



Surface Water Management Plan for Birmingham

Non-Technical Summary

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Birmingham City Council

ATKINS

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Introduction

Birmingham may not have seen the major river flooding events that tend to dominate the headlines; however the City has experienced a number of large scale floods in recent years. Flooding in Birmingham is often a combination of river flooding, sewer flooding and surface water flooding. It is estimated that there are more properties at risk of surface water flooding from severe rain in Birmingham than anywhere else in the UK outside of London – 22,900 in all. Most of the area is heavily developed, so when it rains, the water cannot be absorbed into the ground as it is in open spaces but instead runs quickly across the surface and straight into drains, ditches, rivers and streams. In very heavy rain they can become overloaded and flood. To add to the problem there are properties located within flood plains and some rivers have been re-routed and constricted by development.

It is not possible to eradicate flooding as it is 'part of nature', but Birmingham City Council (BCC), the Environment Agency (EA) and Severn Trent Water (STW) are determined to reduce flood risk and minimise the damage caused by flooding as far as possible. Since 2010 these organisations have been working together to develop a long term Surface Water Management Plan (SWMP) for the city, identifying the causes and effects of surface water flooding in the area to fully understand the risks and where they are greatest, before going on to agree the most cost effective and sustainable way of managing those risks into the future. The SWMP has been funded by the Government.

The initial version of the SWMP for Birmingham is now complete. It explains what the risks are and sets out who will do what to manage surface water flooding in a long-term Action Plan. The Birmingham SWMP is a living document which will continue to develop in consultation with stakeholders and the wider public throughout its implementation. This document explains how the Surface Water Management Plan (SWMP) for Birmingham has been developed and summarises its main findings and proposed actions

1. SWMP aims and objectives

At the beginning of the project BCC, EA and STW agreed a number of aims and objectives for the SWMP.

The keys aims of the SWMP were to:

- increased awareness of the duties and responsibilities for managing flood risk of different partners and stakeholders
- increased understanding of the causes of surface water flooding
- increased understanding of where surface water flooding will occur including the probability and consequences
- to establish a long-term Action Plan to manage surface water in an area
- improved public engagement and understanding of surface water flooding

2. Establishing a partnership

Preventing flooding is a complicated process and it is important that all the organisations responsible for surface water and drainage in the area work together to find the best solutions. A number of key departments from each of the three partner organisations (Birmingham City Council, Environment Agency and Severn Trent Water) have been involved throughout the development of the SWMP for Birmingham:

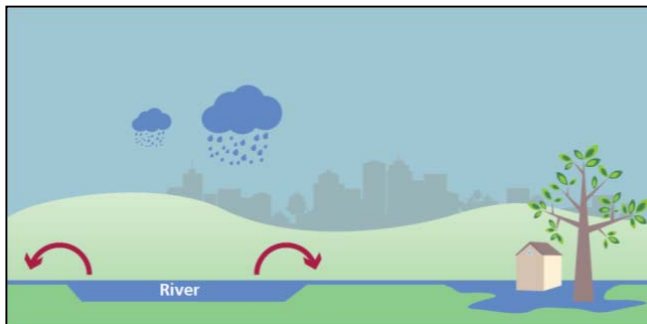
- Birmingham City Council: drainage, resilience, climate change, planning strategy, park and nature conservation and highways (through the Amey Private Finance Initiative Contract)
- Environment Agency: development and flood risk, flood risk mapping and data management
- Severn Trent Water: flooding and asset management

3. What is Surface Water Flooding?

Surface water flooding describes flooding from sewers, drains, small watercourses and ditches that occurs during heavy rainfall in urban areas (Figure 1 below provides definitions of the different types of flooding that could occur in Birmingham). It includes:

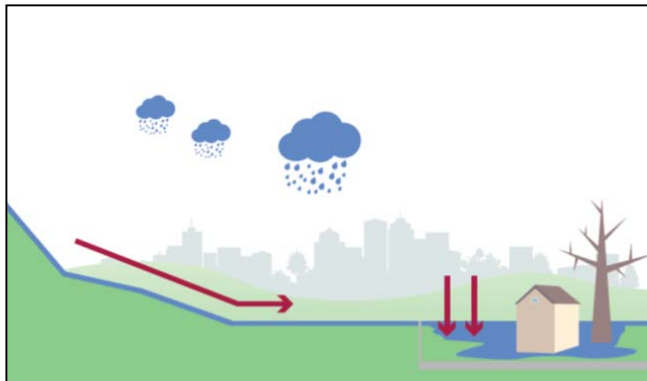
- River Flooding - from small open-channel and culverted watercourses
- Pluvial Flooding - flooding from heavy rainfall where water ponds or flows over the ground surface before it enters a drainage system or watercourse
- Sewer Flooding - flooding that occurs when the capacity of the underground sewer system is exceeded
- Overland flow from the urban or rural fringe entering built up areas

Figure 1. Types of Flooding



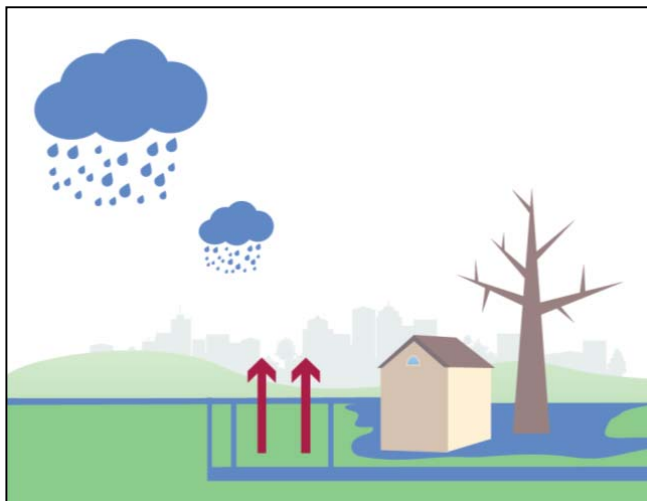
River Flooding (Fluvial Flooding)

Rivers flood when the amount of water in them exceeds the flow capacity of the river channel. Most rivers have a natural floodplain into which the water spills in times of flood. Flooding can either develop gradually or rapidly according to how steeply the ground rises in the catchment and how fast water runs off into surface watercourses.



Pluvial Flooding

Pluvial flooding can be defined as flooding that is as a result of rainfall flowing over the ground surface before it enters a watercourse or sewer. It is usually associated with high intensity rainfall events resulting in overland flow and ponding in depressions in the topography.



Sewer Flooding (Urban Flooding)

In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and waste water known as "combined sewers". Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity.

4. Understanding Surface Water Flood Risk

With an estimated 22,900 properties at risk of surface water flooding, it was not possible to understand the flood risk and develop an action plan to manage the risk to every one of these properties. Therefore it was necessary to develop an approach to determine the areas of the City at significant risk that could be assessed within the budget and timescale available for the project.

To determine the areas at most significant surface water risk three main criteria were chosen:

- Locations that had flooded historically
- Locations predicted to be at risk from national surface water modelling
- Areas with opportunity to reduce risk through the planning process

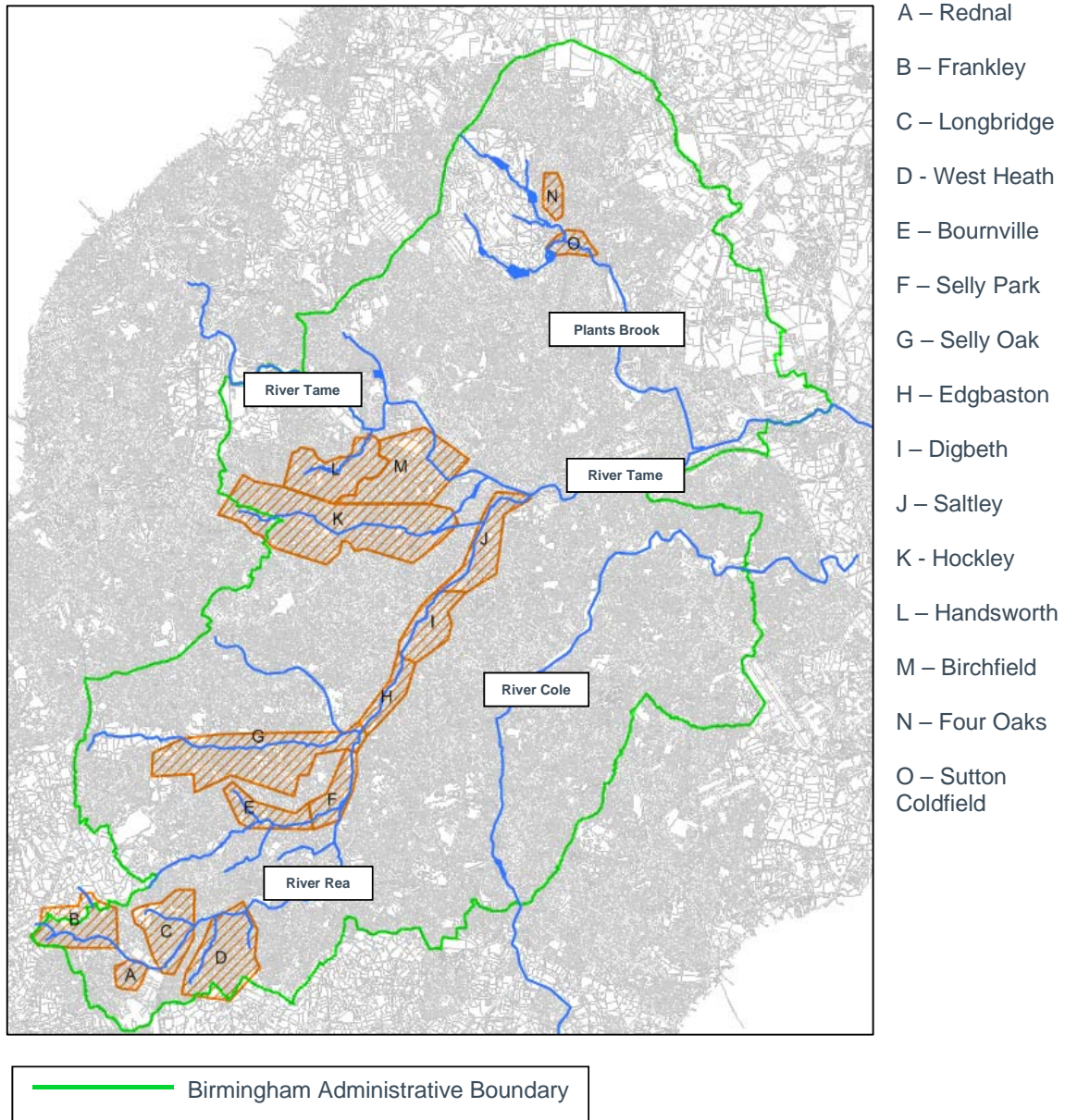
Using these criteria a three stage process was developed that gradually drilled down into further detail to identify the areas of most significant risk which were termed “Local Flood Risk Areas”. The first stage looked at Birmingham at river catchment level and prioritised those catchments with the most significant risk.

The second stage investigated the previously identified catchments to identify any high risk areas where further assessment was needed to fully understand the risk of flooding.

At the final stage the high risk areas were examined in detail to derive 15 priority Local Flood Risk Areas as shown on the map overleaf (Figure 2).

As part of this process detailed models were produced to take account of rivers, minor open watercourses and piped networks of culverted watercourses and public sewers modelling that covered all of the Local Flood Risk Areas. From these models mapped outputs have been produced that identify the areas of the city at risk of surface water flooding. Storms with a 1 in 30, 1 in 100 and 1 in 200 chance of occurring in any year have been run and output as maps to give an idea of the relative likelihood of flooding. These maps are available to view on the Birmingham City Council website, however they should **NOT** be used to definitively identify if individual properties are at surface water flood risk. A full explanation of the process, the areas that were filtered out and why, together with notes to explain the flood can be found in the full SWMP (<web link to be inserted>).

Figure 2. Local Flood Risk Areas (LFRA)



5. Developing an Action Plan

Once the Local Flood Risk Areas were identified and assessed the project partners were able to develop a draft Action Plan setting out who will do what and when considering the management of surface water flood risk in Birmingham over the long term. Whilst it focuses specifically on the priority LFRA's other more strategic City wide actions were also considered.

The project partners agreed the range of different measures which could be used to manage surface water flood risk, including:

- Storing surface water in floodplains, specially created wetlands and sustainable urban drainage systems (SuDS)
- Increasing channel capacity by opening up rivers, streams and ditches to carry more flood water or raising defences
- Infrastructure improvements, maintenance regimes and asset management
- Using planning to ensure flood mitigation measures are built into the design of new development
- Improving resilience through flood awareness, flood planning and property level protection/resilience
- Monitoring and flood warning
- Further assessment including flood investigations and detailed modelling

These options were matched against the various priority LFRA's to decide the best approach in each.

A summary version of the completed Birmingham SWMP Action Plan is given in Table 1 on the following pages, briefly explaining what is proposed in each of the priority LFRA and why that approach has been chosen.

Table 1. Action Plan Summary

LFRA Ref	LFRA Area Name	Location	Action	How	Benefits
B	Frankley	Cotswold Close to Miranda Close	Inspection and Maintenance	Inspection and maintenance of property protection and highway drainage works. Include on Asset Register.	To maintain current standard of protection.
C	Longbridge	Former MG Rover Site	Model Update	Refine model to take account of works being undertaken at the Longbridge site.	To improve representation of this area in the model and better understand the effect of the development on upstream and downstream flood risk.
D	West Heath	Exe Croft	Inspection and Maintenance	Inspection and maintenance of highway drainage works in Exe Croft and Rednal Road. Include on Asset Register.	To maintain current standard of protection.
D	West Heath	Pitclose Road	Inspection and Maintenance	Inspection and maintenance of highway drainage works in Pitclose Road and Houdley Road. Include on Asset Register.	To maintain current standard of protection.
E	Bournville	Bushwood Road	Inspection and Maintenance	Inspection and Maintenance of exceedence flow pathway.	Reduce risk to x number properties and mitigate against flooding of the highway.
E	Bournville	The Bourn (Woodbrooke Road to Cadburys)	Flood storage	Investigate storage options on The Bourn, Wood Brook and Griffins Brook.	To determine if a viable scheme can be developed to mitigate flooding.
F	Selly Park	Oxford Street, Bond Street	Inspection and Maintenance	Inspection and maintenance of flood defence wall to rear of Oxford Street properties.	To determine if a viable scheme can be developed to mitigate flooding.
F	Selly Park	Ripple Road, Pershore Road	Inspection and Maintenance	Inspection and maintenance of storage and upsizing of sewers.	To reduce flood risk to properties in Ripple Road and Cartland Road.
F	Selly Park	Ripple Road, Pershore Road	Model update	Flood alleviation scheme. Scheme to be modelled in SWMP model to assess residual risk.	To understand residual risk from scheme and determine whether further works are necessary.
G	Selly Park	Stonehouse Brook (Mill Lane)	Feasibility	Investigate capacity of Mill Lane Culvert and feasibility of storage at Senneleys Park	To determine if a viable scheme can be developed to mitigate flooding.
G	Selly Oak	Bourn Brook Corridor	Feasibility	Analyse the effects of restricting flows at the B4121 culvert to create attenuation area within the grounds of Woodgate Valley Park.	To determine if a viable scheme can be developed to mitigate flooding.
G	Selly Oak	Harts Green Brook Corridor	Feasibility	Assess feasibility of storage on Harborne Golf Course.	To determine whether there is a cost beneficial scheme.

Table 1 (Continued). Action Plan Summary

LFRA Ref	LFRA Area Name	Location	Action	How	Benefits
G	Selly Oak	Harts Green Brook Corridor	Inspection and Maintenance	Inspection and Maintenance of Arosa Drive culvert and Harts Green Brook Channel.	To maintain current standard of protection.
G	Selly Oak	Alwold Road/Corrisande Road/Weoley Avenue	Community Level Flood Mitigation	Flood mitigation scheme to re-route flows, provide surface water storage and implement property level protection.	To reduce flood risk to properties in Alwold Road, Corrisande Road and Weoley Avenue.
G	Selly Oak	Lodge Hill Cemetery	Inspection and Maintenance	Establish regime for regular inspection and maintenance of drainage in Lodge Hill Cemetery.	Contributes to mitigating surface water flows.
G	Selly Oak	Gibbins Road/Harborne Lane	Feasibility	Investigate the need for management of exceedence flows.	To determine whether properties are at risk and hence whether a scheme needs to be promoted.
G	Selly Oak	Tiverton Road	Investigation	Investigate surface water sewer capacity.	To determine if the surface water issue identified can be attributed to sewer capacity and determine best way forward to mitigate against risk to properties.
G	Selly Oak	Selly Park North	Feasibility	Assess action needed to prevent flooding to Selly Park from overland flow routes derived from spills on the Bourn Brook. Options to be tested to include; raised embankments and reprofiling of the Pershore Road and restrictive structures.	To determine if a viable scheme can be developed to mitigate flooding.
H	Edgbaston	Cheddar Road	Inspection and Maintenance	Inspection and maintenance of highway scheme in Cheddar Road. Include on Asset Register.	To maintain current standard of protection.
H	Edgbaston	Belgrave Road area	Data improvement	Improve data on surface water network.	To allow coverage of surface water network to be improved in integrated model and hence gain a better understanding of flood risk in this area.
I	Digbeth	Southern Gateway Area	Feasibility	Investigate opportunities to open up access to river and possibility of widening channel as part of Southern Gateway redevelopment.	To determine if a viable scheme can be developed to mitigate flooding.
I	Digbeth	Southern Gateway Area	Policy	Southern Gateway planning policies on River Rea and surface water management/SUDS.	To reduce flood risk to new development and existing catchment by appropriate management of flows.

Table 1 (Continued). Action Plan Summary

LFRA Ref	LFRA Area Name	Location	Action	How	Benefits
I	Digbeth	Glover Street	Data improvement	Improve data on surface water network.	To allow coverage of surface water network to be improved in integrated model and hence gain a better understanding of flood risk in this area.
I	Digbeth	Lawley Middleway, Landor Street	Data improvement	Improve data on surface water network.	To allow coverage of surface water network to be improved in integrated model and hence gain a better understanding of flood risk in this area.
J	Saltley	Network Park, Crawford Street	Investigation	Assess likely overland flow routes.	To improve confidence in model results and determine whether a scheme needs to be promoted.
K	Hockley	Upstream of Ninevah Road	Data improvement	Improve data on surface water network.	To allow coverage of surface water network to be improved in integrated model and hence gain a better understanding of flood risk in this area.
K	Hockley	Upstream of Ninevah Road (Sandwell)	Data improvement	Improve representation of Thimblemill Brook in integrated model by working with Sandwell Metropolitan Borough Council to share data.	To improved integrated model and hence gain a better understanding of flood risk in this area.
K	Hockley	Ninevah Road & Grassmere Road	Model refinement	Refine model to reflect conditions on site.	To achieve better understanding of the flood risk to properties in this area.
K	Hockley	Factory Road	Investigation	Assess surface water risk following model refinement.	To assess risk to properties following upstream modifications to the model with a view to identifying whether a scheme needs to be promoted.
K	Hockley	Burberry Park / Farm Croft	Data improvement	Improve data on surface water network.	To allow coverage of surface water network to be improved in integrated model and hence gain a better understanding of flood risk in this area.
K	Hockley	Hockley Brook	Inspection and Maintenance	5 yearly inspection and maintenance of channel.	Based on level of risk from detailed survey.

Table 1 (Continued). Action Plan Summary

LFRA Ref	LFRA Area Name	Location	Action	How	Benefits
L	Handsworth	Church Hill Road	Investigation	Investigate surface water sewer capacity.	To determine if a scheme needs to be promoted by STW, otherwise consider property level protection.
M	Birchfield	Witton Road (Railway) Tame Road areas	Tame Flood Scheme	Consider effect of the Perry Barr and Witton Flood Scheme on surface water flooding and develop appropriate mitigation.	To ensure that when the Perry Barr & Witton Flood Scheme is implemented any residual surface water flood risk is appropriately managed.
N	Four Oaks	Knowles Drive, Blackroot Road and Anderson Close	Inspection and Maintenance	Inspect and maintain culverts at Knowles Drive, Blackroot Road and Anderson Close.	To maintain current standard of protection.
O	Sutton Coldfield	Clifton Road area	Inspection and Maintenance	Inspection and desilting of Clifton Road bridge.	To maintain current standard of protection.
O	Sutton Coldfield	Clifton Road area	Inspection and Maintenance	Inspection and riparian maintenance of channel.	To maintain current standard of protection.
-	-	Citywide	Highway Maintenance	Maintenance of Highway Drainage.	To ensure gullies and connections are fully functioning and hence mitigate against surface water flooding.
A-O	All	SWMP Local Flood Risk Areas	Highway Maintenance	Look at potential to increase highway gully cleansing frequencies in high risk areas.	To ensure gullies and connections are fully functioning and hence mitigate against surface water flooding.
-	-	Citywide	Grill Maintenance	Maintenance of all grills on watercourses.	To mitigate against blockage and therefore flood risk.
A-O	All	SWMP Local Flood Risk Areas	Investigation	Assess locations where leaf fall coincides with surface water flood risk.	To mitigate against blockage of gullies and therefore reduce surface water flood risk.
-	-	Upper Cole catchment	Investigation	Residual and resultant risk from Sparkhill proposals.	To understand properties at risk in Upper Cole catchment and develop proposals for appropriate mitigation.
-	-	Citywide	Awareness	To raise awareness of the issues of discharging fats, oils and greases into the sewer network.	To minimise blockage in the foul and combined sewer systems which can in some locations lead to surface water flooding.
-	-	Citywide	Consultation	To communicate outputs of SWMP with the community.	To ensure community is aware of flood risk and actions that can be taken to address the risk.

6. Public Engagement

Throughout the SWMP process there has been ongoing communication and engagement between the partners and other stakeholders. The draft plan was discussed with key local stakeholders at two workshops and the feedback was used to finalise the long-term Action Plan and also to develop an approach to communicating the risk and plan to the Birmingham community.

Moving forward the risk identified will be communicated with the wider community. General information will be published on the BCC website, however there will also be more targeted communication in risk areas through flood fairs, FLAGS, leaflets etc.

7. What happens next?

The SWMP Action Plan is a living document and will be updated over time as work is completed and new opportunities for managing surface water flood risk in Birmingham emerge.

The SWMP partners will continue to meet regularly and work together, not only to implement the plan but also to monitor, review and update the approach as necessary.

The plan will form part of the Local Flood Risk Management Strategy and will play a key role in helping the partners to exploit opportunities to incorporate flood mitigation measures into other projects. It will also be used as evidence in funding applications.

There will be a series of launch events to explain the Birmingham SWMP to the wider public and to ask for feedback on what is planned.

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