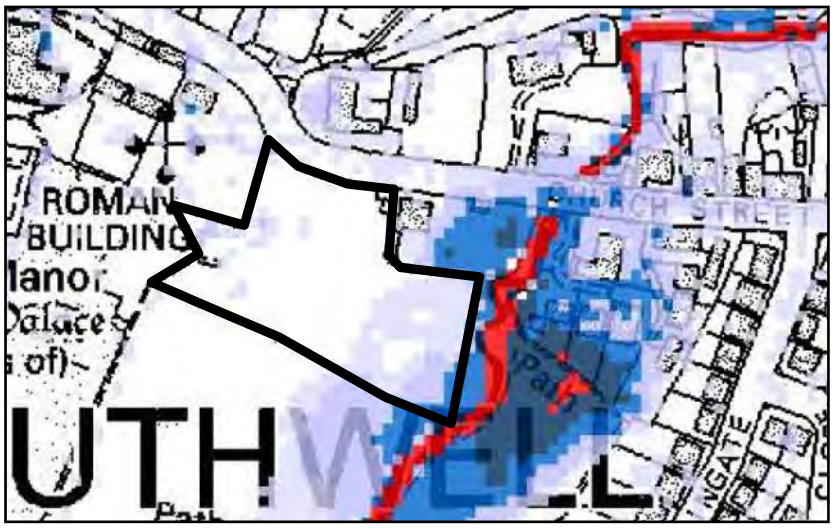

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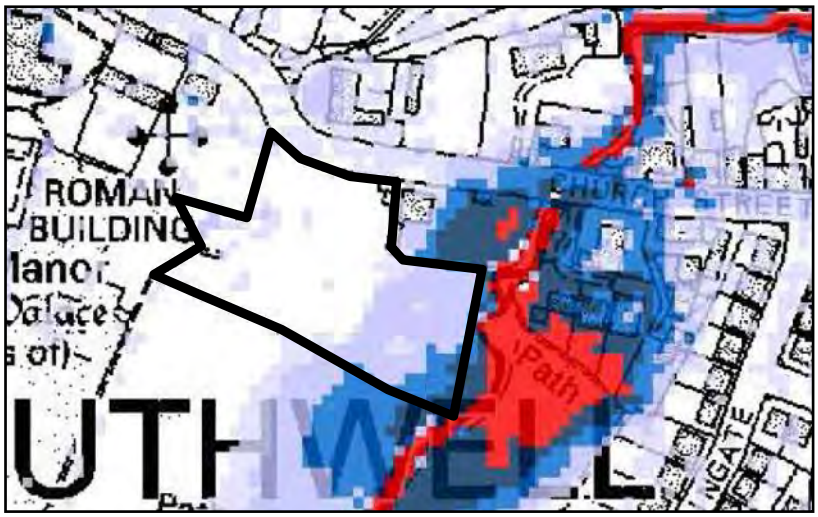
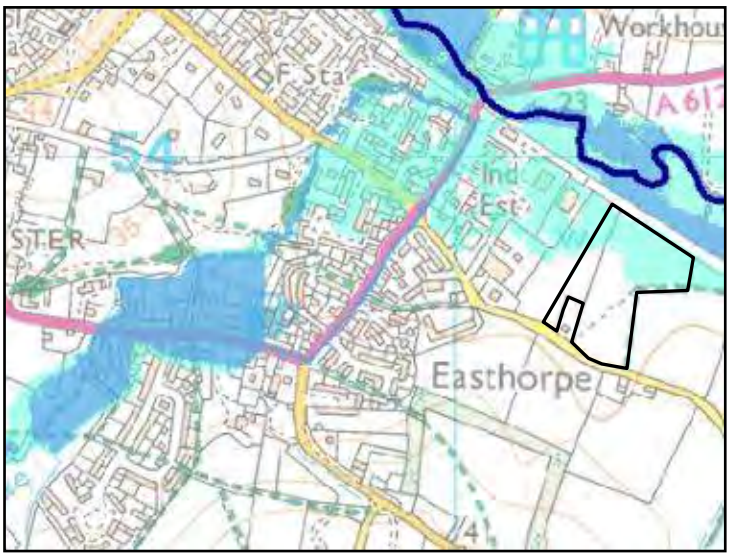
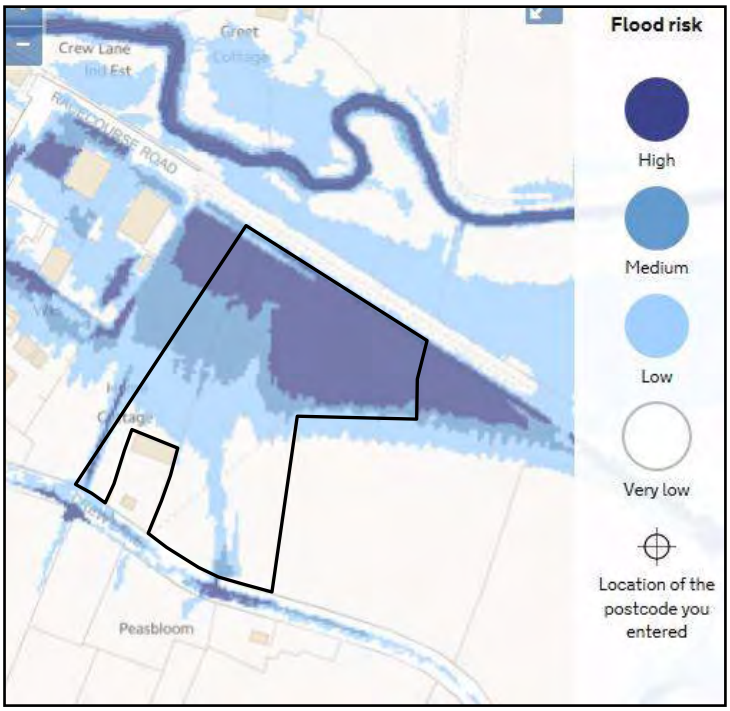


NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

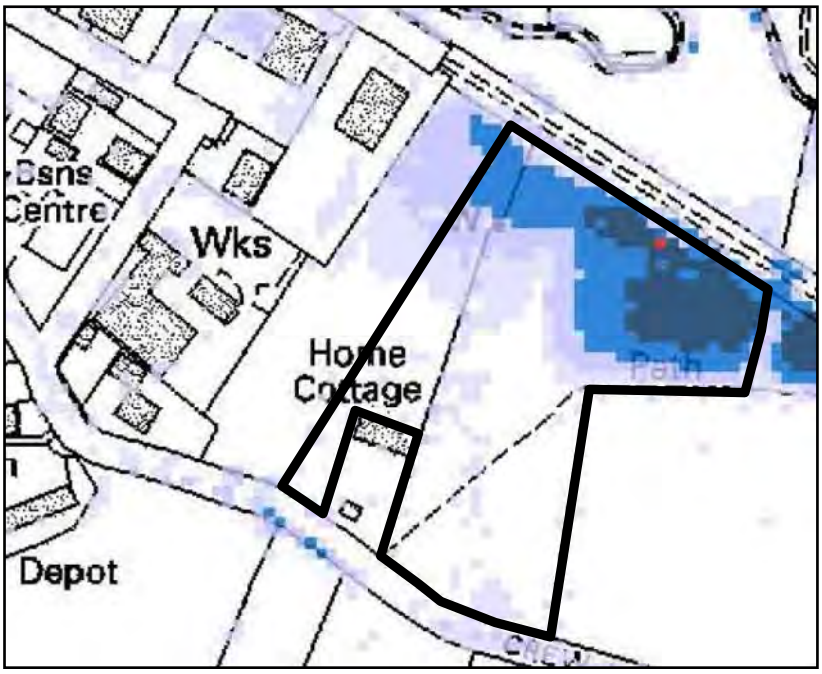
So/E/2: Land to the East of Crew Lane



EA Flood Map for Planning



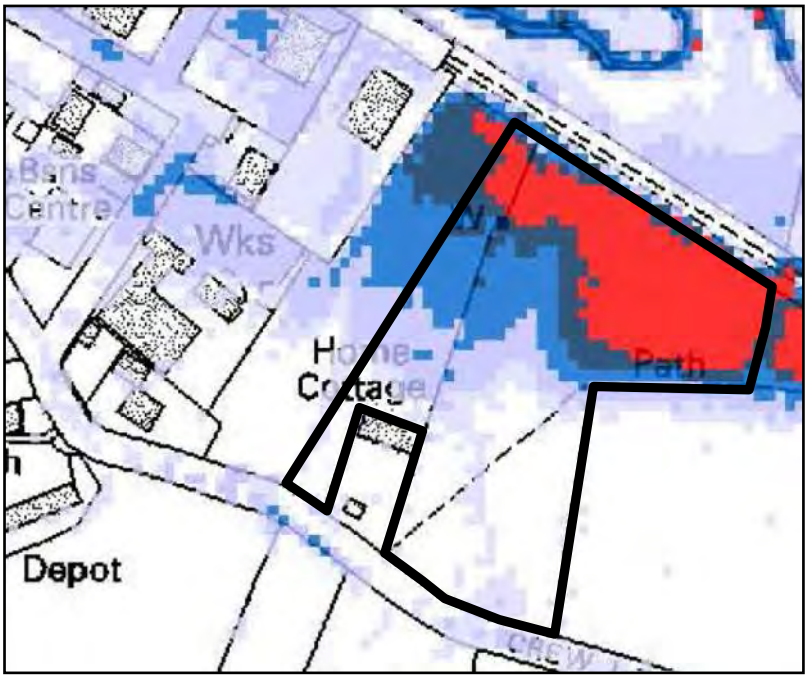
EA Surface Water Flood Map for Planning



NCC Southwell Hydraulic Modelling (Sept 2015): 5% AEP

NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP

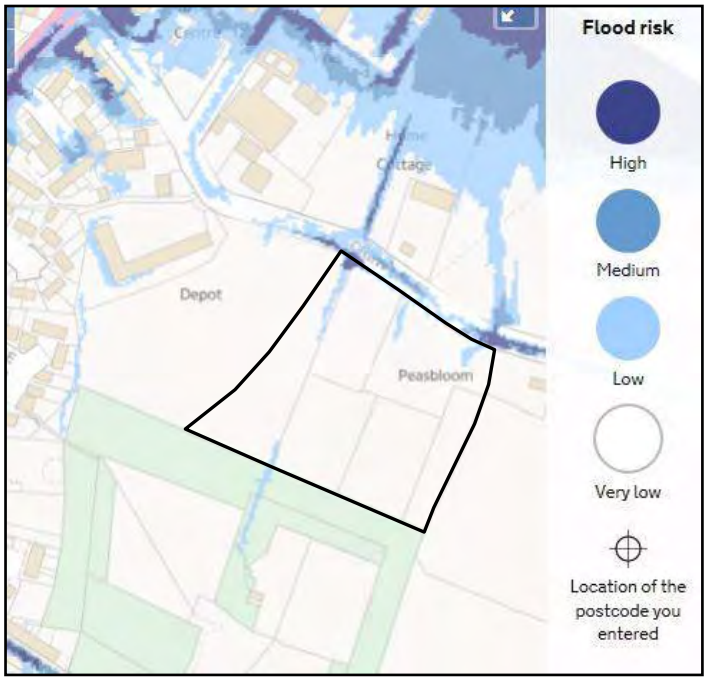
NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



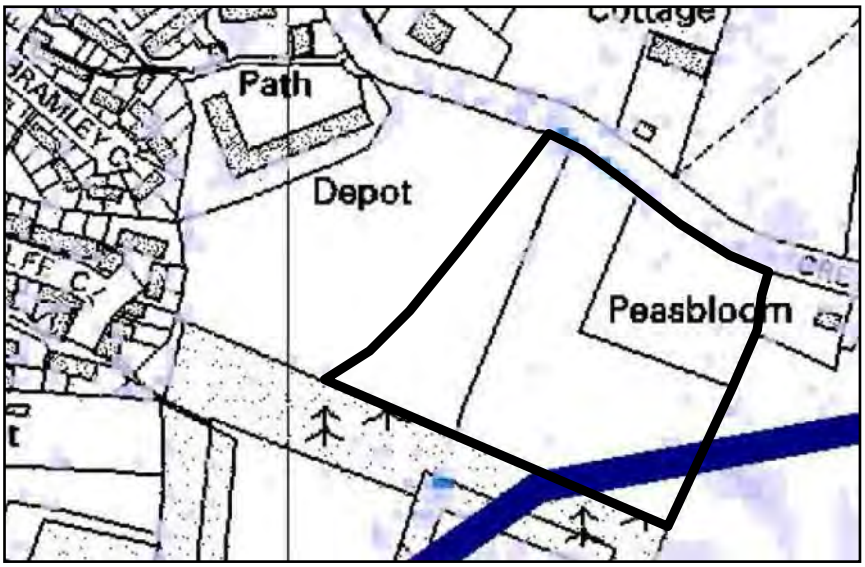
NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

So/E/3: Land to the south of Crew Lane

EA Flood Map for Planning



EA Surface Water Flood Map for Planning



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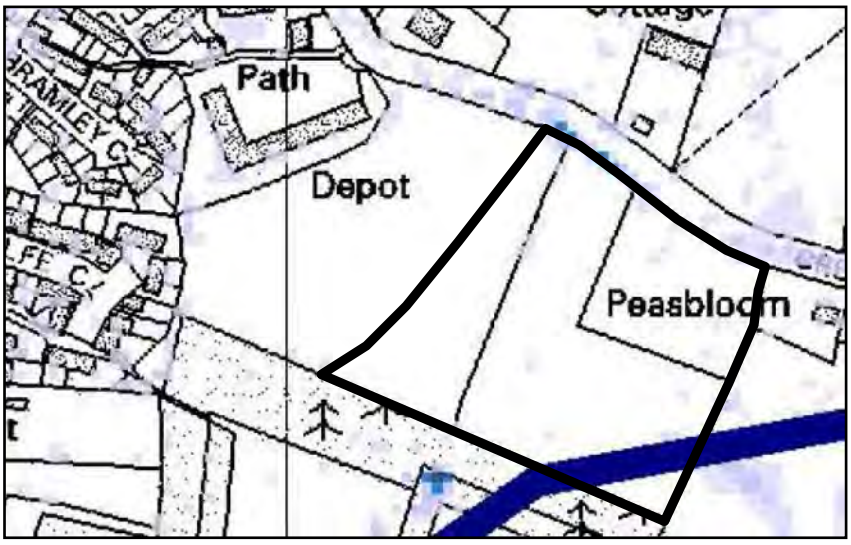

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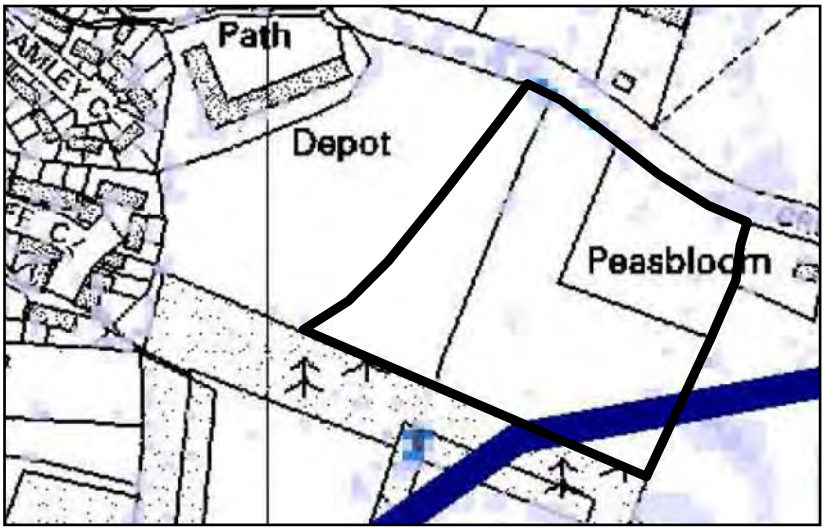
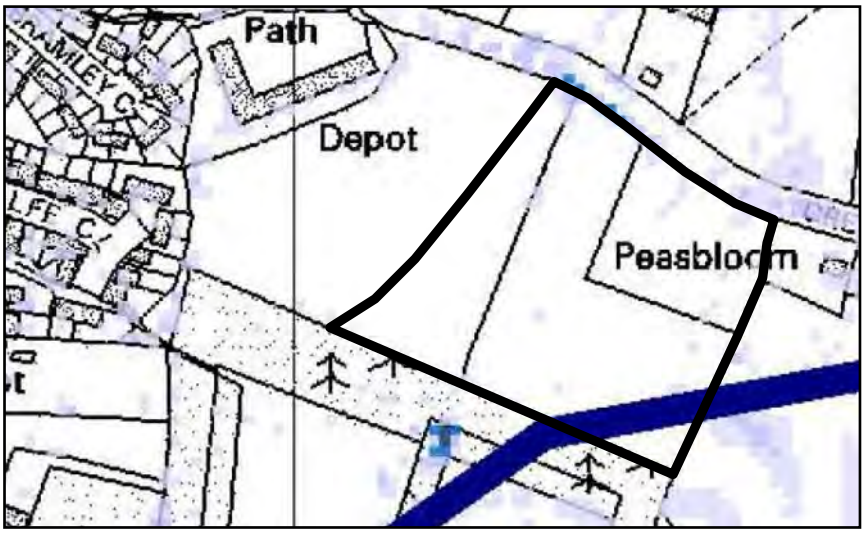


NCC Southwell Hydraulic Modelling (Sept 2015): 1% AEP plus 20% CC



NCC Southwell Hydraulic Modelling (Sept 2015): 0.1% AEP

KEY (NCC Modelling Sept 2015)

Appendix D: SFRA Review Modelling: River Trent upstream of Cromwell Lock and Weir

List of Appendix D Contents

Dwg 029: Dwg Title: River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 20% CC;
Dwg 030: Dwg Title: River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 30% CC;
Dwg 031: Dwg Title: River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 50% CC;
Dwg 032: Dwg Title: River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 20% CC, 30% CC and 50% CC;

N

Legend

District Boundary

Proposed Site Usage

Housing

Employment

Mixed

0 2 4 6 8 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

N&SDC: Proposed Growth Sites - Location

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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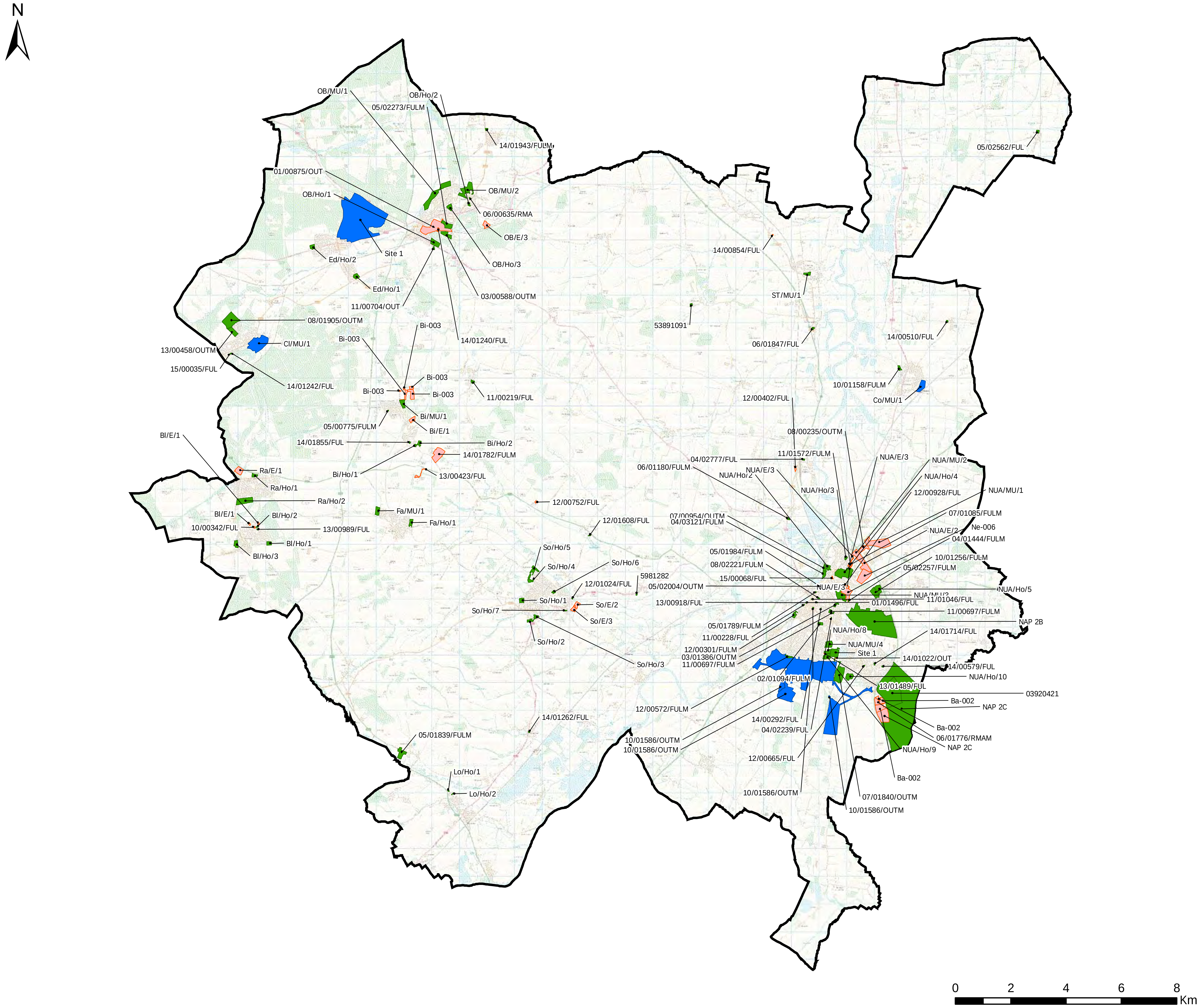

Legend

District Boundary

Proposed Site Usage

Housing

Employment

Mixed

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REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR

TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

N&SDC: Proposed Growth Sites - References

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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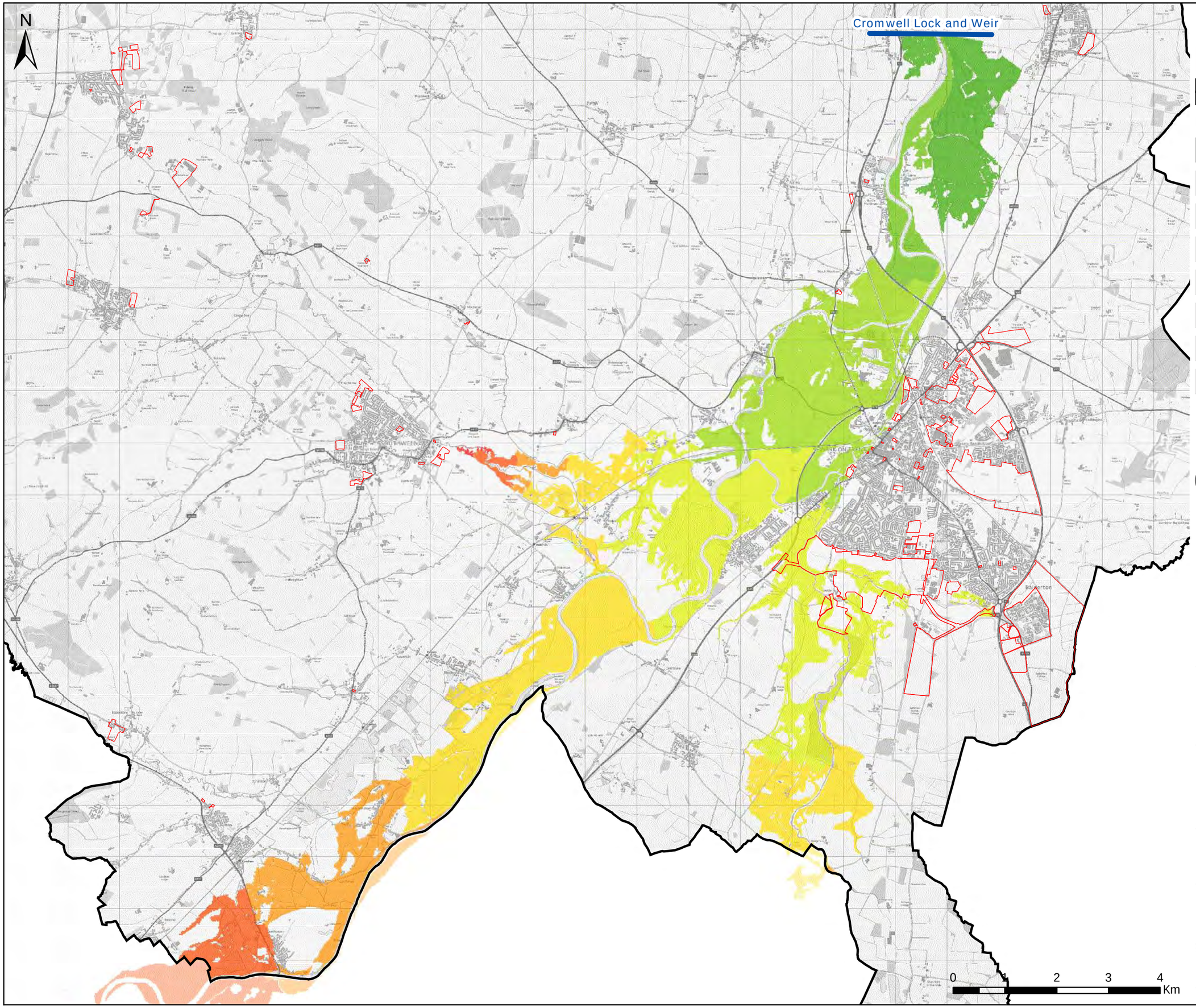

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q20 Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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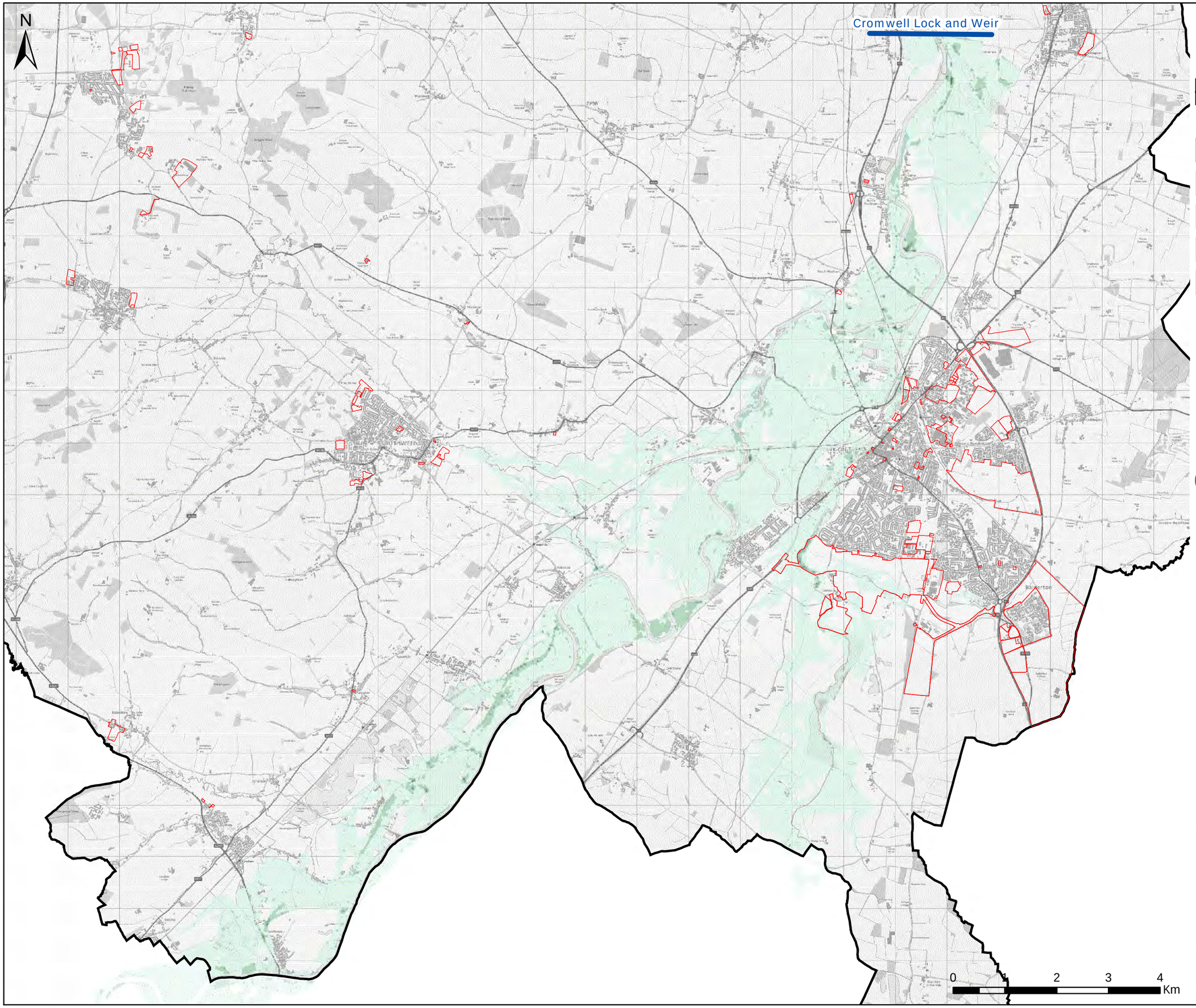

Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent: Fluvial Q20 Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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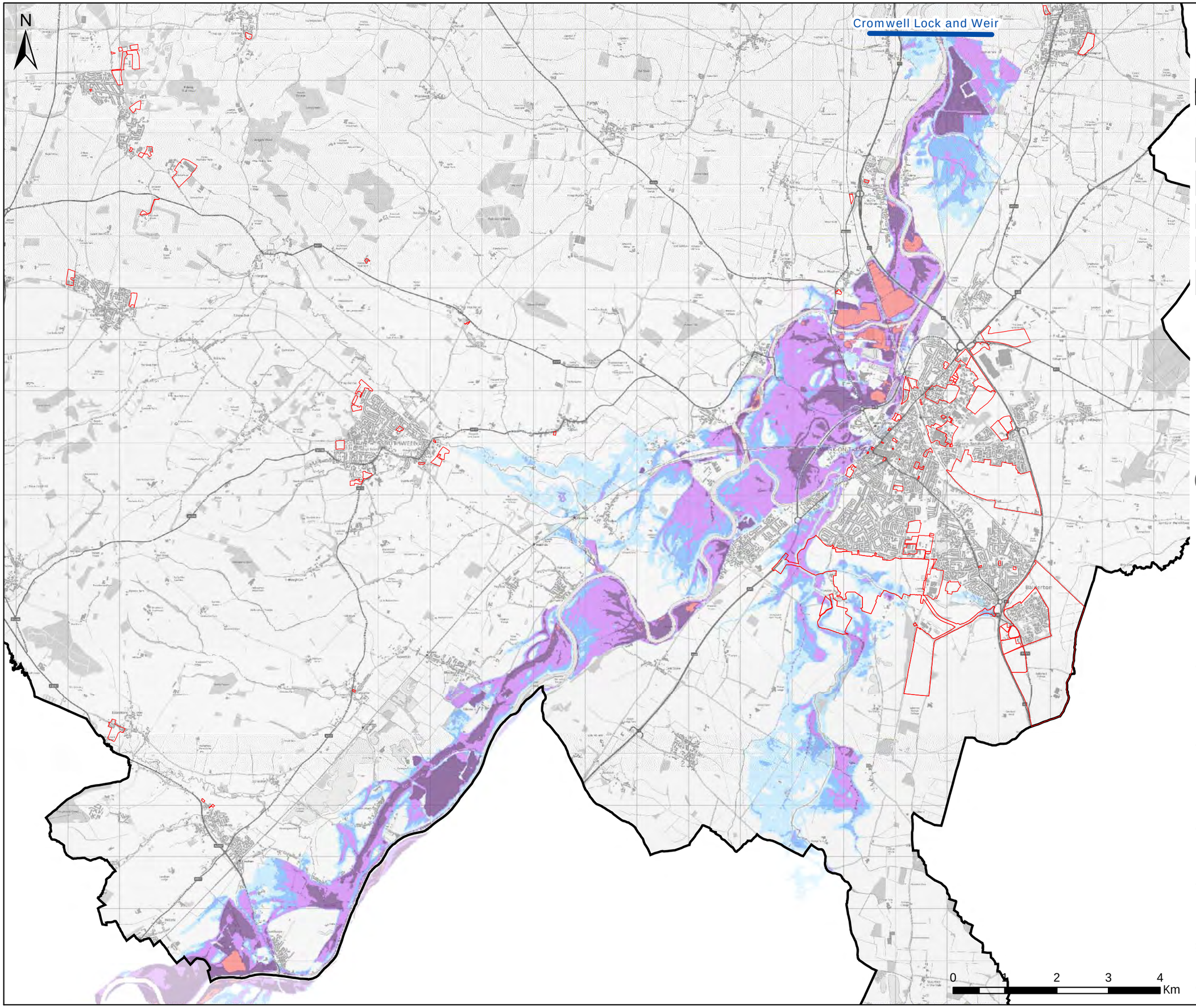

Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

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NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q20 Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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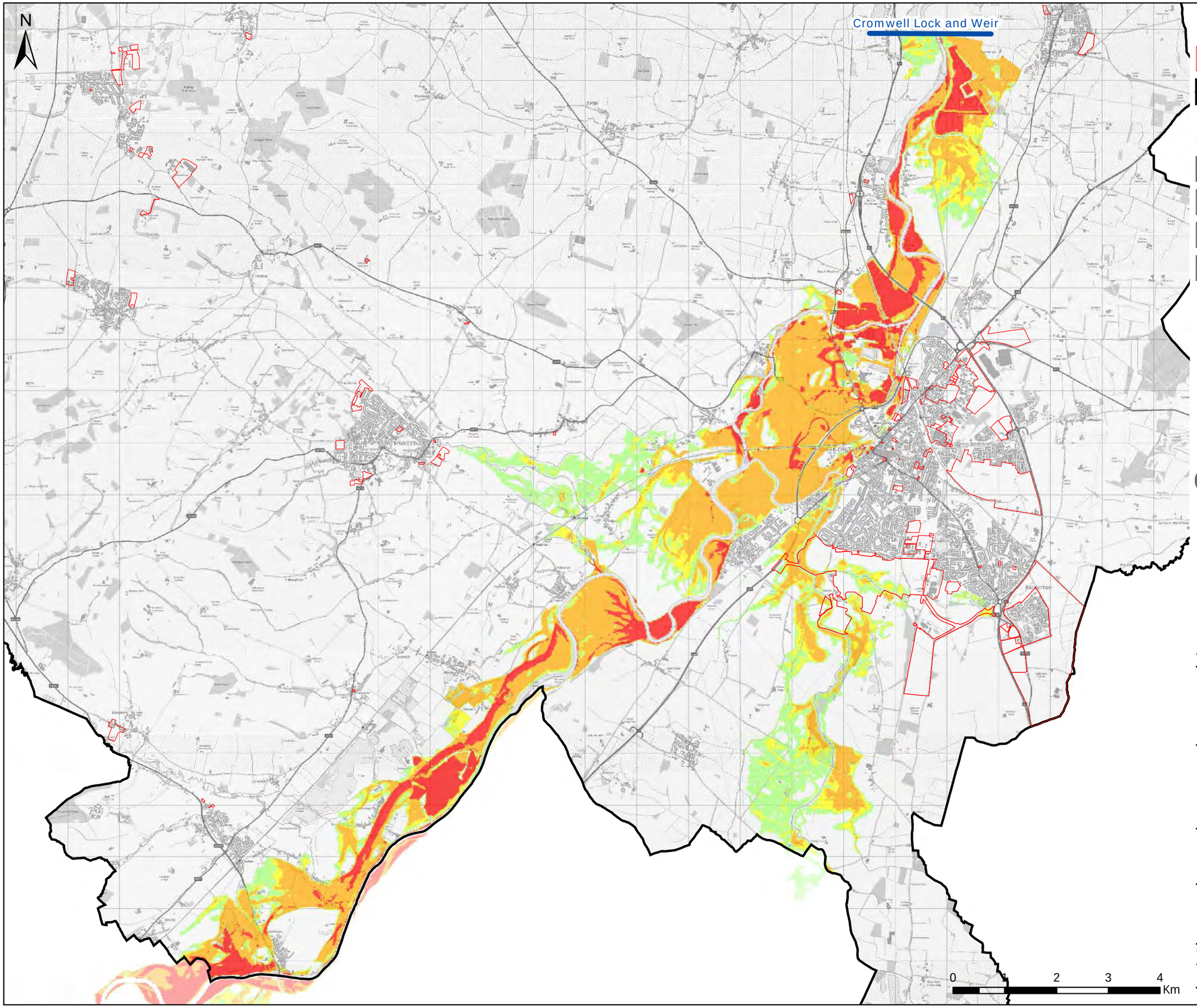

Legend

- Growth Site Locations
- District Boundary

Max Flood Hazard Rating (FD2320)

- < 0.75 (Caution)
- 0.75 - 1.25 (Danger for Some)
- 1.25 - 2 (Danger for Most)
- > 2.0 (Danger for All)

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EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q20 Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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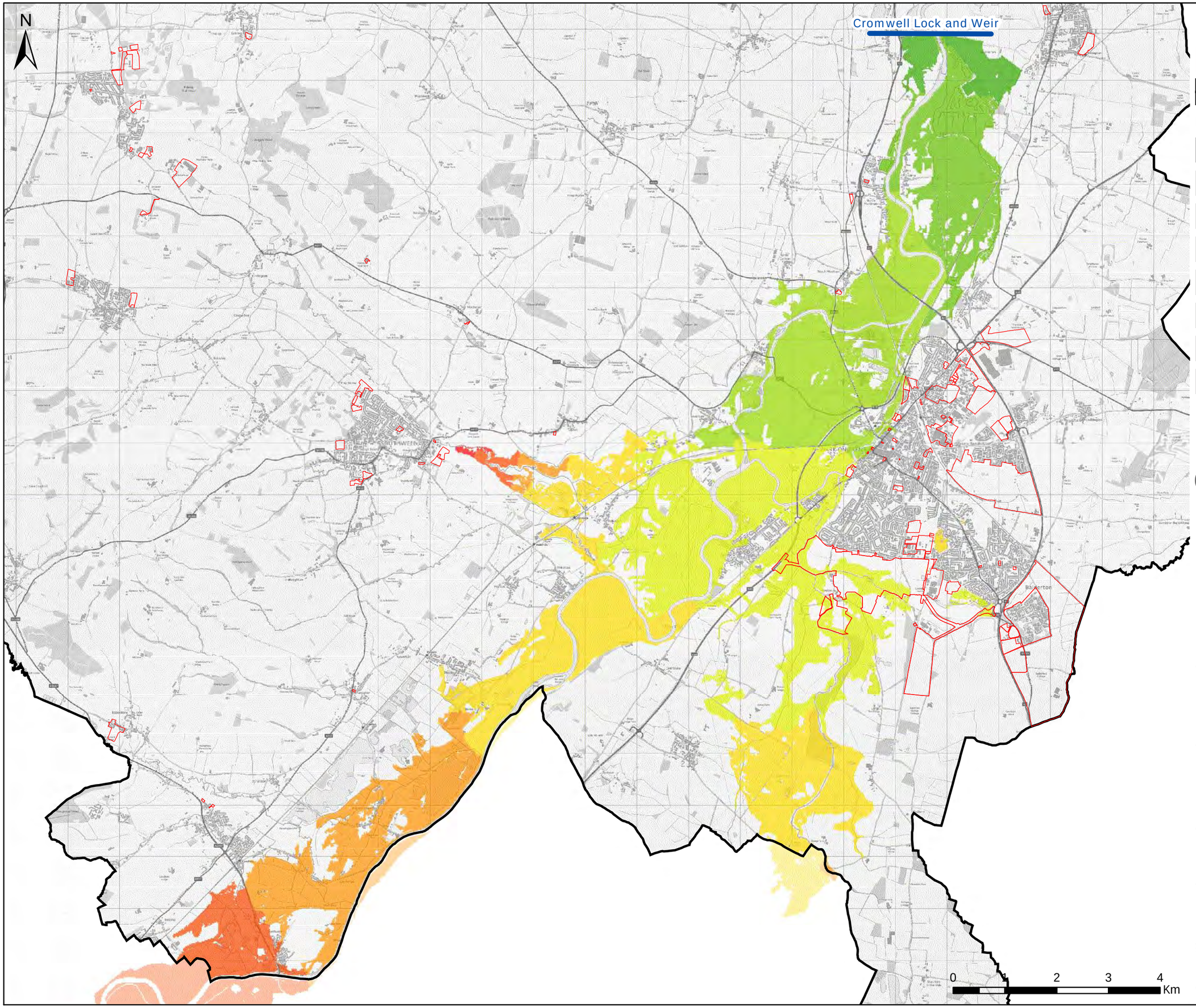

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EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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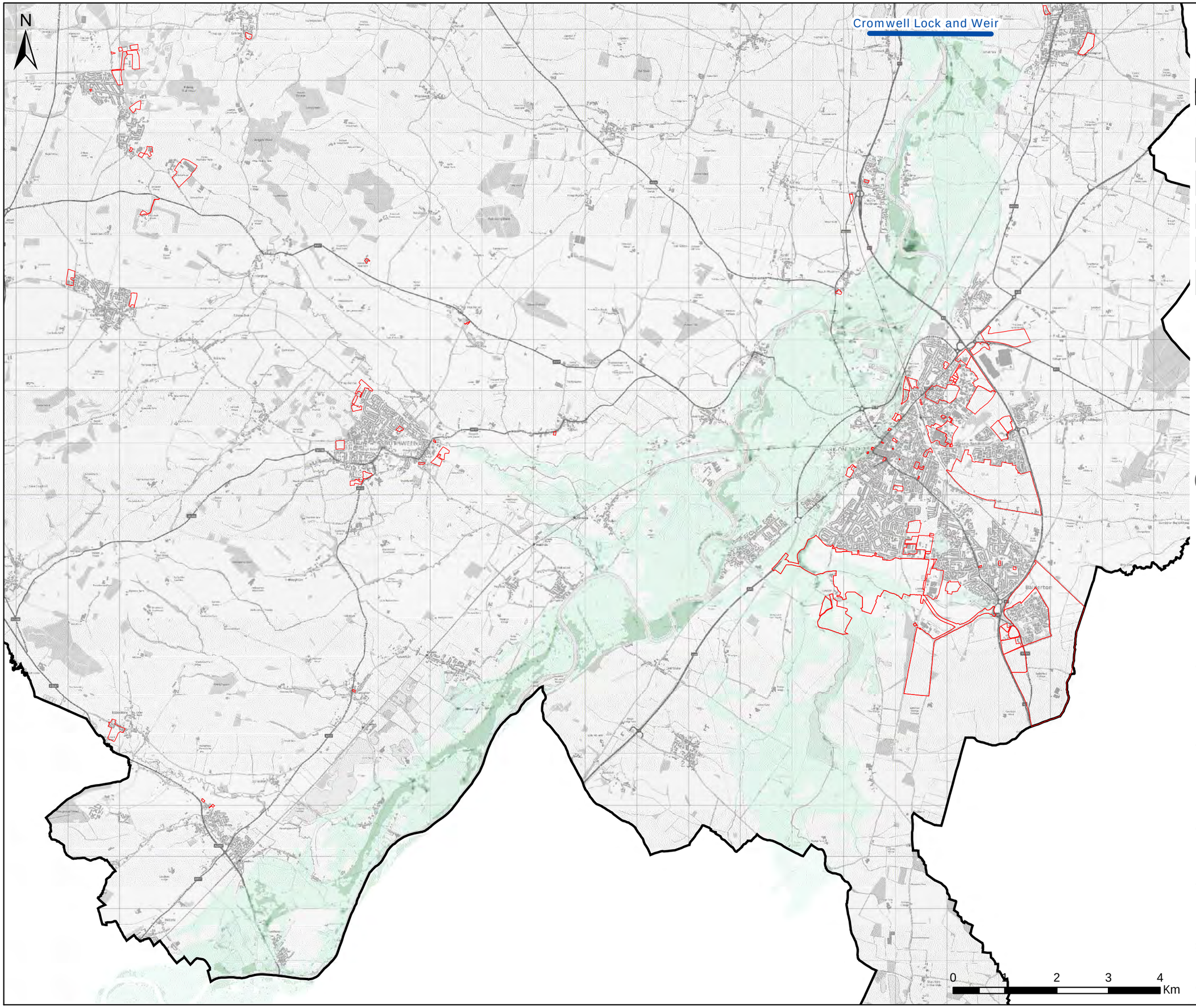

Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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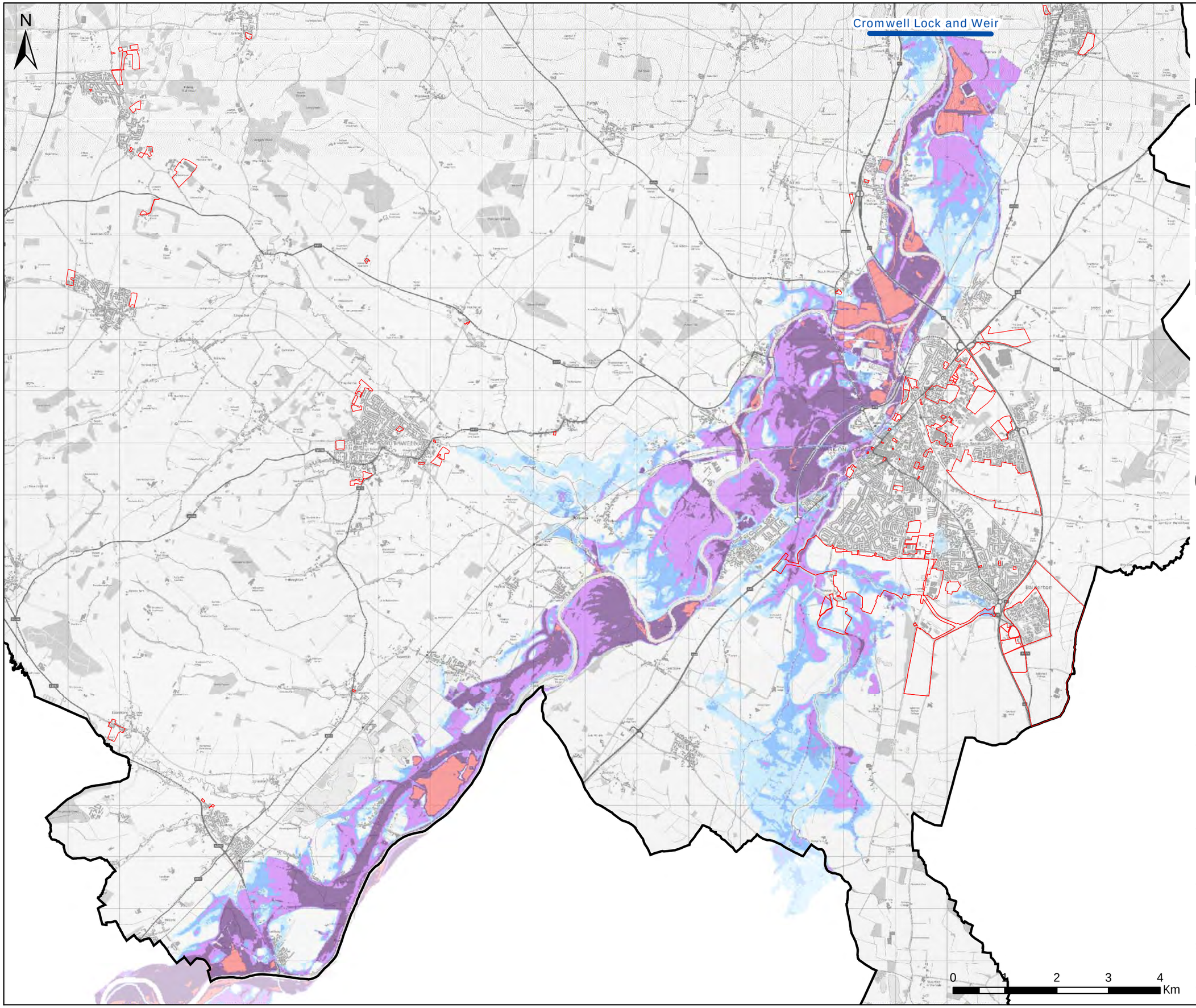

Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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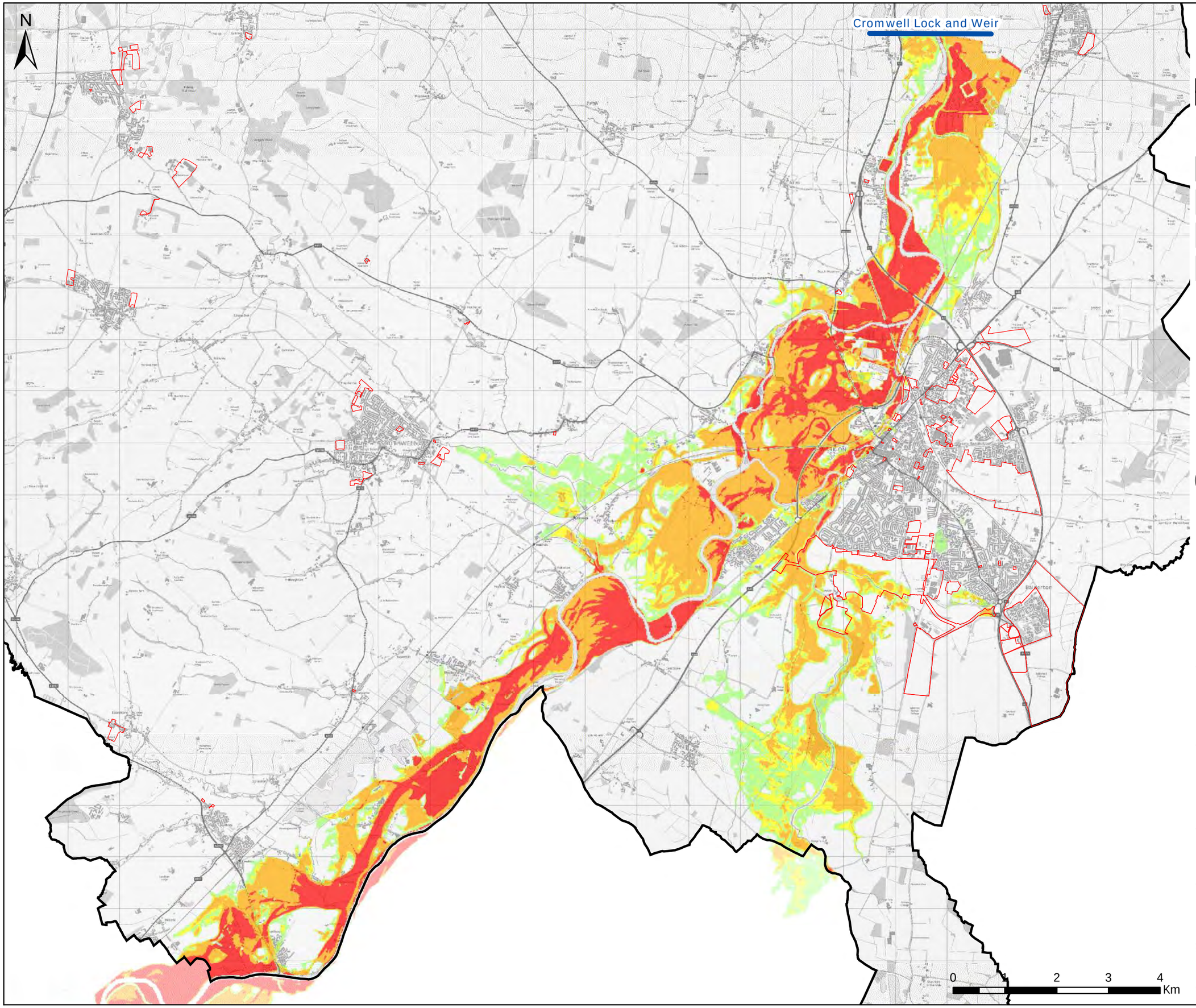

Legend

- Growth Site Locations
- District Boundary

Max Flood Hazard Rating (FD2320)

- < 0.75 (Caution)
- 0.75 - 1.25 (Danger for Some)
- 1.25 - 2 (Danger for Most)
- > 2.0 (Danger for All)

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent: Fluvial Q100 Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
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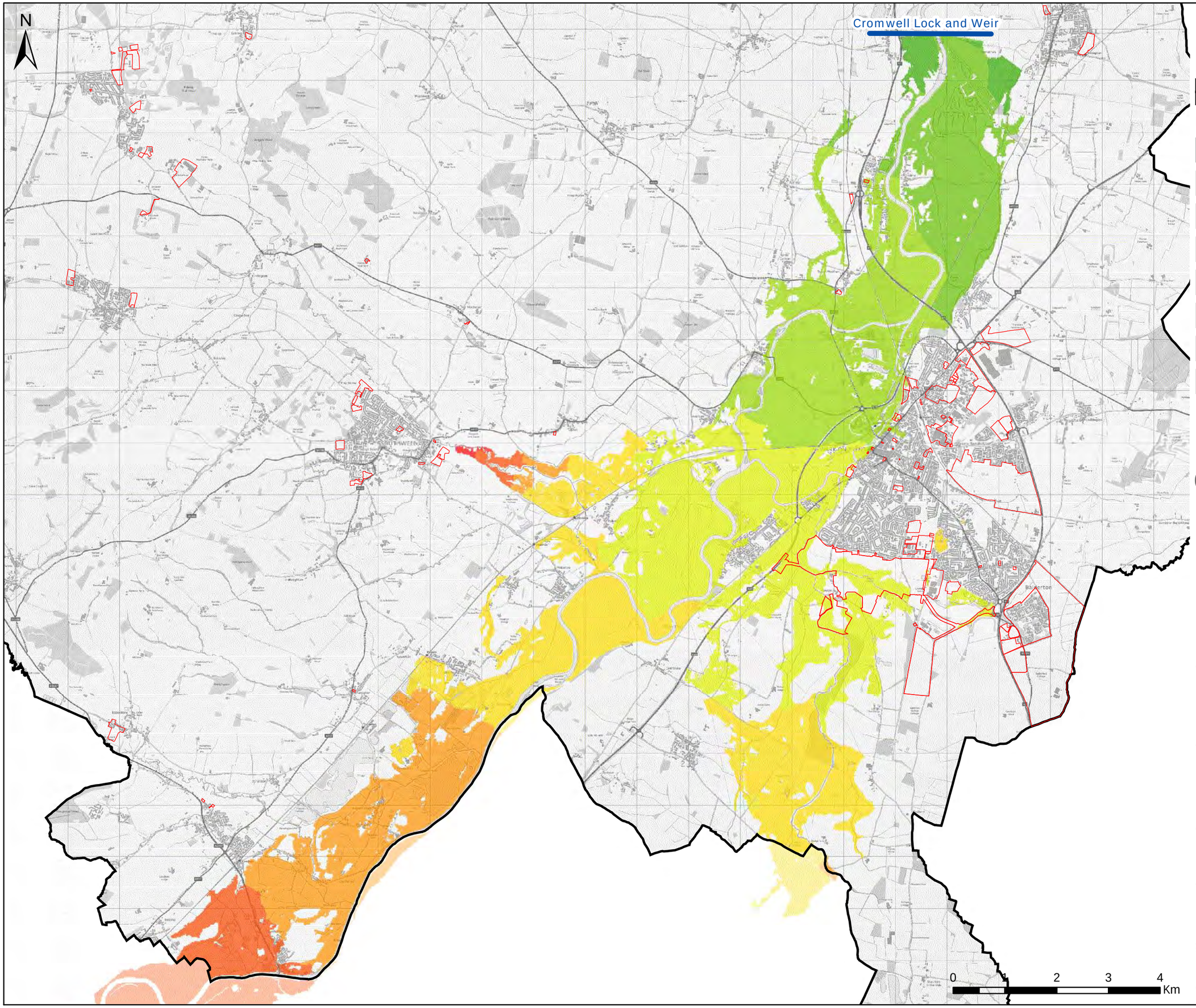

Legend

- Growth Site Locations
- District Boundary

Maximum Flood Level (mAOD)

- < 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18 - 20
- > 20

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

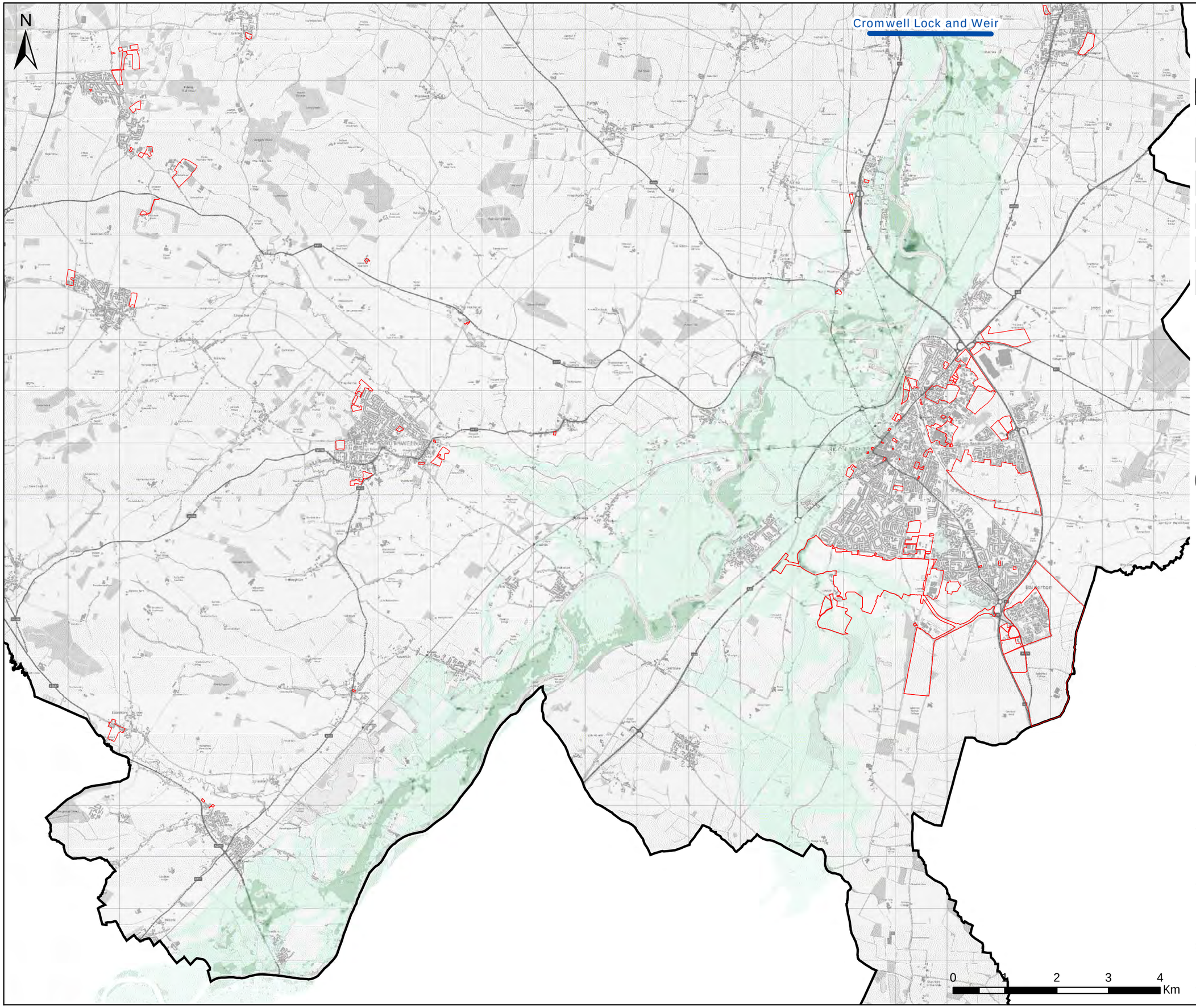
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 20% Climate Change Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	011	-



Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

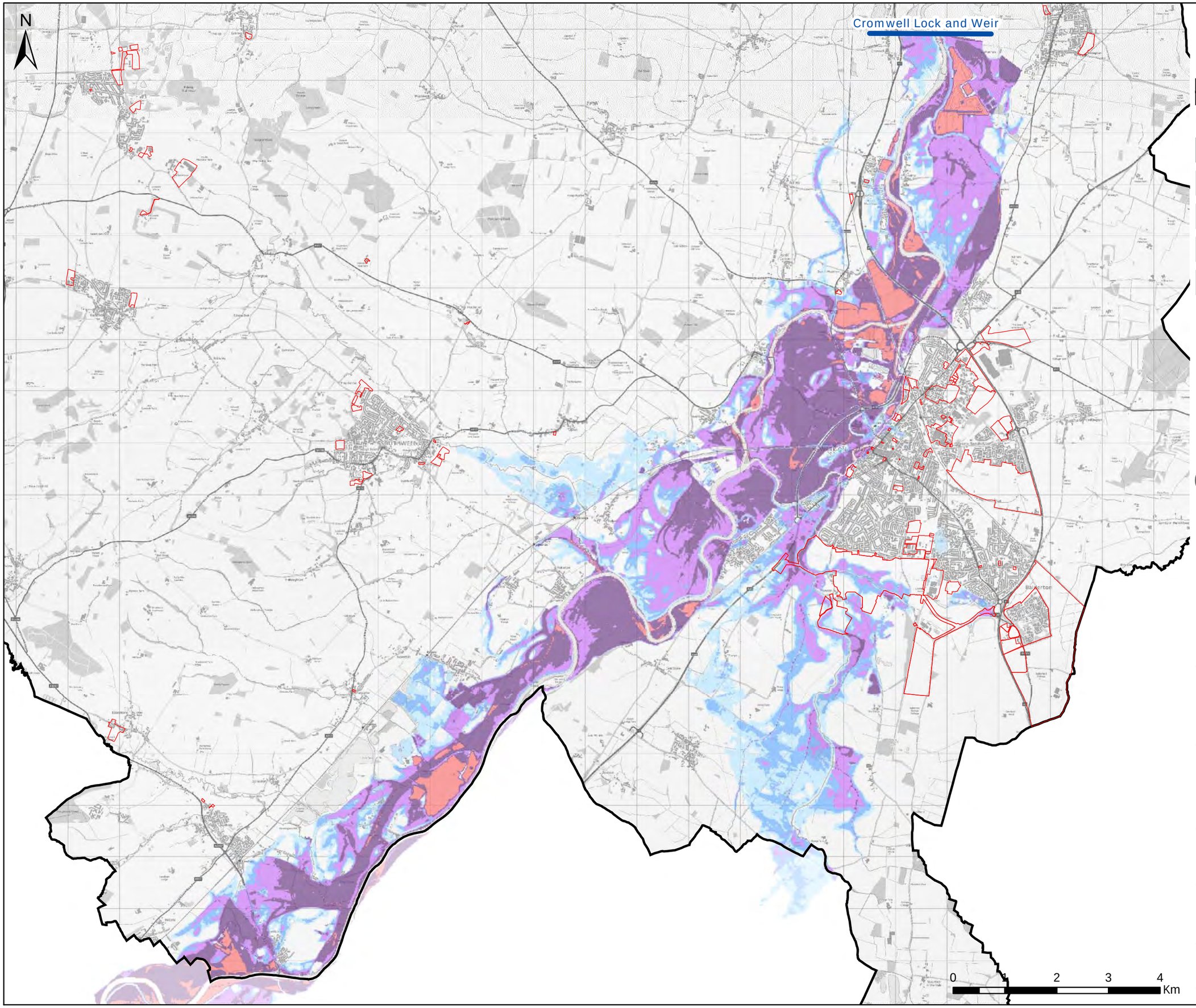
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 20% Climate Change Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	012	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

CONSULTATION ISSUE

waterco consultants

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

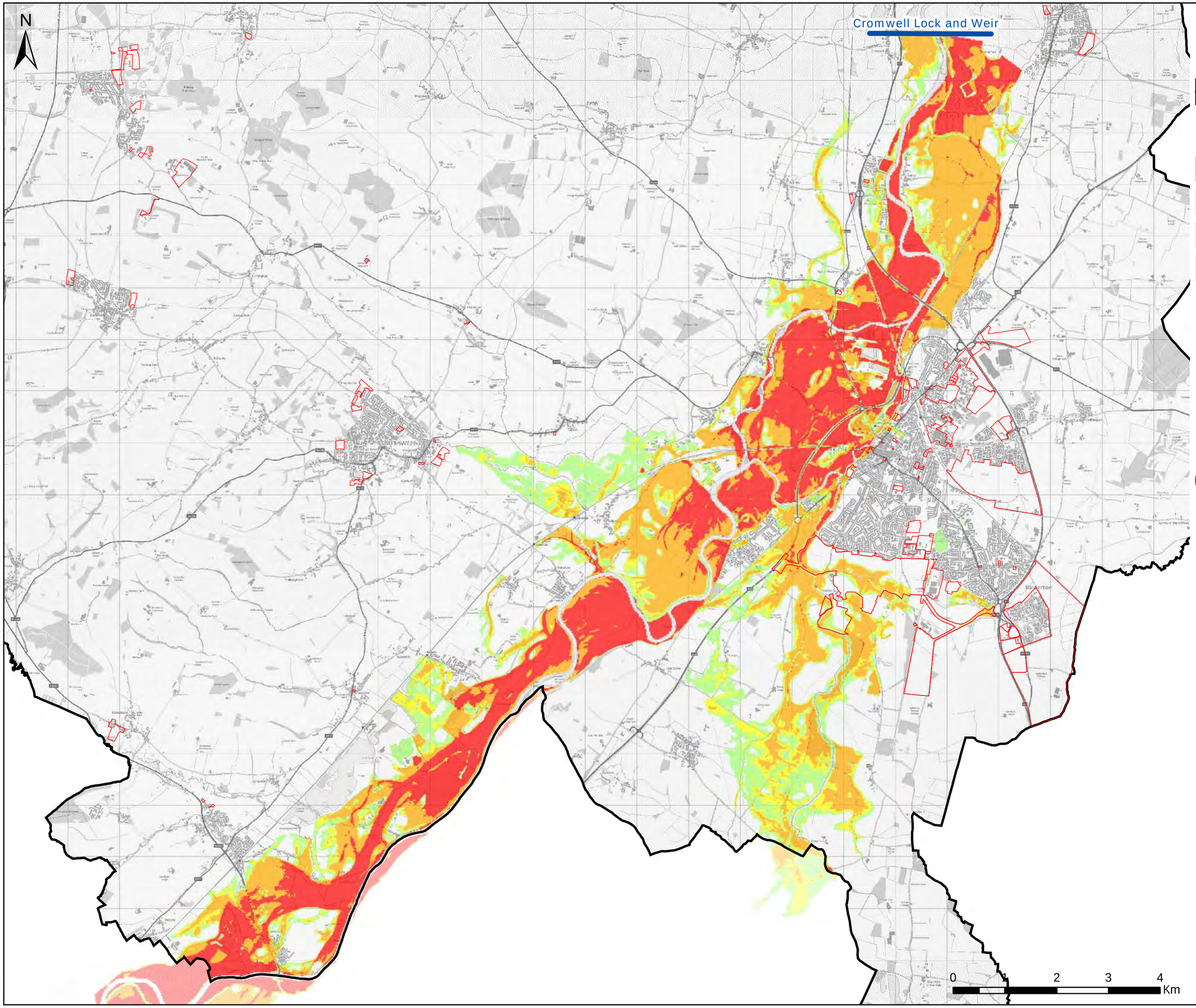
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 20% Climate Change Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	013	-



Legend

- Growth Site Locations
- District Boundary

Max Flood Hazard Rating (FD2320)

- < 0.75 (Caution)
- 0.75 - 1.25 (Danger for Some)
- 1.25 - 2 (Danger for Most)
- > 2.0 (Danger for All)

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

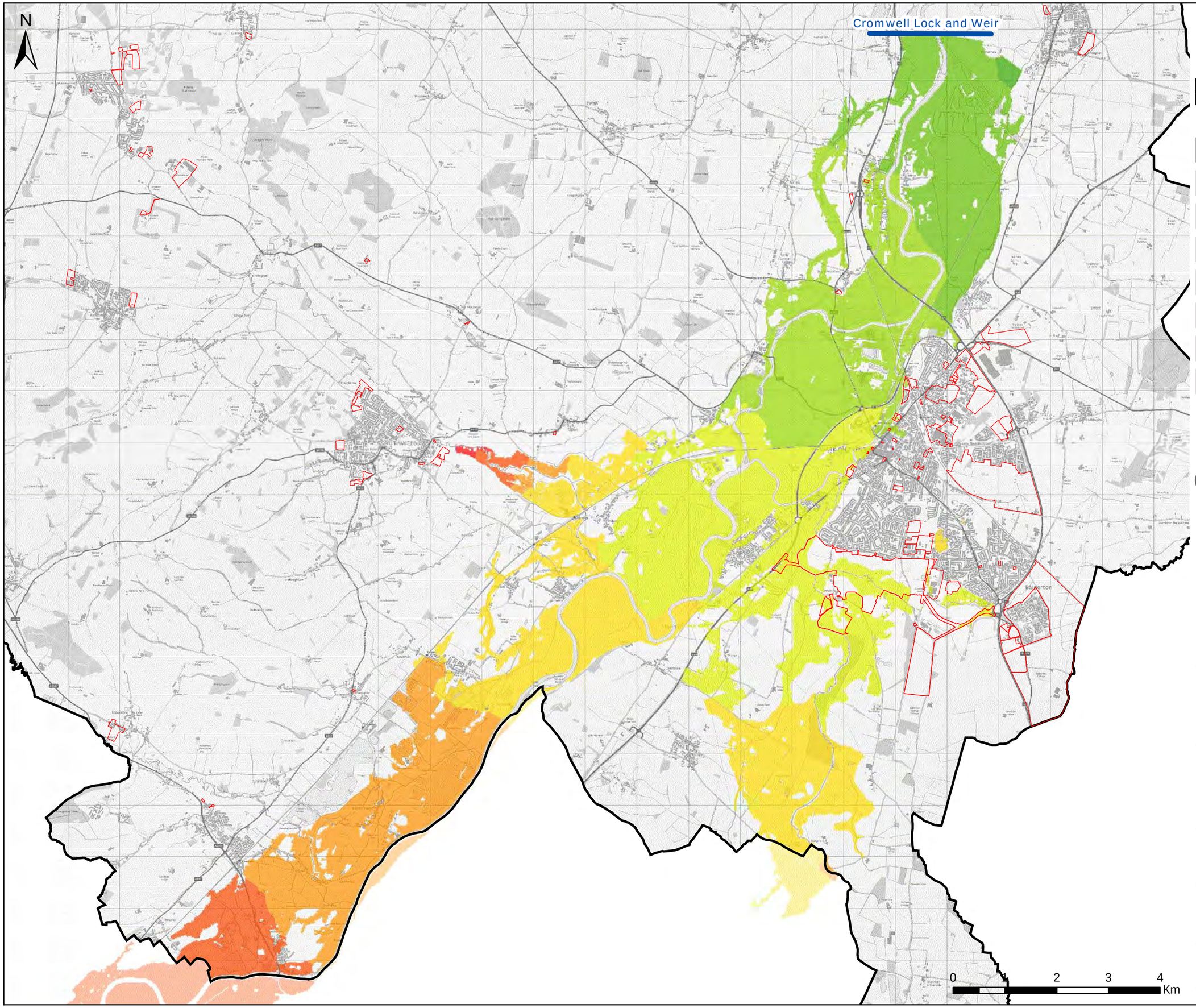
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 20% Climate Change Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	014	-



CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

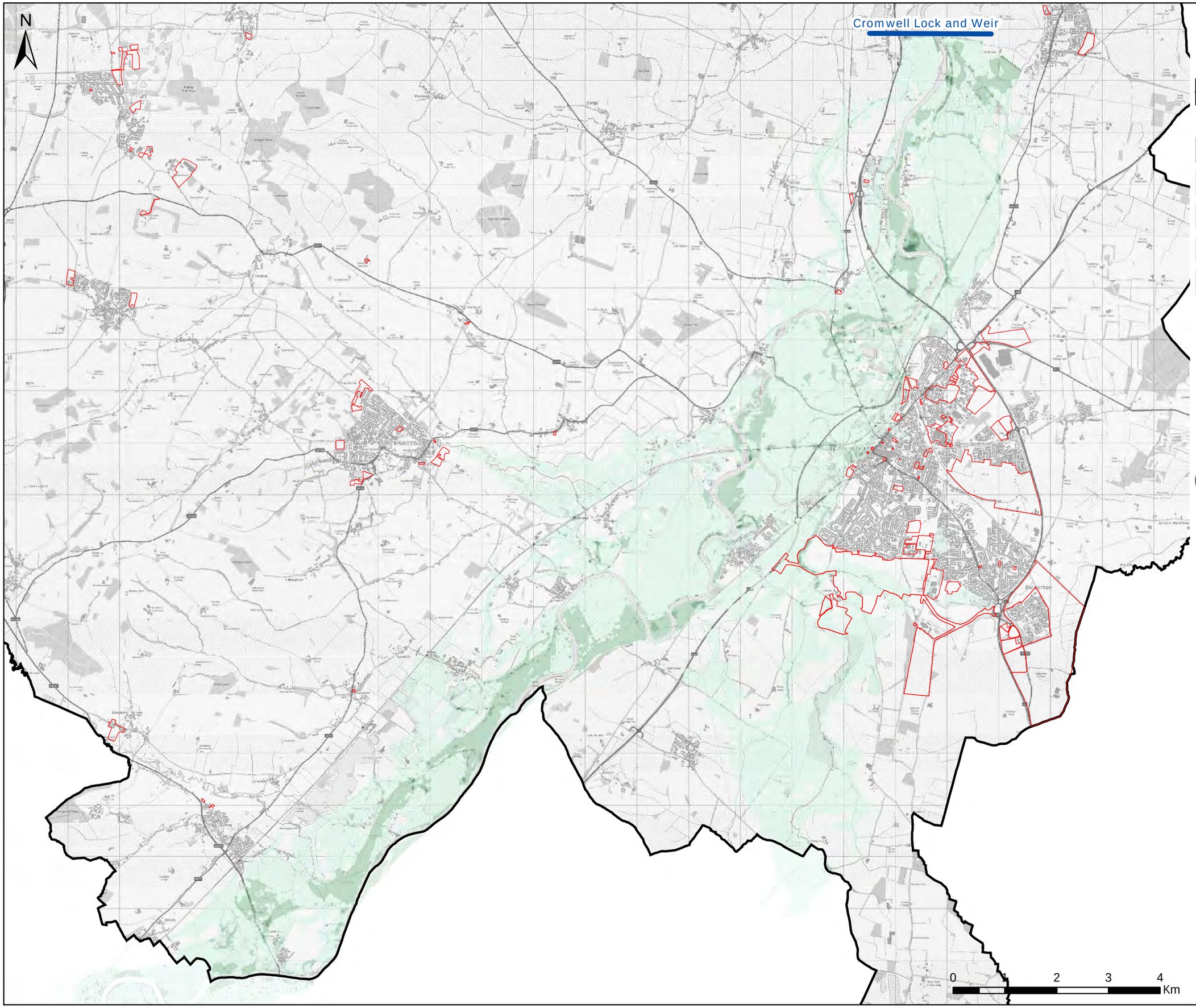
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 30% Climate Change Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	015	-



Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

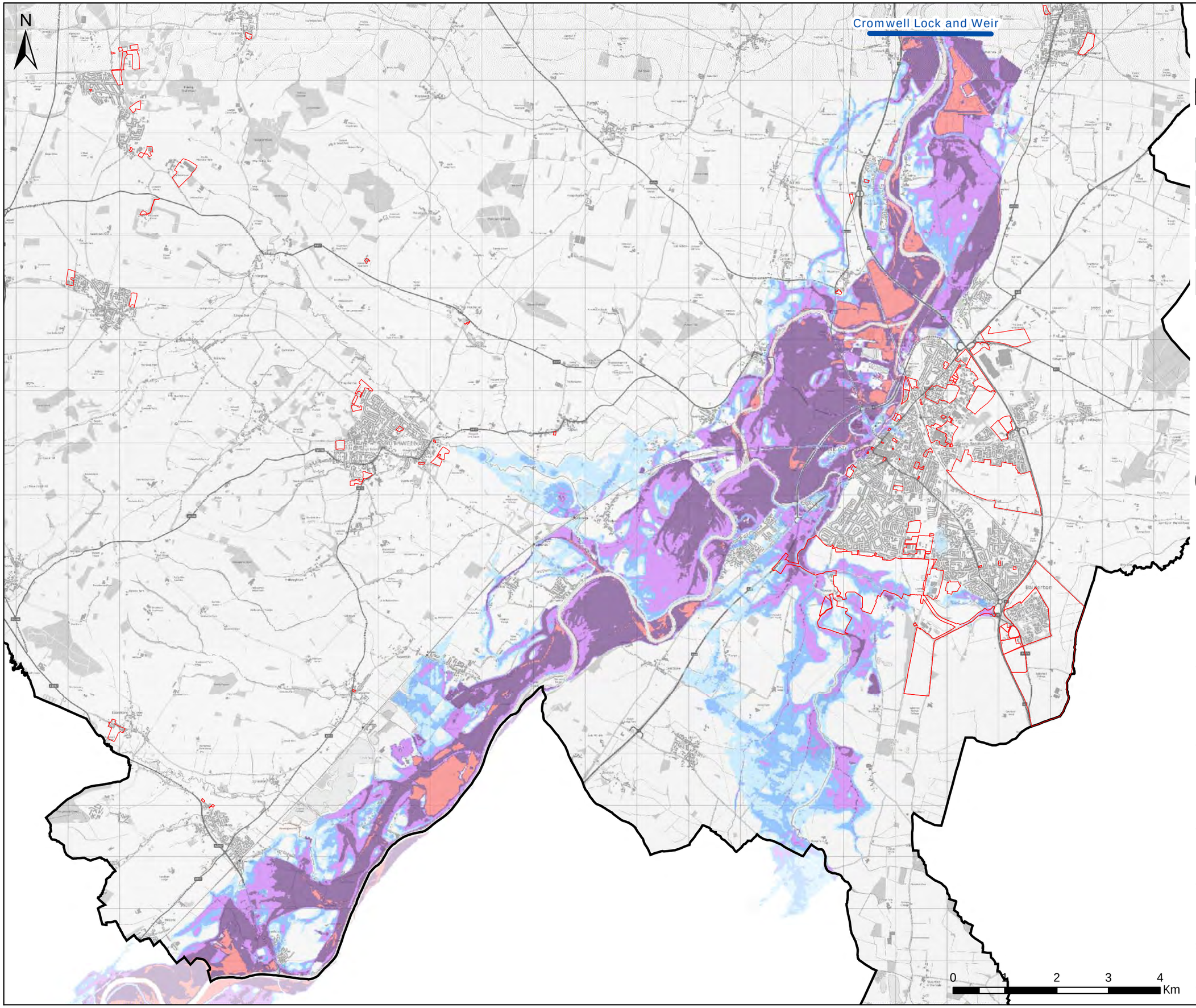
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 30% Climate Change Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	016	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

CONSULTATION ISSUE

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NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

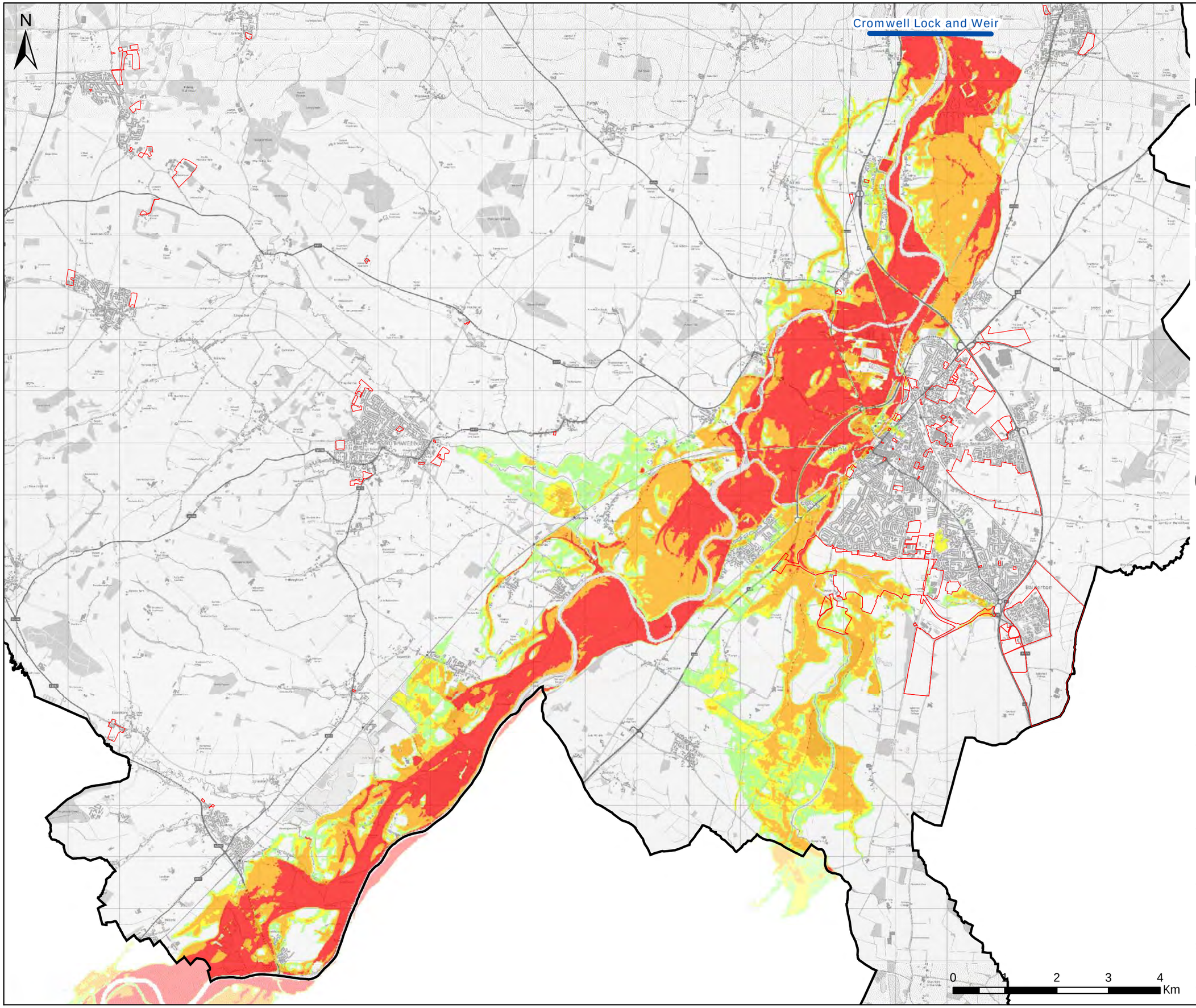
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 30% Climate Change Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	017	-



Legend

- Growth Site Locations
- District Boundary

Max Flood Hazard Rating (FD2320)

- < 0.75 (Caution)
- 0.75 - 1.25 (Danger for Some)
- 1.25 - 2 (Danger for Most)
- > 2.0 (Danger for All)

CONSULTATION ISSUE

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REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

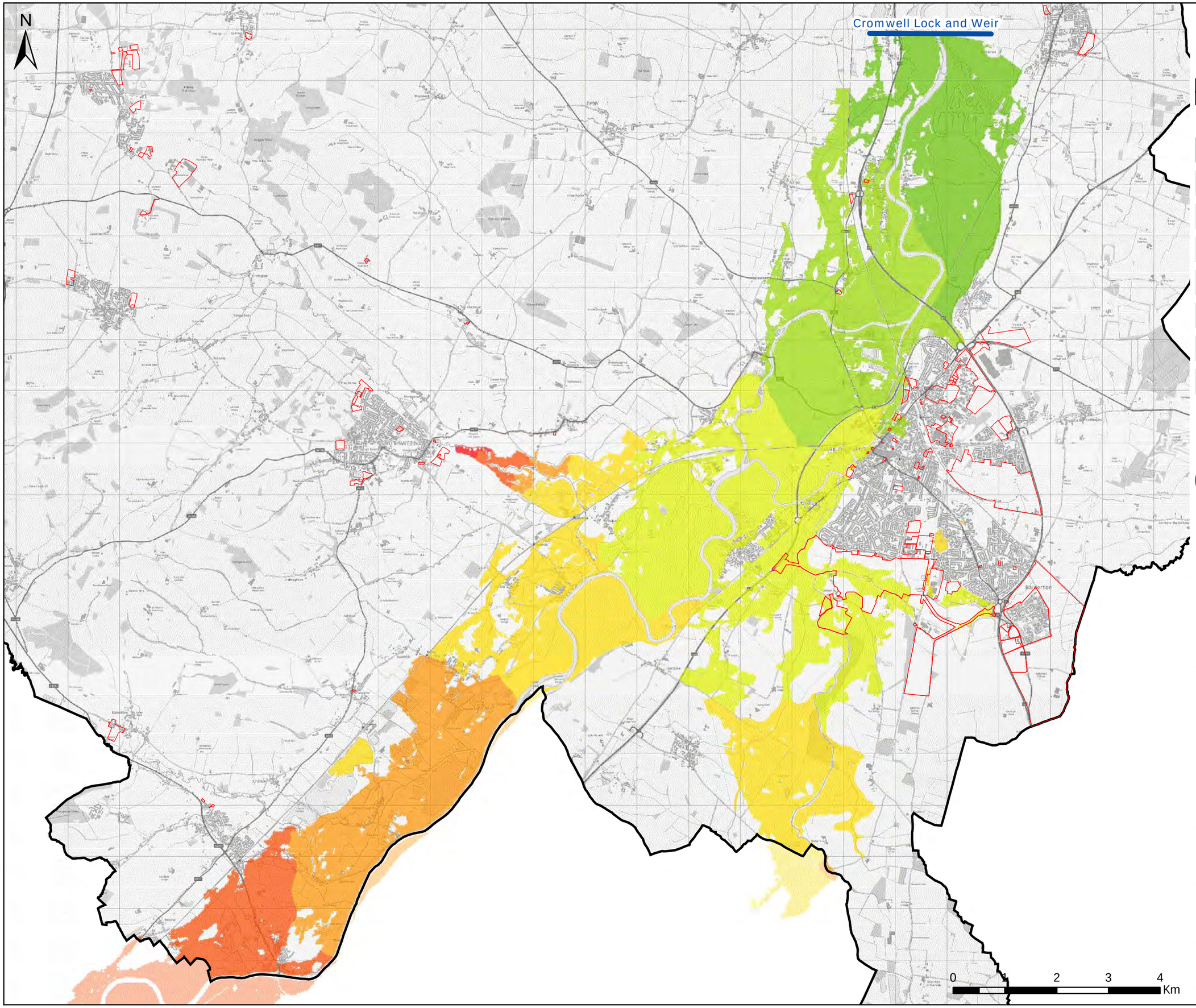
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 30% Climate Change Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	018	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Level (mAOD)

- < 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18 - 20
- > 20

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

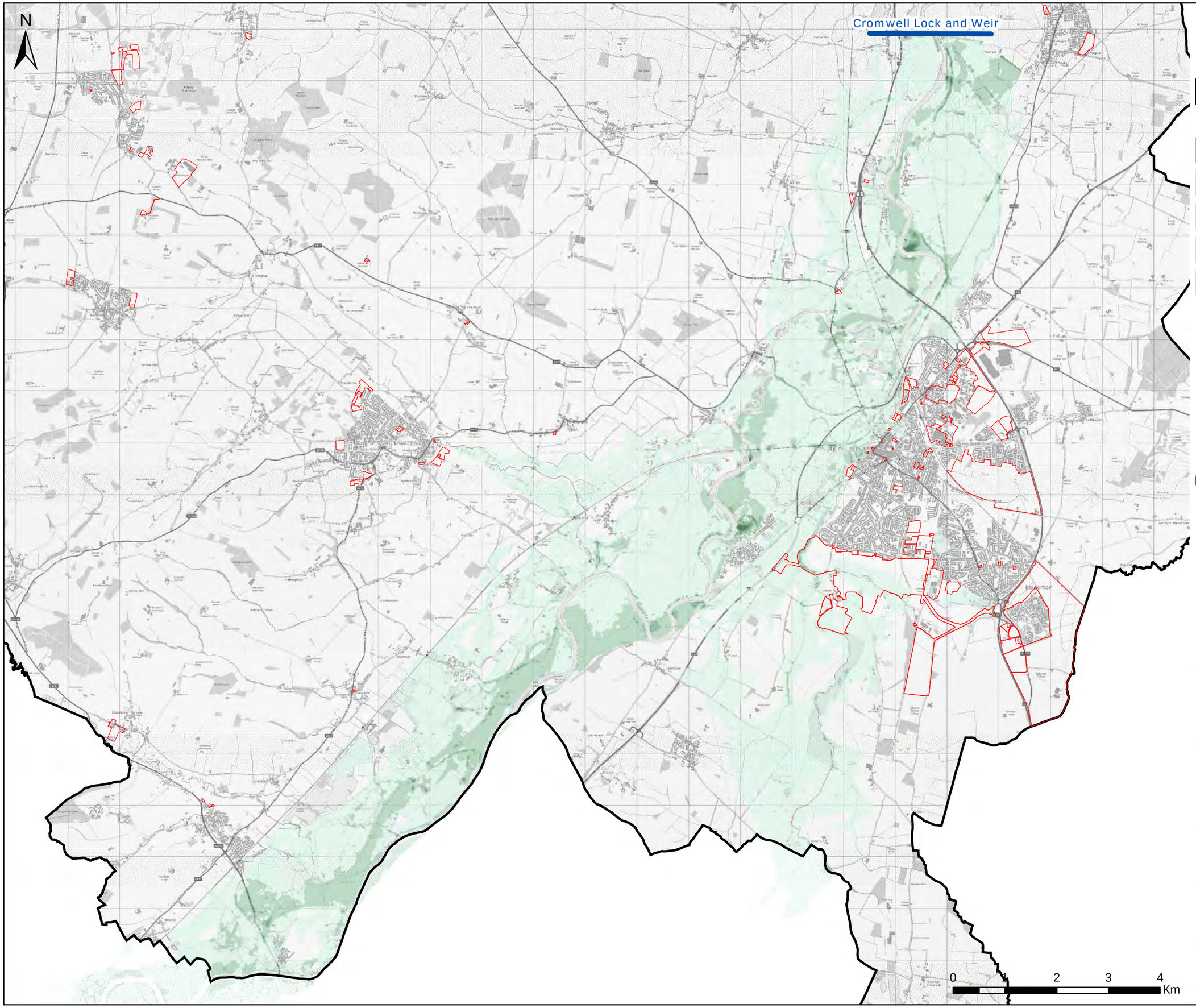
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 50% Climate Change Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	019	-



Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

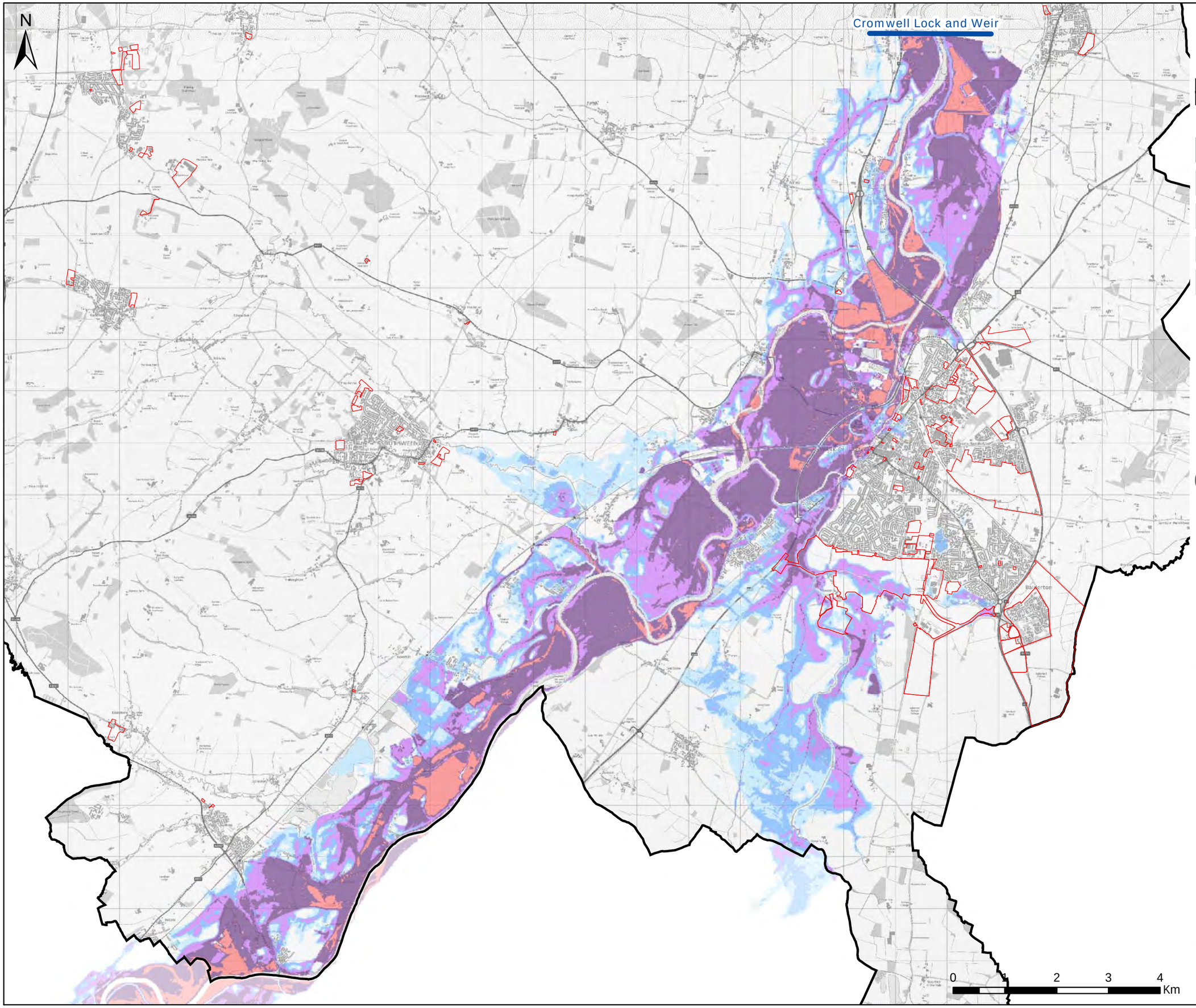
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 50% Climate Change Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	020	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 50% Climate Change Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	021	-

N

Cromwell Lock and Weir

Legend

Growth Site Locations

District Boundary

Max Flood Hazard Rating (FD2320)

< 0.75 (Caution)

0.75 - 1.25 (Danger for Some)

1.25 - 2 (Danger for Most)

> 2.0 (Danger for All)

0 1 2 3 4 Km

CONSULTATION ISSUE

waterco consultants

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

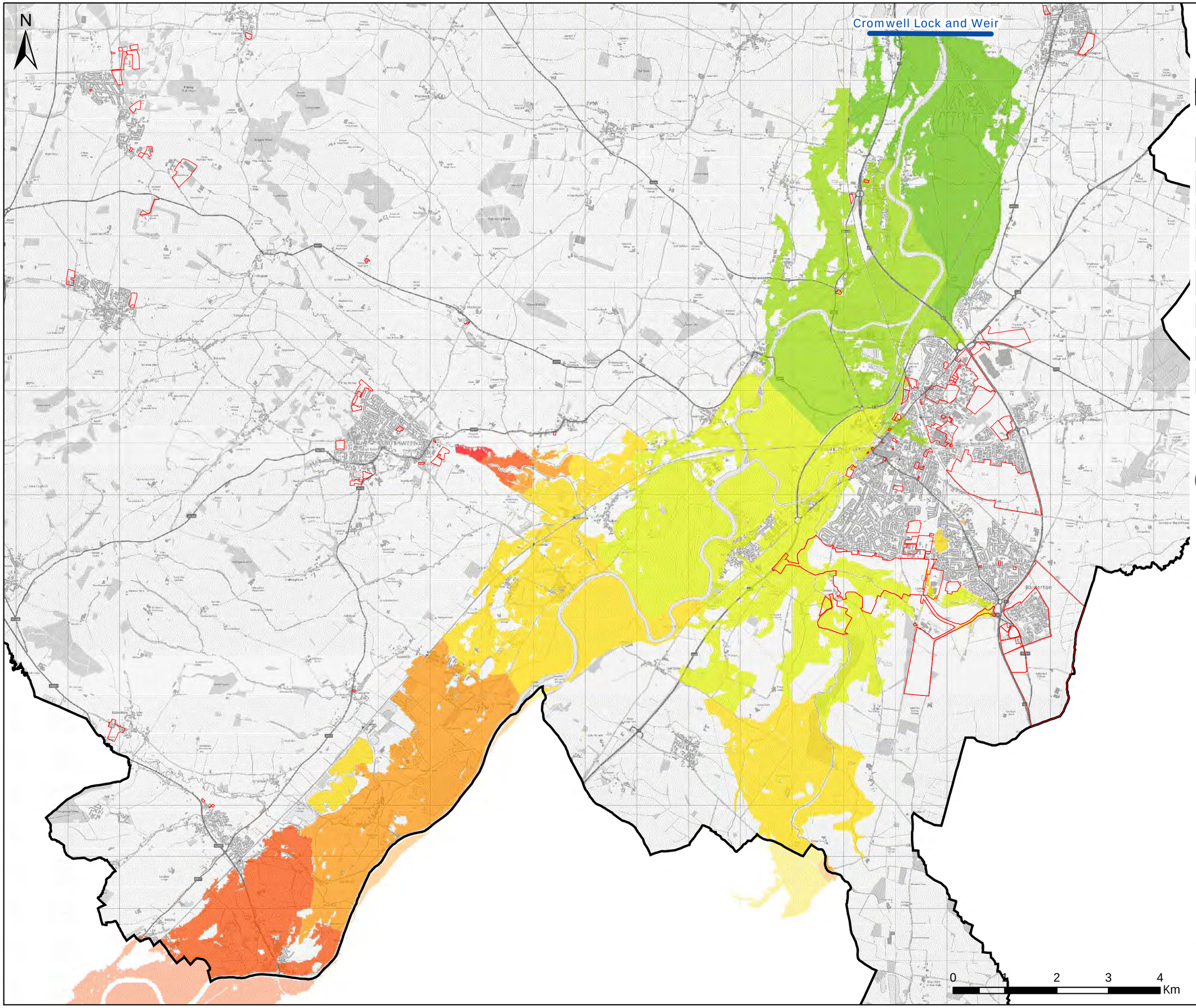
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q100 plus 50% Climate Change Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	022	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Level (mAOD)

- < 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 18 - 20
- > 20

CONSULTATION ISSUE

waterco consultants

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

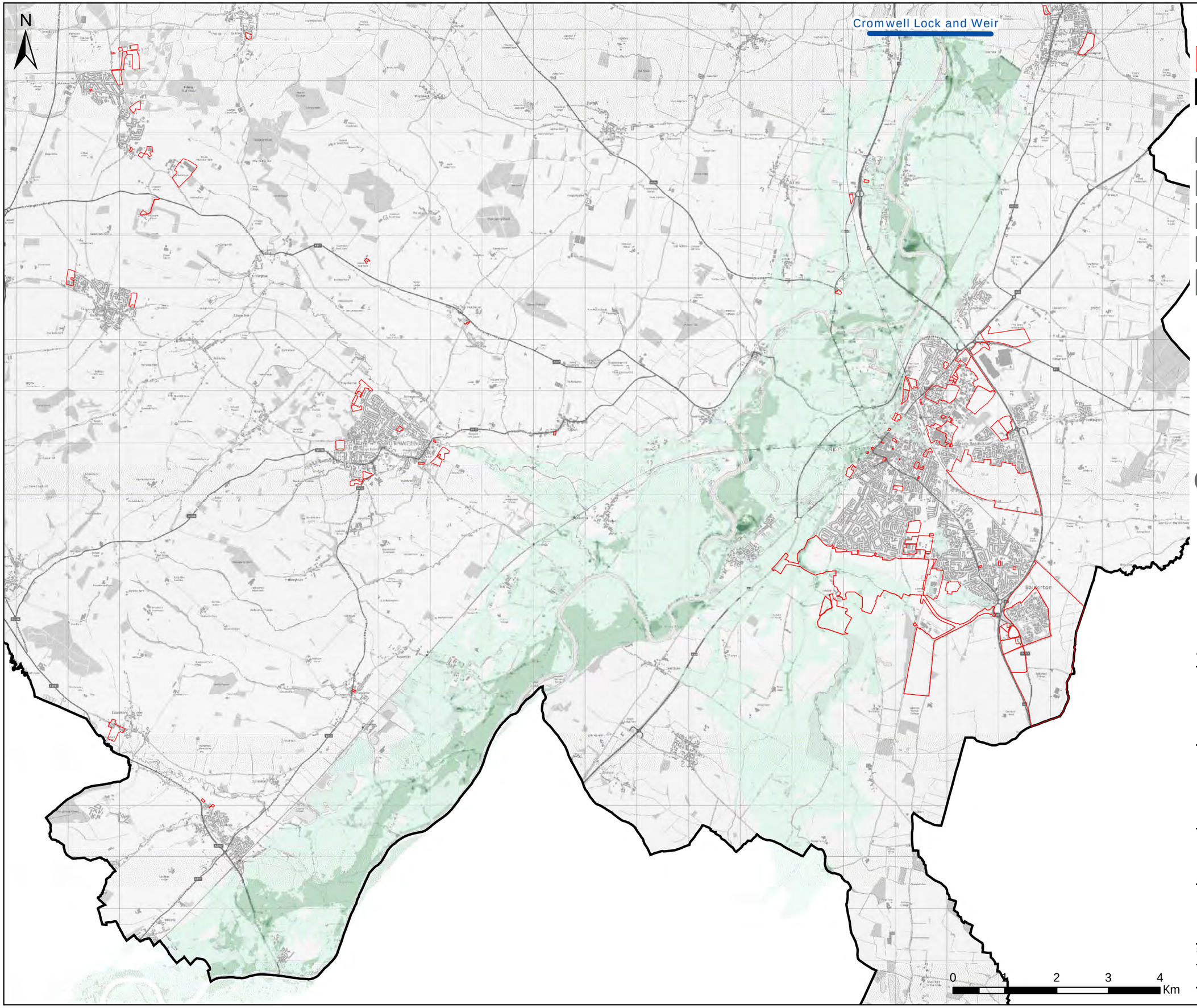
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q1000 Maximum Flood Levels

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	023	-



Legend

- Growth Site Locations
- District Boundary

Maximum Velocity (m/s)

- 0.0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

CONSULTATION ISSUE

waterco consultants

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

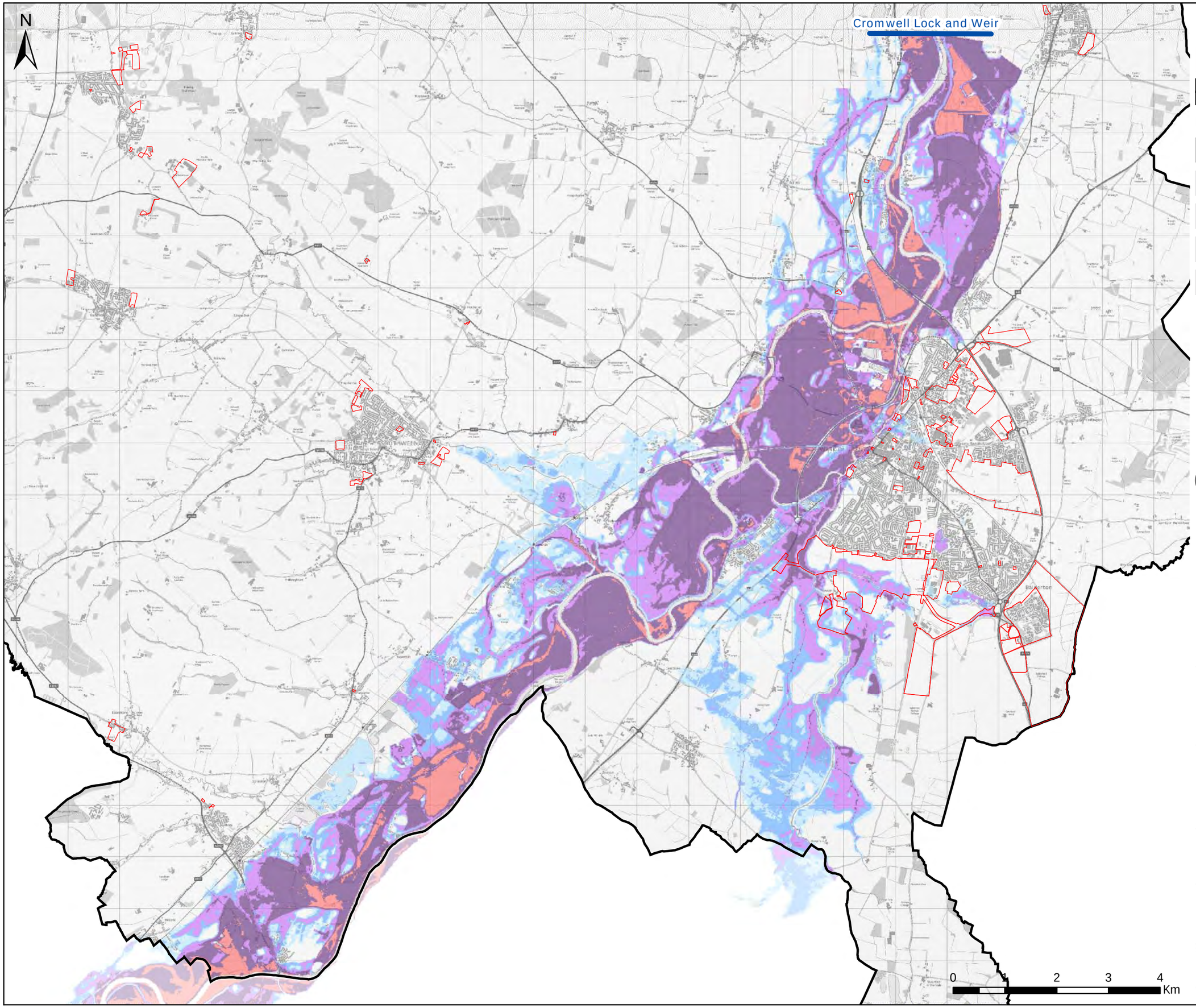
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q1000 Maximum Flood Velocities

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	024	-



Legend

- Growth Site Locations
- District Boundary

Maximum Flood Depth (m)

- 0 - 0.3
- 0.3 - 0.6
- 0.6 - 1.2
- 1.2 - 2.4
- > 2.4

CONSULTATION ISSUE

waterco consultants

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

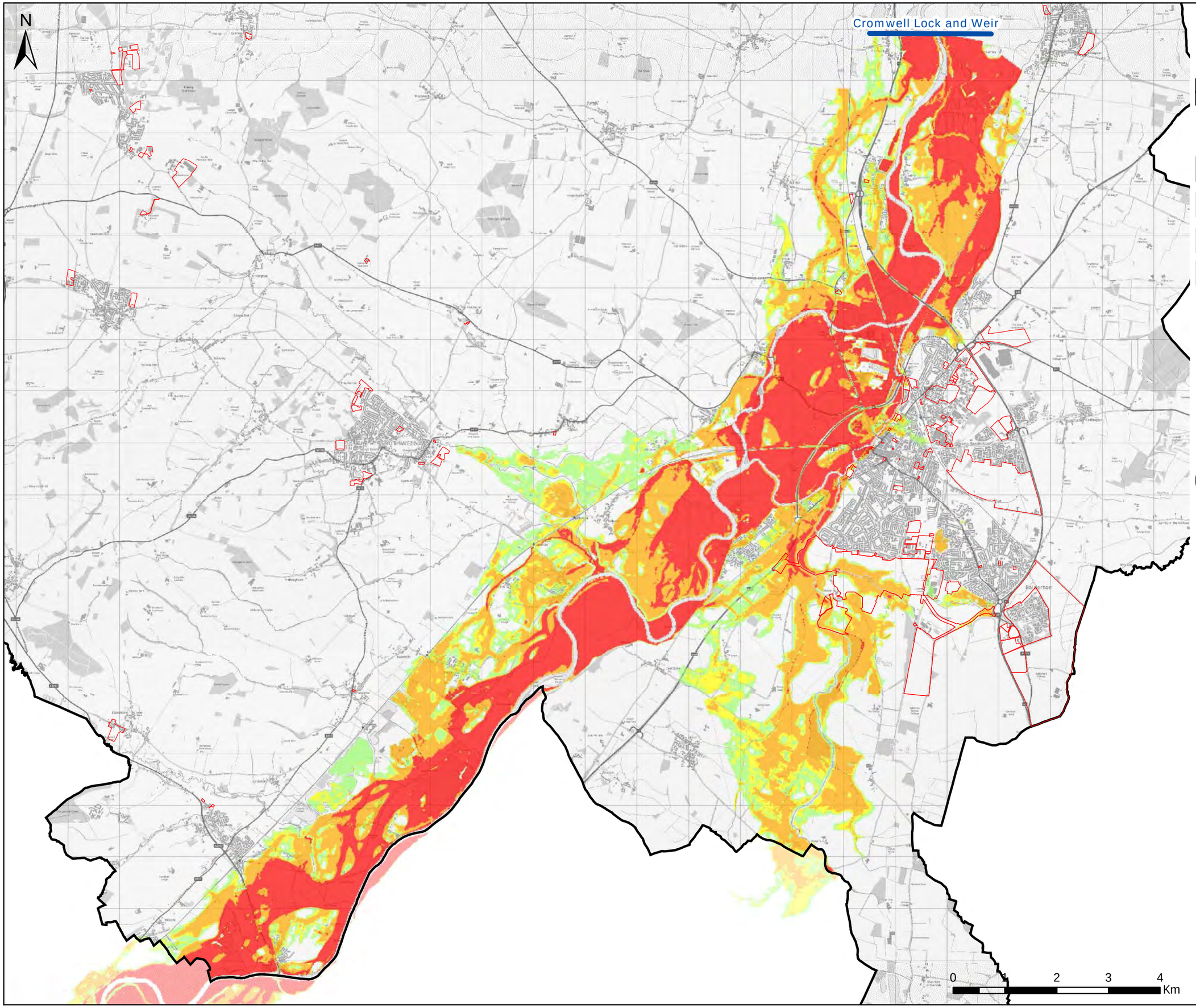
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent: Fluvial Q1000 Maximum Flood Depths

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	025	-



Legend

- Growth Site Locations
- District Boundary

Max Flood Hazard Rating (FD2320)

- < 0.75 (Caution)
- 0.75 - 1.25 (Danger for Some)
- 1.25 - 2 (Danger for Most)
- > 2.0 (Danger for All)

CONSULTATION ISSUE

waterco consultants

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent: Fluvial Q1000 Maximum Flood Hazard Rating

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	026	-

N

Legend

- Growth Site Locations
- District Boundary
- Defences
- Areas Benefiting from Flood Defences
- Cromwell Lock and Weir

0 2 4 6 8 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

Flood Defences

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	027	-

N

Legend

- Growth Site Locations
- District Boundary
- Flood Zone 3
- Flood Zone 2
- Cromwell Lock and Weir

0 2 4 6 8 Km

CONSULTATION ISSUE

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

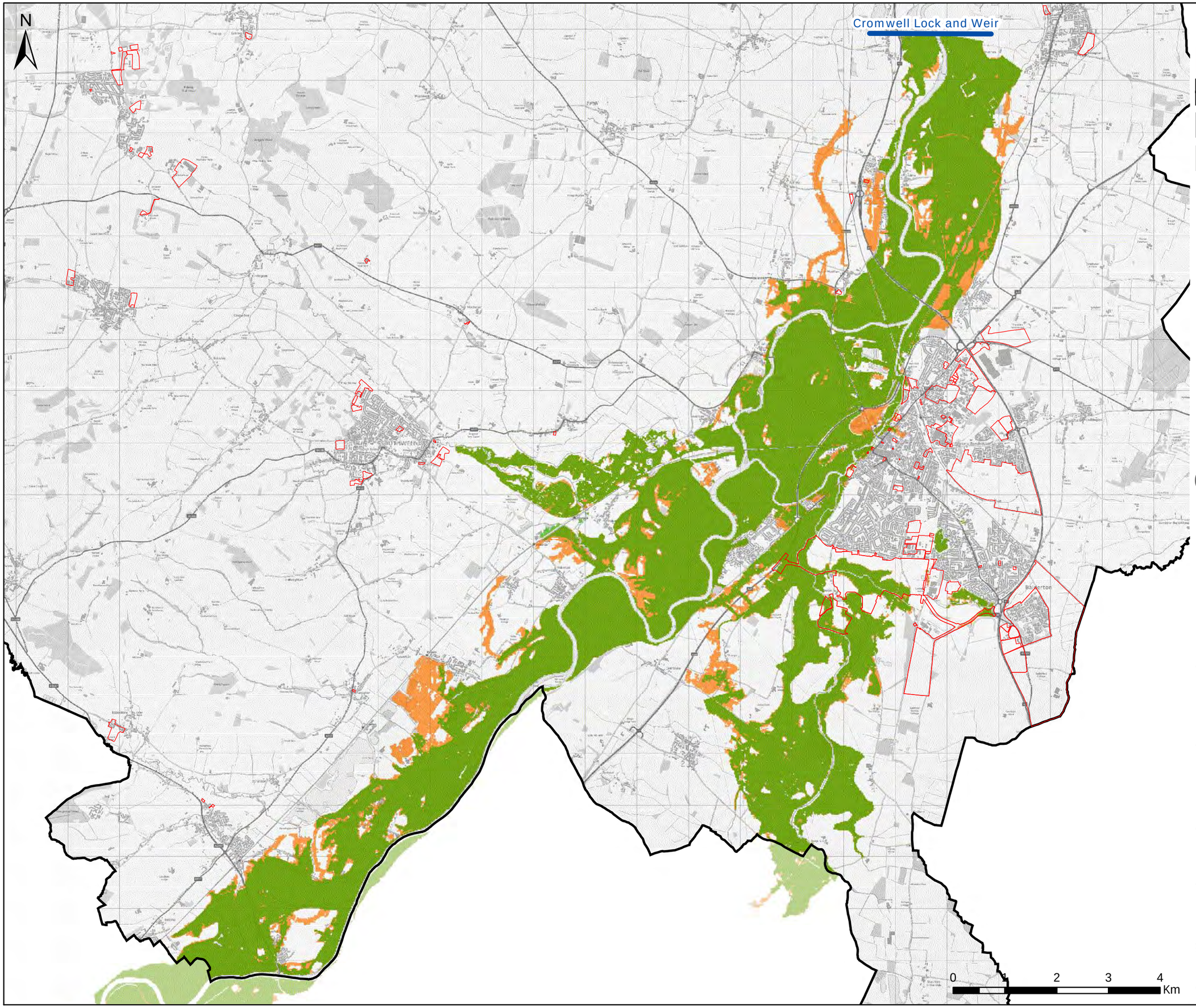
EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
Flood Zones taken from the EA Flood Map for Planning (August 2016)

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	028	-



CONSULTATION ISSUE

waterco consultants

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

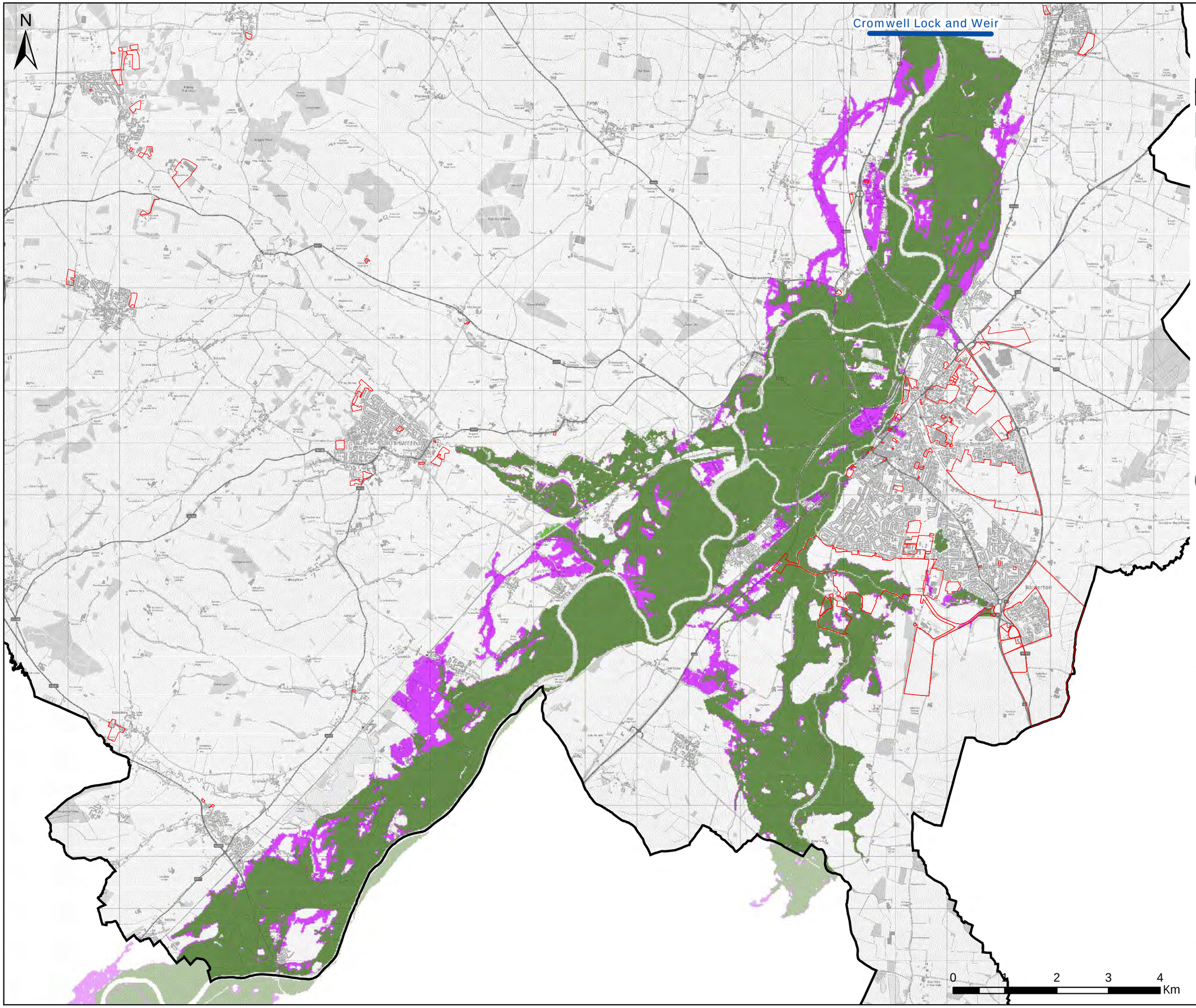
wyg.

Project:
Strategic Flood Risk Assessment 2016 Review

Drawing Title:
River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 20% CC

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	029	-



Legend

- Growth Site Locations
- District Boundary
- Q100
- Q100 with 30% CC

CONSULTATION ISSUE

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REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

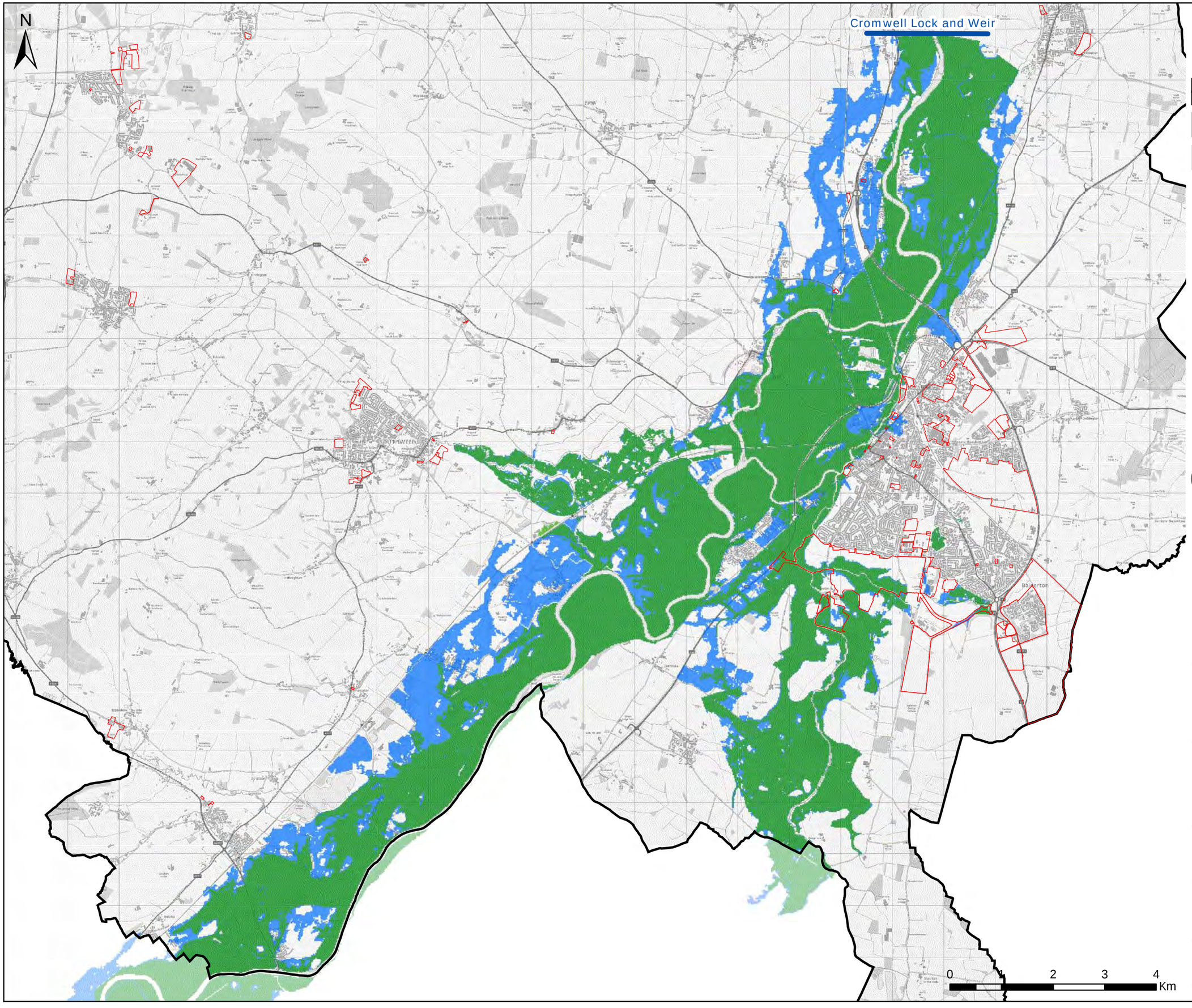
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 30% CC

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	030	-



Legend

- Growth Site Locations
- District Boundary
- Q100
- Q100 with 50% CC

CONSULTATION ISSUE

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REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

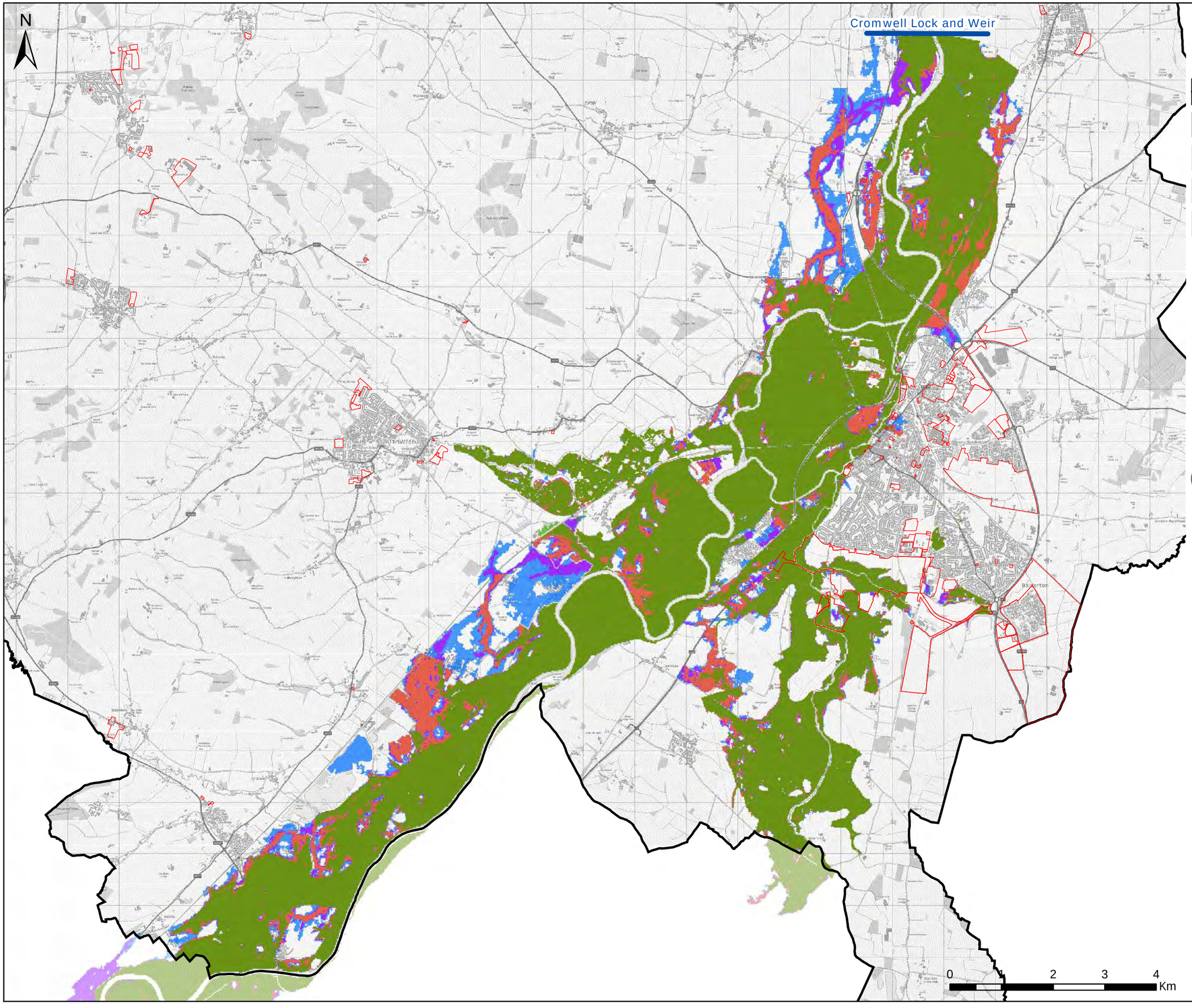
Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 50% CC

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	031	-



Legend

- Growth Site Locations
- District Boundary
- Q100
- Q100 with 20% CC
- Q100 with 30% CC
- Q100 with 50% CC

CONSULTATION ISSUE

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Client:

NEWARK & SHERWOOD DISTRICT COUNCIL

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

wyg.

Project:

Strategic Flood Risk Assessment 2016 Review

Drawing Title:

River Trent Fluvial: Flood Extent Difference Map: Q100 and Q100 plus 20% CC, 30% CC and 50% CC

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
NTS	PJ	03/10/16	JJC	03/10/16	ME	03/10/16

Project No.	Office	Type	Drawing No.	Revision
A098016	35	18	032	-