



Flood Report

To discuss the flood report contact the Flood Risk Management Team by e-mail: flooding@leics.gov.uk or phone 0116 305 0001

DETAILED FLOOD INVESTIGATION

Investigation Ref.:	2012-047
Investigation:	Loughborough, Cothelstone Avenue
Date of Flooding:	28 th June 2012
Revision	FINAL

Officer:	E Knight	Senior Technician	7/5/14
Checked:	J McGuinness	Senior Engineer	4/6/14
Approved:	D Rawle	Team Manager	4/6/14

Environment and Transport Department, Technical Services Group, County Hall, Glenfield, Leicester. LE3 8RJ.



CONTENTS		PAGE NO.
1.	Executive summary	2
2.	Introduction	3
3.	Site background	5
4.	Flooding incident	6
5.	Summary of impacts and findings	7
6.	Responsibilities	8
7.	Conclusion	11
8.	Recommendations	12
9.	Acronyms	13
10.	Useful Contacts/Links	13
	Appendix A – Site Location Plan	
	Appendix B – Lidar Plan	
	Appendix C – Flood Map for Surface Water (FMfSW)	
	Appendix D – Severn Trent Water Plan	
	Appendix F – EA Standard Notice	

1 EXECUTIVE SUMMARY

1.1 STATUTORY CONTEXT

Section 19 of the Flood and Water Management Act 2010 (FWMA) states that, on becoming aware of a flood which meets certain predetermined criteria, the LLFA (lead local flood authority) must undertake a flood investigation in order to determine the relevant flood risk management authorities involved and which flood risk management actions have been (or should be) taken to mitigate future flood risk. Where an authority carries out a formal investigation, it must publish the results.

1.2 It was deemed necessary to complete a formal investigation into the flooding incident at Cothelstone Avenue on the 28th June 2012. The internal flooding of two properties was reported to the LLFA and the source of the flooding was initially not clear and reported to be from multiple sources.

1.3 CAUSE OF FLOODING

The flooding that occurred at Cothelstone Ave, Loughborough is a result short duration very intense rainfall event that following a number of days and weeks of significant rain. The inability of existing drainage systems to collect and carry rainwater effectively meant excess surface water flowed over ground following natural contours to low points in the area.

1.4 MAIN FINDING

Surface water was seen to be running off the park and flowing onto Cothelstone Avenue. The design capacity of the 'public sewer' and highway gullies were exceeded due to this additional surface water.

The natural flow path for the surface water is through the properties on Cothelstone Avenue. Surface Water is believed to have flowed in, around and through the houses, eventually returning to the open space via the rear gardens.



2 INTRODUCTION

2.1 LEAD LOCAL FLOOD AUTHORITY INVESTIGATION

Section 19 of the FWMA states:

- (1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers necessary or appropriate, investigate:
 - (a) which risk management authorities have relevant flood risk management functions, and
 - (b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
- (2) Where an authority carries out an investigation under subsection (1), it must -
 - (a) publish the results of its investigation, and
 - (b) notify any relevant risk management authorities

2.2 FLOOD INVESTIGATION CRITERIA

A formal investigation will be carried out if one or more of the following occurs after a flooding event:

- Loss of life or serious injury
- Critical infrastructure flooded or nearly flooded from unknown or multiple sources
- Internal property flooding from unknown or multiple sources

In the following circumstances, discretion may be used to investigate a flooding incident:

- A number of properties have been flooded or nearly flooded
- Other infrastructure flooded
- Repeated instances
- Investigation requested
- Risk to health (foul water)
- Environmental or ecologically important site affected
- Depth/area/velocity of flooding a cause for concern

2.3 RISK MANAGEMENT AUTHORITIES

The following risk management authorities were identified as relevant to the flooding within Charnwood Borough:

- Leicestershire County Council Lead Local flood Authority
- Leicestershire County Council Local highway authority
- Environment Agency Midlands East Area
- Charnwood Borough Council
- Severn Trent Water Ltd

2.4 NON-RISK MANAGEMENT AUTHORITIES

The following agencies are not prescribed as risk management authorities (RMAs). However, they have a significant involvement in flood risk management:

• Leicester, Leicestershire and Rutland Local Resilience Forum

2.5 **FLOODING INCIDENT**

It was considered appropriate to complete a formal investigation into the flooding incident at Cothelstone Avenue, Loughborough on 28th June 2012 since at least one property was flooded internally, and the source of the flooding was initially not clear and reported to be from multiple sources.

3 SITE BACKGROUND

3.1 LOCATION

Cothelstone Avenue, Loughborough is situated in the North of Leicestershire, within the borough of Charnwood, approximately 13 miles from Leicester. The area immediately around Cothelstone Avenue is low-lying, with the only significant hill in the area being Gorse Covert located on the opposite side of the Black Brook.

Cothelstone Avenue is situated adjacent to The Black Brook which is classified as a 'Main River' which means that the Environment Agency has permissive powers to undertake work to reduce flood risk.

The area is located within Flood Zone 2 of the Environment Agency Main River flood map. The Environment Agency defines Zone 2 as an 'outlying area likely to be affected by a major flood, there is up to a 0.1 per cent (1 in 1000) chance of river flooding each year'.

The area also benefits from a flood defence built to protect the area from flooding from the Black Brook up to a 1 per cent (1 in 100) chance.

3.2 DRAINAGE SYSTEMS

There is a single watercourse within the area and this is the Black Brook

The area is served by both a foul and dedicated storm public sewer systems. These systems are maintained by Severn Trent Water as the relevant water and sewerage authority. The responsibility for lateral connections onto the main sewer varies and can either be the responsibility of the adjacent landowner or water company (Severn Trent Water). Further guidance on this is contained within the 'Useful Contacts' section of this report.

The highway drainage network within the immediate area consists of a number of highway gullies which connect via lateral connections to the 'public sewer'. The local highway authority is responsible for maintaining highway gullies (drains) and the lateral connections to the public sewer. This is indicated by figure 1 below:

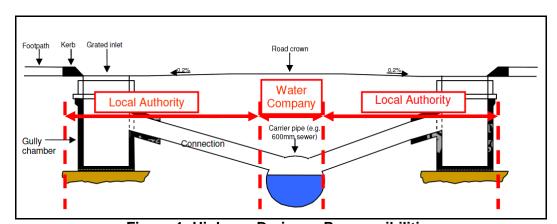


Figure 1: Highway Drainage Responsibilities

4 FLOODING INCIDENT

4.1 PREVIOUS FLOODING INCIDENTS

While there are no recorded flooding incidents in the area, anecdotal evidence indicates that the park has flooded from time to time, however the flooding would normally remain within the open space.

4.2 FLOOD INCIDENT

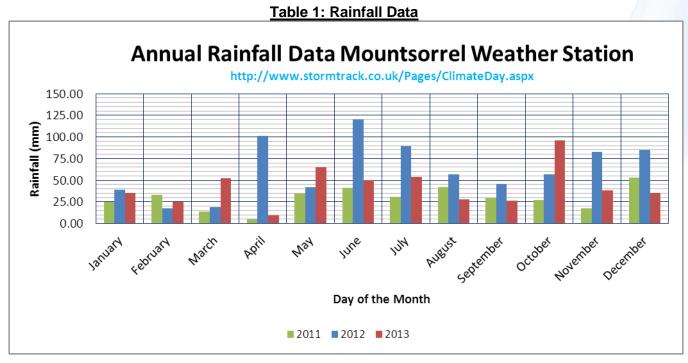
On the 28th June 2012 there was a short duration very intense rainfall event that followed a number of days and weeks of significant rain. It is believed that the ground was saturated and green field runoff rates would have consequently been higher than usual. Two residential properties suffered internal flooding to a depth of approximately 250mm; the floodwater was not believed to be running at a high velocity.

The County Council has received accounts of surface water running from the public open space and flowing onto Cothelstone Avenue. The design capacity of the 'public sewer' and highway gullies were exceeded due to the additional surface water and this resulted in the flooding of the highway. The flow path of the surface water also flooded two residential properties on Cothelstone Avenue.

4.3 RAINFALL ANALYSIS

Well above average rainfall was experienced in the East Midlands in the summer of 2012. On 28th June 2012, approx. 22.00 mm rainfall was recorded, at a nearby weather station.

The graph below depicts the annual rainfall at the Mountsorrel weather station 2011 – 2013.



5 SUMMARY OF IMPACTS AND FINDINGS

5.1 **IMPACTS**

People and property were affected by the flooding as a result of the significant rainfall. The County Council have spoken to the affected persons to establish and further quantify the physical effects of the flooding incident.

5.2 **HIGHWAY DRAINS**

The spacing and location of the gullies on Cothelstone Avenue complies with the design criteria for a residential street, as laid out in the '6Cs Design Guide'. These highway gullies are connected into the Severn Trent Water adopted surface 'public sewer' in Cothelstone Avenue.

5.3 **PUBLIC SEWER**

Within the area immediately outside the affected properties there is both a public foul and surface water sewer (Appendix D);

- The foul sewer takes the foul water away to be treated and is not associated with the flooding in this location.
- The surface water sewer runs in a northerly direction with an outfall into the Black Brook.

5.4 THE BLACK BROOK

The Black Brook is designated by the Environment Agency as Main River. There has been extensive flood defence work undertaken on the banks of the brook at this location. The Black Brook was running at a high on the day of the flooding incident, the EA river gauge indicates the normal level being between 0.52m - 1.57m. On the 28 June 2012 the water level rose steeply, reaching a peak of 2.0m at midnight then fell again at a slower rate to reach near normal conditions by 8:00am on the 30 June 2012.

5.5 **EXTENT OF FLOODING**

The extent of the flooding is broadly reflective of the low lying areas indicated by both LIDAR mapping (Appendix B) and the Flood Map for Surface Water (Appendix C).

Aerial LIDAR uses a laser to measure the distance between a survey aircraft and the ground surface, including buildings and other assets (above ground pipelines, highways, street furniture, power lines, railway tracks). This data is represented in a LIDAR Plan that shows the topography of the area.

The Environment Agency's Flood Map for Surface Water shows areas where surface water would be expected to flow or pond.



6 RESPONSIBILITIES

6.1 LEAD LOCAL FLOOD AUTHORITY (LCC)

As stated within the introduction section, the County Council as the LLFA has a responsibility to investigate flood incidents under Section 19 of the FWMA.

The LLFA also has a responsibility to maintain a register of assets which have a significant effect on flooding from surface runoff, groundwater or ordinary watercourse, as detailed within Section 21 of the FWMA. The register must contain a record about each structure or feature, including the ownership and state of repair.

Whilst the County Council can suggest possible causes of flooding in Leicestershire and make recommendations to ensure flood risk is mitigated as far as possible, the FWMA does not provide the County Council with the mandate or funding to tackle all identified causes of flooding.

The County Council also has powers to serve notice on individuals, requiring them to maintain the flow of ordinary watercourses in accordance with Section 25 of the Land Drainage Act 1991 (LDA)

6.2 CHARNWOOD BOROUGH COUNCIL

CBC has powers under Section 14 of the LDA to undertake flood risk management works on ordinary watercourses (non-Main River), where deemed necessary. Under Section 20 of the LDA, CBC has the powers to (by agreement of any person and at their expense) undertake drainage work which that person is entitled to carry out and maintain.

6.3 ENVIRONMENT AGENCY

The Environment Agency has a strategic overview responsibility under the FWMA as well as permissive powers to carry out maintenance work on Main Rivers under Section 165 of the Water Resources Act (WRA). Main River means all watercourses shown on the statutory Main River maps held by the Environment Agency and the Department of Environment, Food and Rural Affairs, and can include any structure or appliance for controlling or regulating the flow of water into, in or out of the channel.

The Environment Agency has permissive powers to carry out works of maintenance and improvement on these rivers. These powers can be used to undertake works to reduce flood risk where landowners fail to undertake their responsibilities under the WRA.

The Environment Agency can undertake enforcement action where third party asset owners fail to maintain their property/land in appropriate condition. They may consider undertaking maintenance or repair of third party assets in order to safeguard the public interest and where other options are not appropriate.

6.4 **HIGHWAY AUTHORITY (LCC)**

LCC, in its role as local highway authority, has a duty to maintain the highway under Section 41 of the Highway Act 1980. Section 100 of the Highways Act 1980 also gives the power to prevent water running on to a highway. Further information on the Highways Act 1980 is available via the link identified within the Useful Links section of this report.

6.5 WATER COMPANY (SEVERN TRENT WATER)

Water and sewerage companies are responsible for managing the risks of flooding from surface water, foul water or combined sewer systems. Public sewers are designed to protect properties from the risk of flooding in normal wet weather conditions. However, in extreme weather conditions, there is a risk that sewer systems can become overwhelmed and result in sewer flooding.

Since October 2011, under the 'Private Sewer Transfer', Water Companies are required to adopt piped systems on private land that serve more than one curtilage and were connected to a public sewer on or prior to 1st July 2011. Statutory sewerage undertakers have a duty under Section 94 of the Water Industry Act 1991 to provide sewers for the drainage of buildings and associated paved areas within property boundaries.

Water companies are responsible for public sewers and lateral drains. A public sewer is a conduit, normally a pipe that is vested in a water and sewerage company (or predecessor thereof) that drains two or more properties and conveys foul, surface water or combined sewage from one point to another point and discharges via a positive outfall. There is no automatic right of connection for other sources of drainage to the public sewer network. Connection is therefore discretionary, following an application to connect.

6.6 RIPARIAN LANDOWNERS OF WATERCOURSES

As detailed within the EA document 'Living on the Edge', riparian landowners have certain rights and responsibilities, including the following:

- They must maintain the bed and banks of their watercourse, and also the trees and shrubs growing on the banks;
- They must clear any debris, even if it did not originate from their land. This debris may be natural or man-made;
- They must keep any structures that they own clear of debris. These structures include culverts, trash screens, weirs and mill gates.

The following link provides further information:

http://www.environment-agency.gov.uk/homeandleisure/floods/31626.aspx.

6.7 RESIDENTS AND TENNANTS

Local residents and tenants who are aware that they are at risk of flooding should take action to ensure that they and their properties are protected.

Community resilience is important in providing information and support to each other if flooding is anticipated. Actions taken can include signing up to Flood Warning Direct (if available), nominating a community flood warden, producing a community flood plan implementing property level protection and moving valuable items to higher ground, to more permanent measures such as installing floodgates, raising electrical sockets and fitting non-return valves on pipes.

6.8 **COMPLIANCE**

There is no evidence to suggest that any of the risk management authorities or stakeholders listed above did not comply with either internal policy or any legal duties

7 CONCLUSION

The flooding that occurred on Cothlestone Avenue is a result of the rainfall that fell in the preceding weeks combined with intense rainfall that fell over a short period of time on the 28th June 2012. Existing drainage systems were unable to cope with the deluge of water, which effectively meant excess surface water flowed over ground following natural contours to low points in the area.

Existing physical barriers, such as kerbs, to prevent surface water surface water from the public highway overtopping and entering properties were compromised by the volume and depth of ponding.

8 **RECOMENDATIONS**

8.1 **SEVERN TRENT WATER**

Severn Trent Water should continue to monitor their network. A particular item of concern is the outfall of the Surface Water sewer which was reported to be under water when the Black Brook was in full flow. The non-return valve should continued to be maintained in line with STW policies and procedures.

8.2 LEAD LOCAL FLOOD AUTHORITY (LLFA)

The LLFA will continue to monitor the locality and revisit when required, and continue to coordinate the management of flood risk and the interaction of RMAs across Leicestershire.

8.3 LOCAL HIGHWAY AUTHORITY (LCC)

The Highway Authority should check the gullies and lateral connections to ensure that they are in good working order.

8.4 CHARNWOOD BOROUGH COUNCIL (CBC)

Charnwood Borough Council should consider the management of the surface water runoff from the park; consideration should be given to the construction of a low bund along the eastern and southern boundaries of the open space to provide a basic level of protection to the adjacent properties.

8.5 THE ENVIRONMENT AGENCY (EA)

In some circumstances watercourse maintenance can reduce the effect of flooding and improve land drainage. The Environment Agency should continue to monitor the Black Brook and monitor the impacts on local drainage systems.

9 ACRONYMS

EA Environment Agency

LCC Leicestershire County Council
CBC Charnwood Borough Council
FIR Flood Investigation Report

FWMA Flood and Water Management Act 2010

LDA Land Drainage Act 1991
LLFA Lead Local Flood Authority
WRA Water Resources Act 1991
LIDAR Light Detection and Ranging
STW Severn Trent Water Ltd
FMfSW Flood Map for Surface Water
RMAs Risk Management Authorities

10 USEFUL CONTACTS

10.1 ENVIRONMENT AGENCY

General enquiries 03708 506 506 (Mon-Fri, 8am – 6pm) Incident hotline 0800 80 70 60 (free phone, 24hours)

10.2 **SEVERN TRENT WATER**

Emergencies 0800 783 4444(24hours)

Website: www.stwater.co.uk

10.3 LEICESTERSHIRE COUNTY COUNCIL

Highways 0116 305 0001 (24hours)

10.4 LEICESTERSHIRE COUNTY COUNCIL

Lead local flood authority 0116 305 0001 (Mon-Fri, 9am – 5pm)

Email: flooding@leics.gov.uk

10.5 CHARNWOOD BOROUGH COUNCIL

Customer Services 01509 263151

10.6 USEFUL LINKS

OFWAT Guidance on sewers

http://www.ofwat.gov.uk/consumerissues/rightsresponsibilities/sewers/prs web sewertransfer

Environment Agency:

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

Charnwood Borough Council Website:

http://www.charnwood.gov.uk/

Leicestershire County Council Flood Risk Team:

http://www.leics.gov.uk/flooding

Local Resilience Forum:

http://www.localresilienceforum.org.uk/

Land Drainage Act 1991:

http://www.legislation.gov.uk/ukpga/1991/59/contents

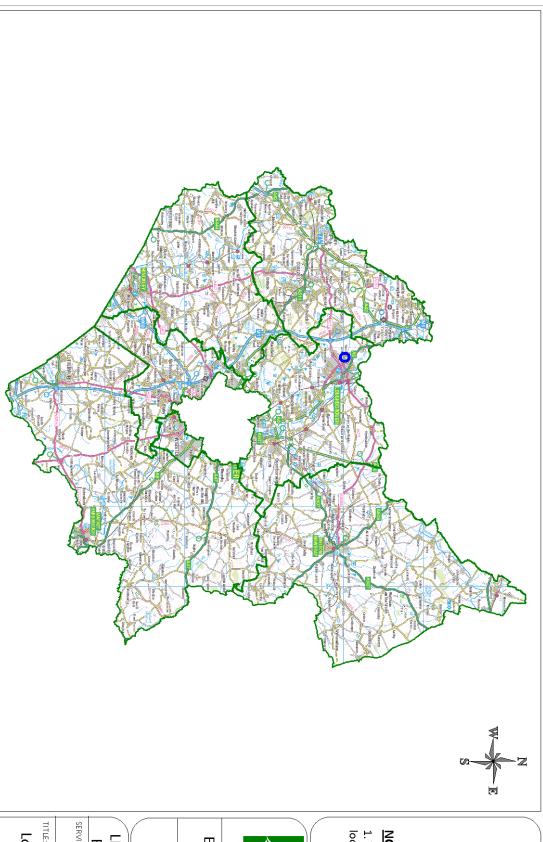
Water Resources Act 1991: http://www.legislation.gov.uk/ukpga/1991/57/contents

Highways Act 1980: http://www.legislation.gov.uk/ukpga/1980/66



APPENDIX A SITE LOCATION PLAN





1. The blue circle indicates the approximate location of the flooding



Leicestershire County Council

ENVIRONMENT AND TRANSPORT DEPARTMENT

ON BEHALF OF THE DIRECTOR

LEICESTERSHIRE COUNTY COUNCIL **ENVIRONMENT AND TRANSPORT**

LEAD LOCAL FLOOD AUTHORITY

Location Plan, Cothelstone Avenue

COTHELSTONE AVENUE, LOUGHBOROUGH

DRAWING NUMBER E-MAIL: APPROVED BY: 2012-Enq-047-LP flooding@leics.gov.uk Daniel Rawle Chris Bramley SIZE: DATE: 27-12-2013 Not To Scale A4

PHONE:

0116 305 0001

COUNTY HALL · GLENFIELD · LEICESTER · LE3 &RJ

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used

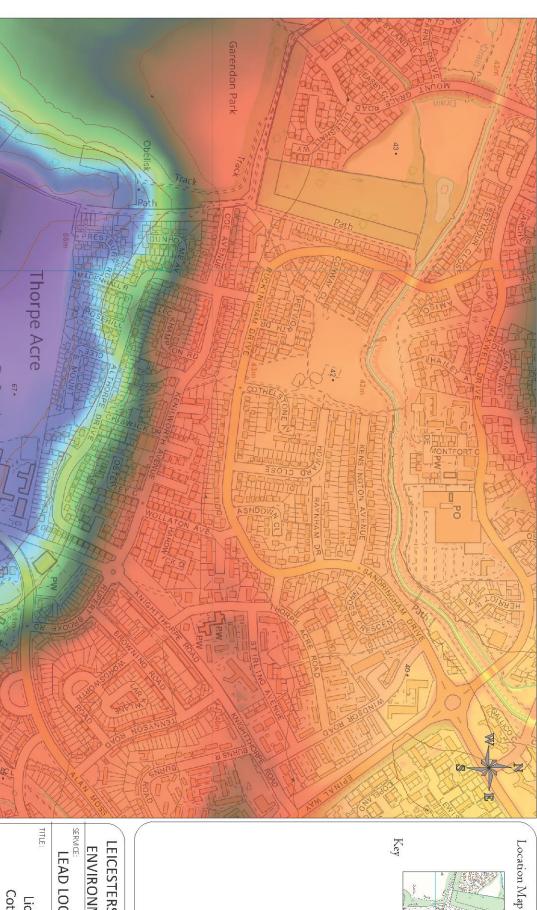
the normal presumption is that these do not generally form part of the publicly maintainable highway. This plan has been produced in This is not a definitive record, but is based on the best available information and is given without warranty. If roadside ditches are present,

® Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Leicestershire County Council This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office

LA100019271. Published 2013.

relation to the specified area of enquiry and should not be used for any other purpose, since its accuracy can not be guaranteed

APPENDIX B LIDAR PLAN



Lidar levels

This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.

Leicestershire County Council. LA100019271. Published 2013.

This is not a definitive record, but is based on the best available information and is given without warranty. If roadside ditches are present, the normal presumption is that these do not generally form part of the publicly maintainable highway. This plan has been produced in relation to the specified area of enquiry and should not be used for any other purpose, since its accuracy can not be guaranteed.

This map gives an indication of the broad areas likely to be at risk of surface water flooding it is not suitable for use at an individual property scale due to the method used.



Leicestershire Council

ENVIRONMENT AND TRANSPORT
DEPARTMENT

ON BEHALF OF THE DIRECTOR

COUNTY HALL · GLENFIELD · LEICESTER · LE3 8RJ



LEAD LOCAL FLOOD AUTHORITY

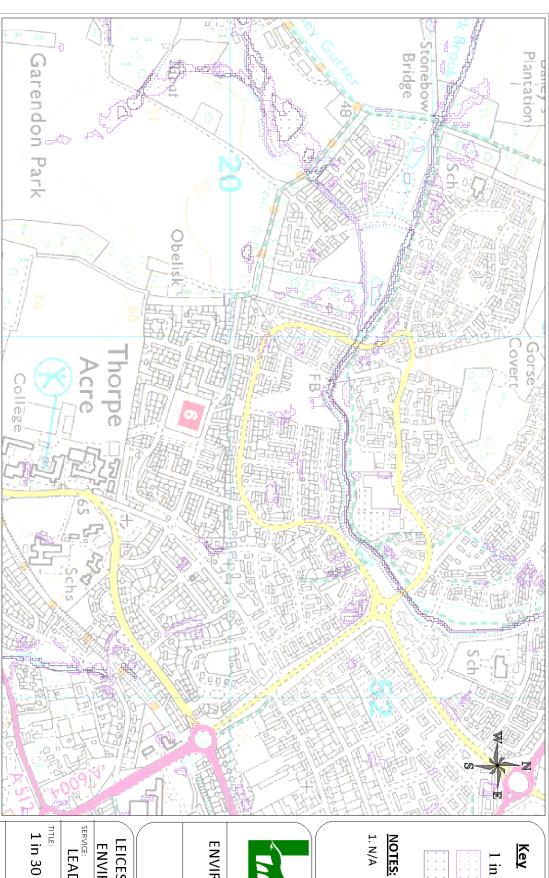
Lidar mapping for Cothelstone Avenue

COTHELSTONE AVENUE LOUGHBOROUGH

ıl Use Only	For Internal Use Only	0116 305 0001	PHONE: 011
		flooding@leics.gov.uk	E-MAIL: floo
A4	SIZE:	Daniel Rawle	APPROVED BY:
21-03-2014	DATE:	Chris Bramley	CREATED BY:
Not To Scale	SCALE Not	DRAWING NUMBER 2012-Inv-047-01	DRAWING NUMBER 2012-Inv-

APPENDIX C

FLOOD MAP FOR SURFACE WATER (FMfSW)



This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Leicestershire County Council LA100019271. Published 2013.

the normal presumption is that these do not generally form part of the publicly maintainable highway. This plan has been produced in This is not a definitive record, but is based on the best available information and is given without warranty. If roadside ditches are present, relation to the specified area of enquiry and should not be used for any other purpose, since its accuracy can not be guaranteed

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used

1 in 30 Year Flood Map

Surface Water

Surface Water Deep



Leicestershire County Council

ENVIRONMENT AND TRANSPORT DEPARTMENT

ON BEHALF OF THE DIRECTOR

LEICESTERSHIRE COUNTY COUNCIL **ENVIRONMENT AND TRANSPORT**

LEAD LOCAL FLOOD AUTHORITY

1 in 30 year surface water flood map Cothelstone Avenue

COTHELSTONE LANE, LOUGHBOROUGH

	FAX:	0116 305 0001	011	PHONE:	
		flooding@leics.gov.uk	floc	E-MAIL:	
SIZE: A4		Daniel Rawle	D BY:	APPROVED BY:	
DATE: 24-12-2013		Chris Bramley)BY:	CREATED BY:	
Not To Scale	30	2012-lnv-047-SW3C	12-1	20	
SCALE		SER.	NUME	DRAWING NUMBER	

COUNTY HALL · GLENFIELD · LEICESTER · LE3 8RJ

APPENDIX D SEVERN TRENT WATER PLAN



APPENDIX E EA STANDARD NOTICE

Standard notice [not for use with Special Data, Personal Data or unlicensed 3rd party rights]



Information warning

We (The Environment Agency) do not promise that the Information supplied to You will always be accurate, free from viruses and other malicious or damaging code (if electronic), complete or up to date or that the Information will provide any particular facilities or functions or be suitable for any particular purpose. You must ensure that the Information meets your needs and are entirely responsible for the consequences of using the Information. Please also note any specific information warning or guidance supplied to you.

Permitted use

- The Information is protected by intellectual property rights and whilst you have certain statutory rights
 which include the right to read the Information, you are granted no additional use rights whatsoever
 unless you agree to the licence set out below.
- Commercial use of anything except EA OpenData is subject to payment of a £50 licence fee (+VAT) for each person seeking the benefit of the licence, except for use as an Environment Agency contractor or for approved media use.
- To activate this licence you do not need to contact us (unless you need to pay us a Commercial licence
 fee) but if you make any use in excess of your statutory rights you are deemed to accept the terms
 below.

Licence

We grant you a worldwide, royalty-free (apart from the £50 licence fee for commercial use), perpetual, non-exclusive licence to use the Information subject to the conditions below.

You are free to:



copy, publish, distribute and transmit the Information



adapt the Information



exploit the Information commercially, for example, by combining it with other Information, or by including it in your own product or application

You must (where you do any of the above):



acknowledge the source of the Information by including the following attribution statement: "Contains Environment Agency information © Environment Agency and database right" ensure that you do not use the Information in a way that suggests any official status or that We endorse you or your use of the Information



ensure that you do not mislead others or misrepresent the Information or its source or use the Information in a way that is detrimental to the environment, including the risk of reduced future enhancement



ensure that your use of the Information does not breach the Data Protection Act 1998 or the Privacy and Electronic Communications (EC Directive) Regulations 2003

These are important conditions and if you fail to comply with them the rights granted to you under this licence, or any similar licence granted by us will end automatically.

No warranty

The Information is licensed 'as is' and We exclude all representations, warranties, obligations and liabilities in relation to the Information to the maximum extent permitted by law. We are not liable for any errors or omissions in the Information and shall not be liable for any loss, injury or damage of any kind caused by its use. We do not guarantee the continued supply of the Information.

Governing Law

This licence is governed by the laws of England and Wales.

Definitions

"Information" means the information that is protected by copyright or by database right (for example, literary and artistic works, content, data and source code) offered for use under the terms of this licence.

"Commercial" means:

- offering a product or service containing the Information, or any adaptation of it, for a charge, or
- internal use for any purpose, or offering a product or service based on the Information for indirect commercial advantage, by an organisation that is primarily engaged in trade, commerce or a profession.

Contact: enquiries@environment-agency.gov.uk

03708 506506