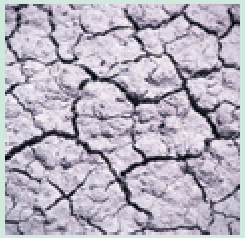

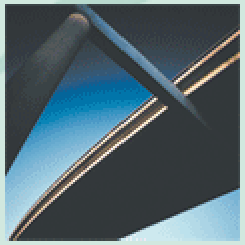

Aston Lodge Flood Study

Stuart Nelmes

BWB Consulting Limited

15th November 2005

Background

- Large recent flood events – August 2004 caused significant flooding and damage to properties on the Aston Lodge Estate
- Anecdotal feedback on flooding (ALRFA and the council):
  - Capacity restrictions on existing culverted watercourse system;
  - Overland flow ('pluvial' flooding) in other parts of the catchment
  - Interaction of a number of different systems e.g. watercourse, highway drainage, combined sewer system
- Haswell appointed by Staffordshire County Council:
  - To liaise with residents and relevant authorities;
  - To undertake hydrological & hydraulic analysis (river modelling);

  with a view to providing;
  - An understanding of the problem and identification of potential solutions

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Methodology

- **Data Collection**
  - Topographic survey of the watercourse and immediate floodplain including spot threshold levels and maximum flood depth at locations around the site
  - CCTV Survey
  - Questionnaire survey/ ALRFA website/ meeting with ALRFA coordinators
  - Consultations with the Environment Agency
- **Hydrological Analysis**
  - Flood Estimation Handbook
- **Hydraulic Modelling**
  - HEC-RAS v.3.1.2 (industry standard river modelling software)

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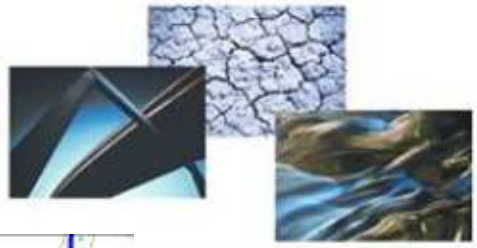
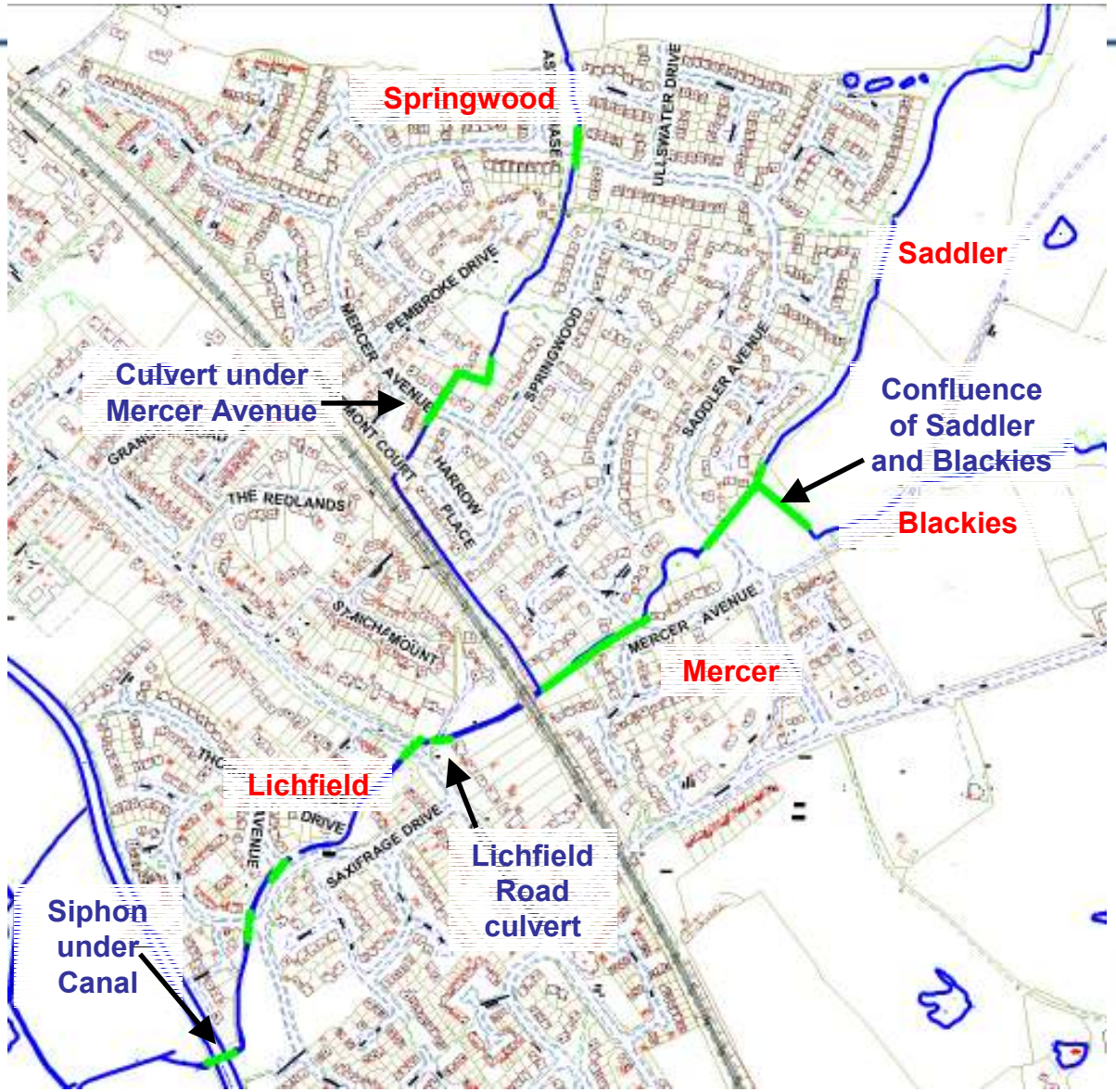
General plan





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Flooding Mechanism

First

- Springwood culvert
- This is the culvert which runs under Mercer Avenue and outfalls into Harrow Place

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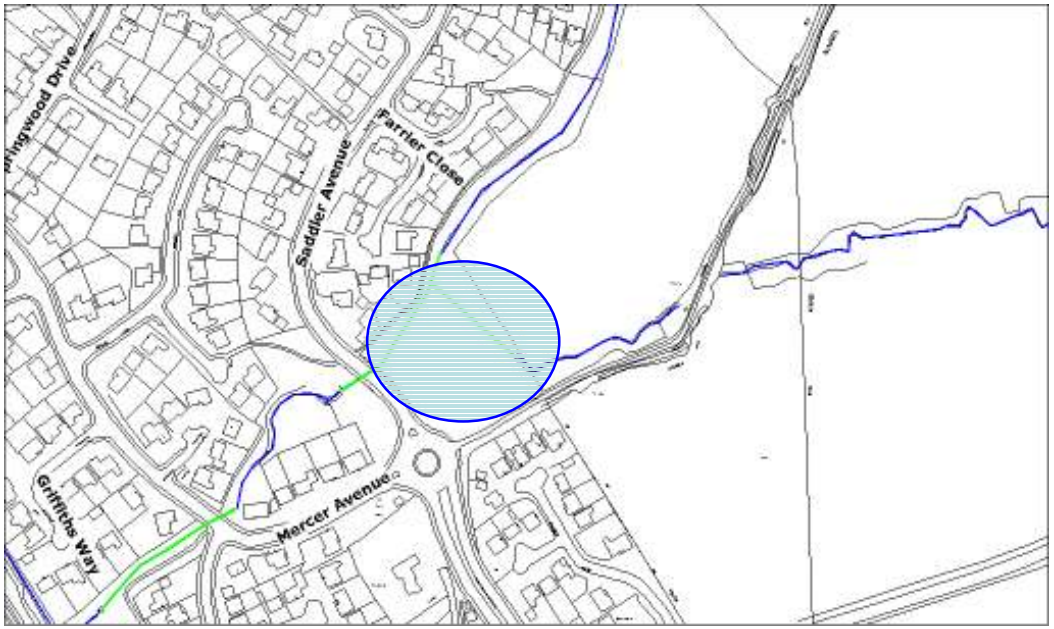
Flooding Mechanism

Second

- Saddler and Blackies culvert
- This is the confluence in the culvert at the top of Saddler Avenue



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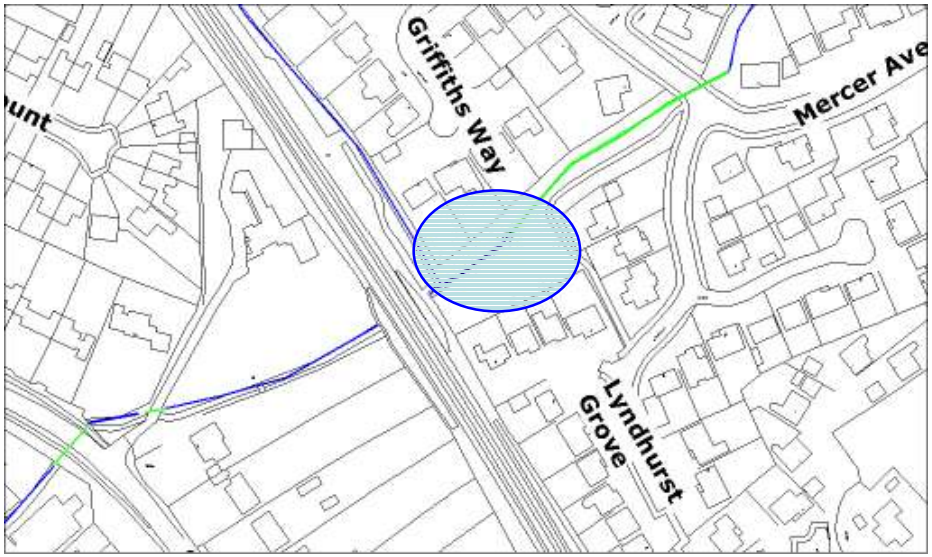
Flooding Mechanism

Third

- Confluence of Mercer and Springwood
- Confluence upstream of the railway line



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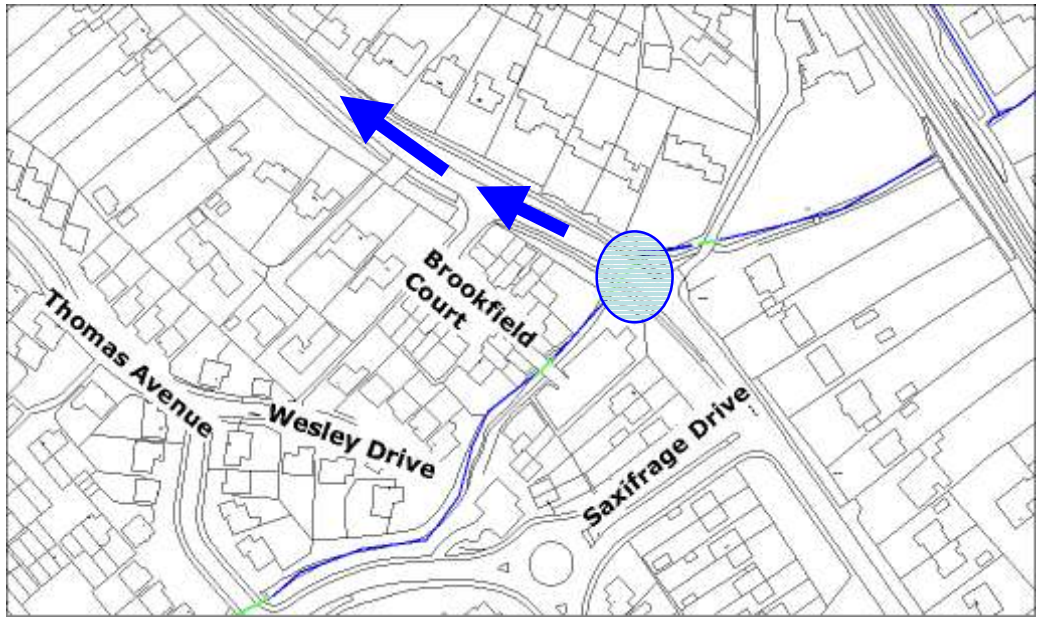
Flooding Mechanism

Fourth

- Lichfield Road culvert
- Culvert under Lichfield Road



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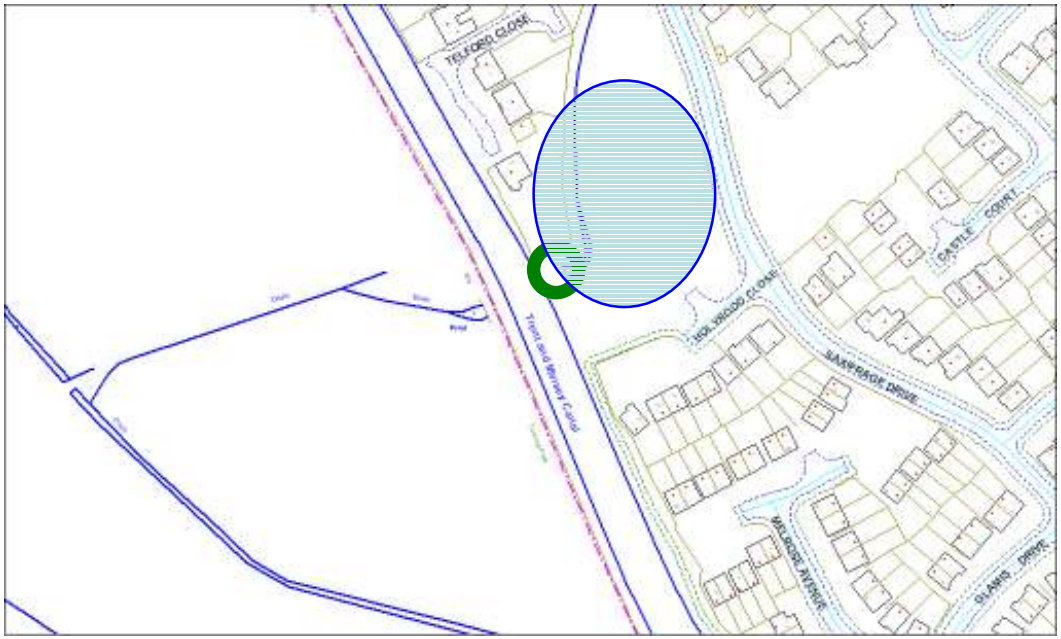
Flooding Mechanism

Fifth

- Siphon under Canal
- Blockages cause backing up of flows and potential risk of flooding
- Trash screen to Siphon requires regular maintenance



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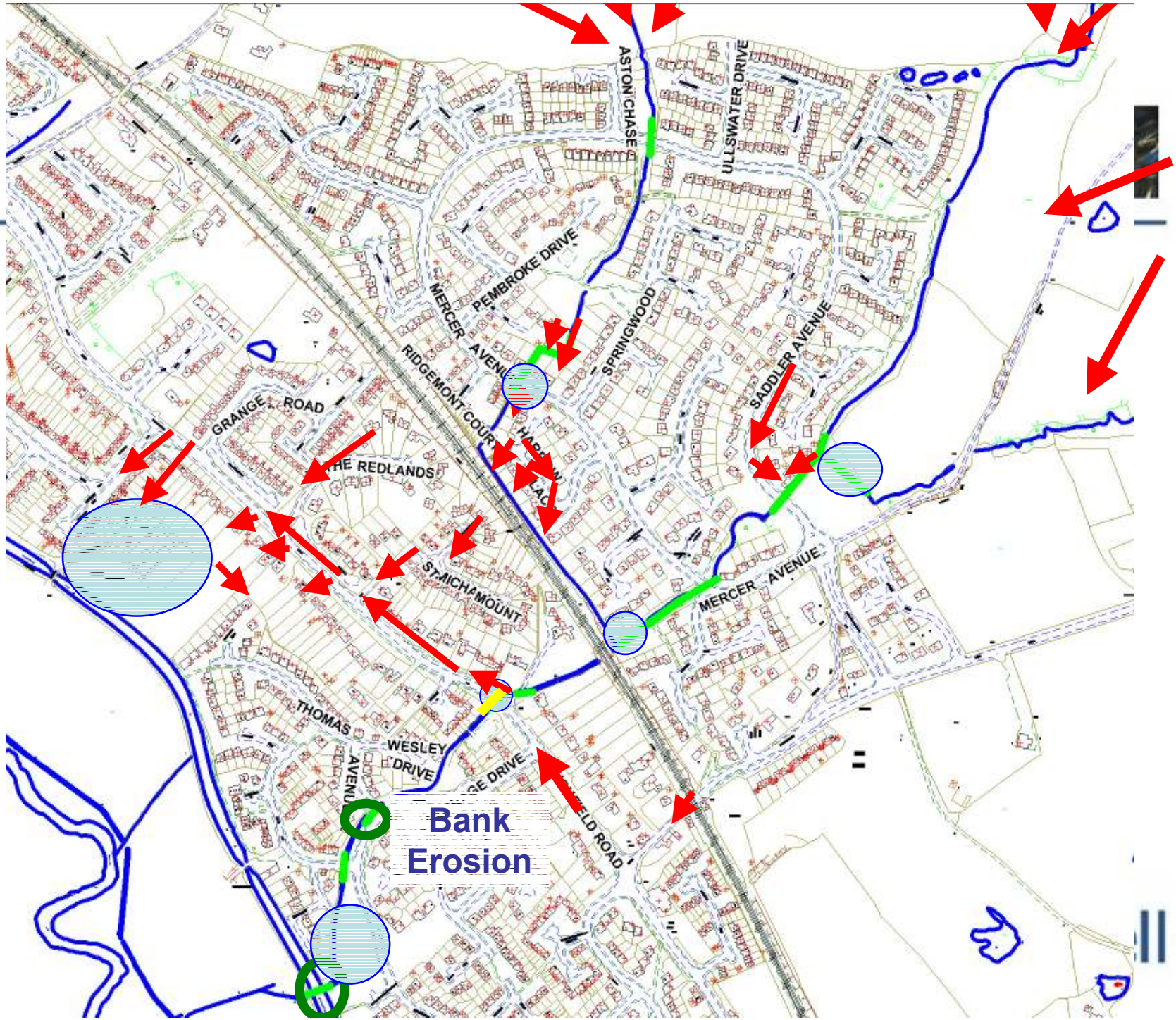
ASTON CHASE
ULLSWATER DRIVE
PEMBROKE DRIVE
MERCER AVENUE
RIDGEMONT COURT
SPRINGWOOD
SADDLER AVENUE
GRANGE ROAD
THE REDLANDS
ST MICHAMOUNT
MERCER AVENUE
THOMAS
WESLEY
DRIVE
Bank
Erosion

Options

- **Two Options Considered**

  Option1 – Upstream storage only

  Option 2 – Culvert improvements and upstream storage

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Discounted Options

1. **Increasing the capacity of the Springwood culvert**

   - Would increase pass-on flow to watercourse at rear of Harrow Place
   – Placing them at potentially increased flood risk

2. **Formalisation of the bowl shaped area at the confluence of Springwood and Mercer (upstream of the railway track)**

   - Wouldn't solve upstream flooding problems and spare capacity is limited

3. **Increase the capacity of Lichfield Road culvert**

   - Would solve flooding on Lichfield Road, but transfer flooding to the properties on Brookfield Court

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Option 1 – Upstream Storage

- Aim is to hold back/ attenuate flood flows and throttle the flow to the capacity of the most restrictive feature (Springwood culvert)
- Size of storage volumes include for climate change.

Q25	= 4350m^3
Q50	= 5900m^3
Q100	= 7700m^3

- The reduction of flow is great enough to prevent downstream watercourse related flooding
- Potential for area to be of high ecological/ conservation value

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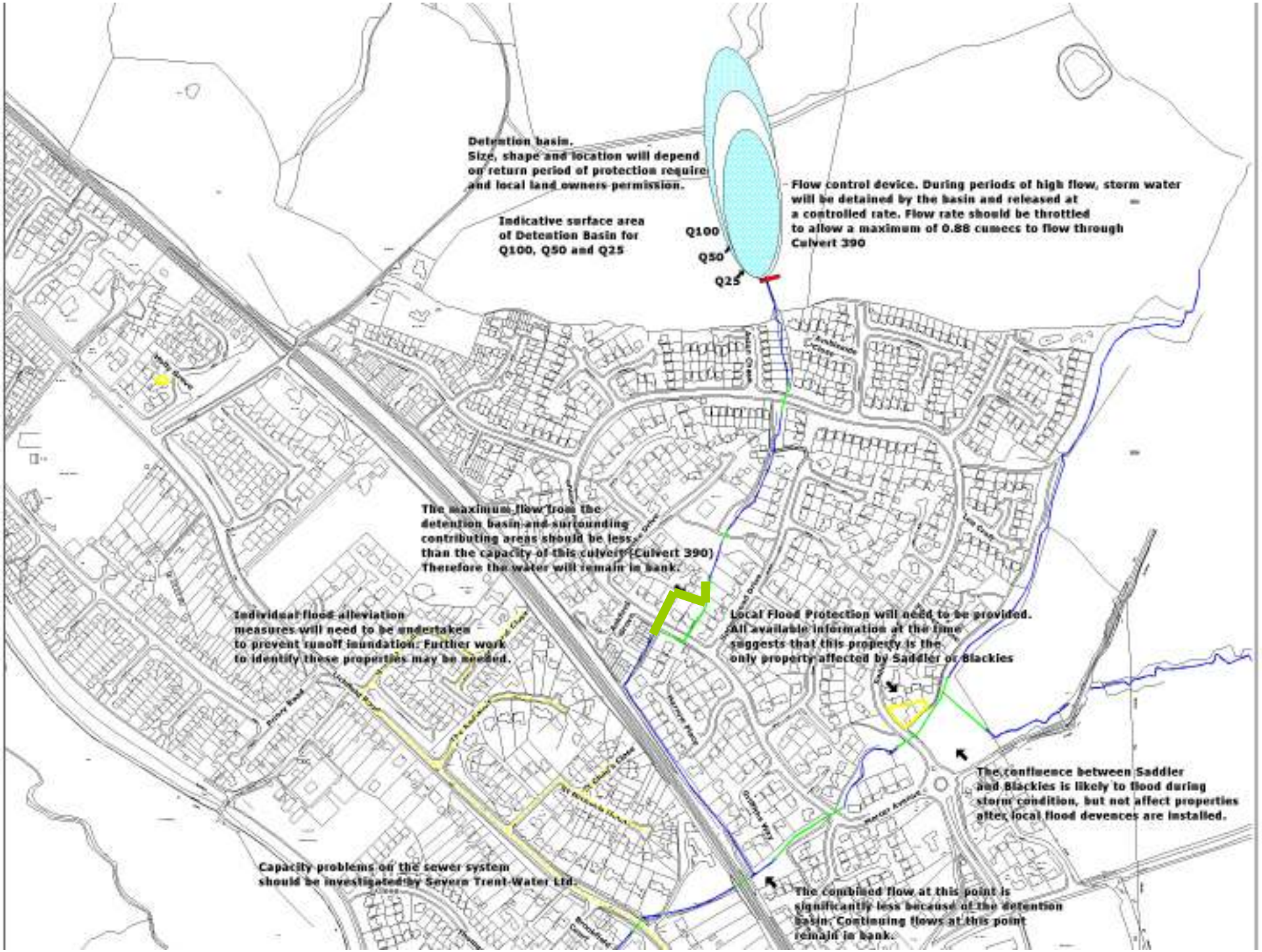
Detention basin.
Size, shape and location will depend on return period of protection required and local land owners permission.
Indicative surface area of Detention Basin for Q100, Q50 and Q25
Q100
Q50
Q25
Flow control device. During periods of high flow, storm water will be detained by the basin and released at a controlled rate. Flow rate should be throttled to allow a maximum of 0.88 cumecs to flow through Culvert 390
The maximum flow from the detention basin and surrounding contributing areas should be less than the capacity of this culvert (Culvert 390) Therefore the water will remain in bank.
Individual flood alleviation measures will need to be undertaken to prevent runoff inundation. Further work to identify these properties may be needed.
Local Flood Protection will need to be provided. All available information at the time suggests that this property is the only property affected by Saddler or Blackles
The confluence between Saddler and Blackles is likely to flood during storm condition, but not affect properties after local flood deveences are installed.
Capacity problems on the sewer system should be investigated by Severn Trent Water Ltd.
The combined flow at this point is significantly less because of the detention basin. Continuing flows at this point remain in bank.

Option 1 – Upstream Storage

- Indicative scheme cost estimates:

Q25	= £62,900
Q50	= £76,000
Q100	= £91,300

- NB. Costs do not take into consideration land purchase / compensation and assume on-site spoil disposal

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Option 2 – Culvert Improvement / Upstream Storage

- High level bypass channel to direct flows around Springfield culvert along with distributed storage to control downstream flows
- By-pass culvert restricted to 600mm diameter because of cover and fall. Q100 storage area volumes:

Springwood	= 2850m³
Saddler	= 2100m³

- The reduction of flow is great enough to prevent downstream flooding at all locations up to 100-year level
- Potential for area to be of high ecological/ conservation value

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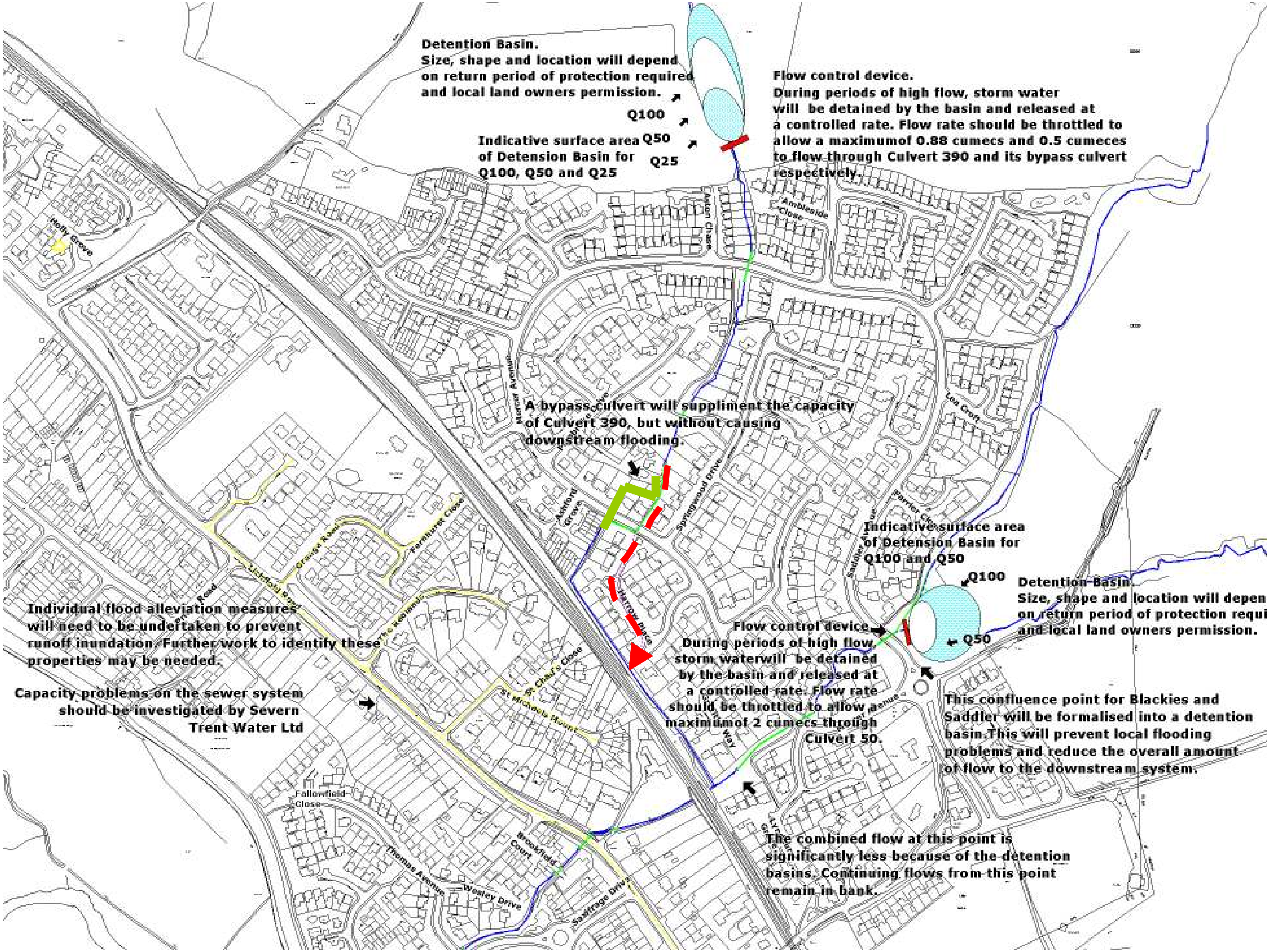
Detention Basin.
Size, shape and location will depend on return period of protection required and local land owners permission.
Q100
Q50
Q25
Indicative surface area of Detension Basin for Q100, Q50 and Q25
Flow control device.
During periods of high flow, storm water will be detained by the basin and released at a controlled rate. Flow rate should be throttled to allow a maximumof 0.88 cumecs and 0.5 cumeces to flow through Culvert 390 and its bypass culvert respectively.
A bypass culvert will suppliment the capacity of Culvert 390, but without causing downstream flooding.
Indicative surface area of Detension Basin for Q100 and Q50
Q100
Detention Basin.
Size, shape and location will depen on return period of protection requi and local land owners permission.
Q50
Flow control device.
During periods of high flow, storm waterwill be detained by the basin and released at a controlled rate. Flow rate should be throttled to allow a maximumof 2 cumecs through Culvert 50.
Individual flood alleviation measures will need to be undertaken to prevent runoff inundation. Further work to identify these properties may be needed.
Capacity problems on the sewer system should be investigated by Severn Trent Water Ltd
This confluence point for Blackies and Saddler will be formalised into a detention basin.This will prevent local flooding problems and reduce the overall amount of flow to the downstream system.
The combined flow at this point is significantly less because of the detention basins. Continuing flows from this point remain in bank.
Holly Grove
Ambleside Close
Lea Croft
Springwood Drive
Ashford Grove
Fernhurst Close
St Chad's Close
St Michaels Mount
Fallowfield Close
Brookfield Court
Thomas Avenue
Wesley Drive
Saxifrage Drive

Option 2 - Combined

- Indicative scheme cost estimates:

Q25	= £164,200
Q50	= £185,800
Q100	= £207,900

- NB the above scheme costs do not include land purchase or compensation

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Summary

- Outline DEFRA cost-benefit analysis = approximate ratio of 3:1
- Springwood & Lichfield Rd culverts are most problematic
- Resolving watercourse flooding may reduce the likelihood of other system failure
- Both options rely on landowner consent and would cause some disruption to the residents
- Individual schemes to protect isolated individual properties from flooding incidences would also be required

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Recommendations

- Option 1 - Q100 is most cost-effective:
  Scheme costs = £91,300
  Cost benefit for Q100 flood = £289,920
  NB. does not allow for land purchase or spoil disposal etc.
- A review of the combined sewer system and highway drainage is recommended
- NB. Cannot simply upsize existing culverts as this would increase pass on flow and transfers the flooding problem to elsewhere in the catchment
- Potential environmental benefits of de-culverting some lengths e.g. Blackies system to be considered in design

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Gary Tustin

Environment Agency

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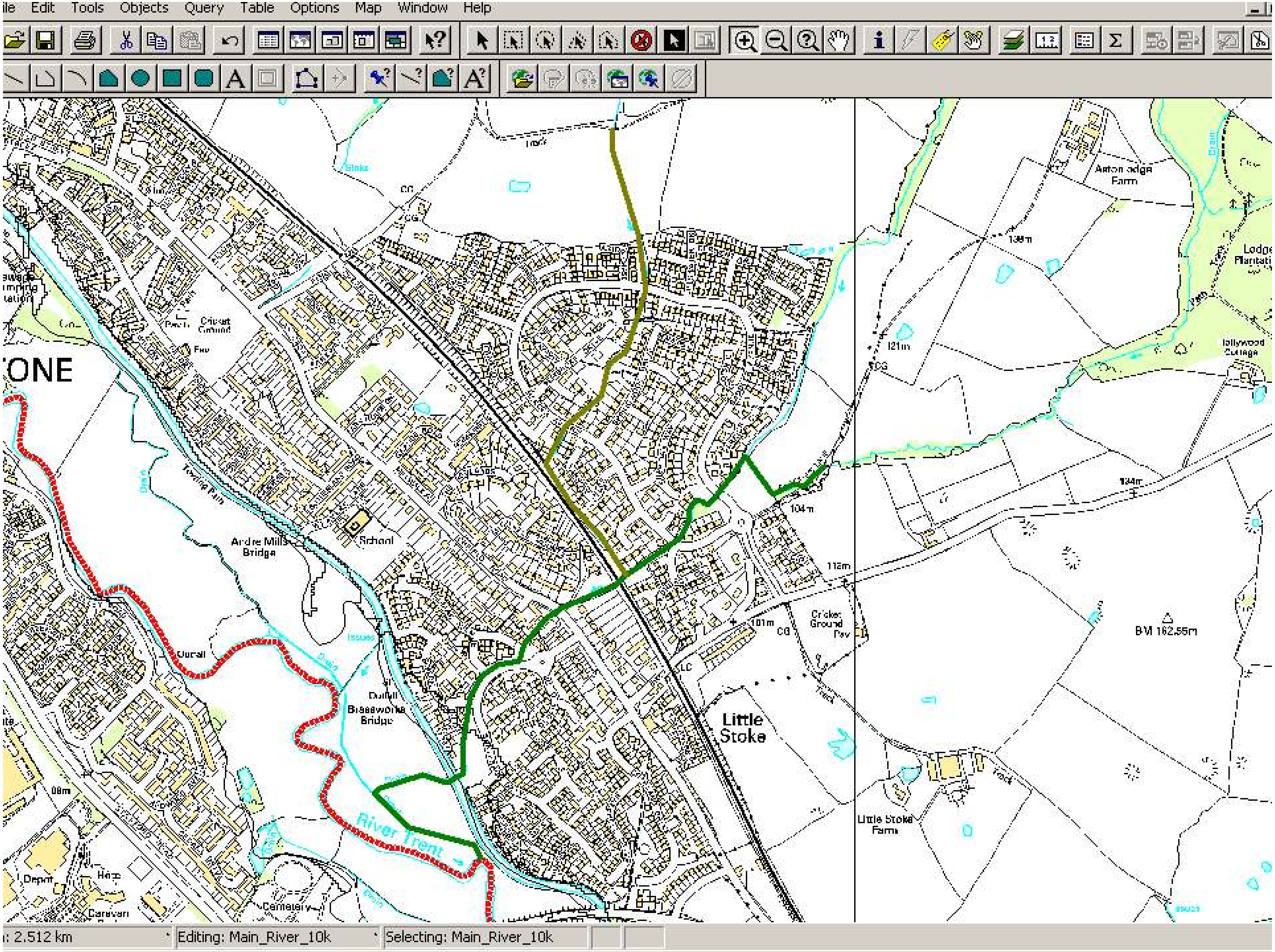
ile Edit Tools Objects Query Table Options Map Window Help
ONE
School
Cricket Ground
Little Stoke
River Trent
Little Stoke Farm
BM 162.55m
Cemetery
Depot
: 2.512 km
Editing: Main_River_10k
Selecting: Main_River_10k

Environment Agency

* Change of Responsibility from 1.4.06

* Works programmed Feb 2007 - May 2007

* Majority of Funding approved by Flood Defence Committee for 2006/07 financial year

* Riparian Owners

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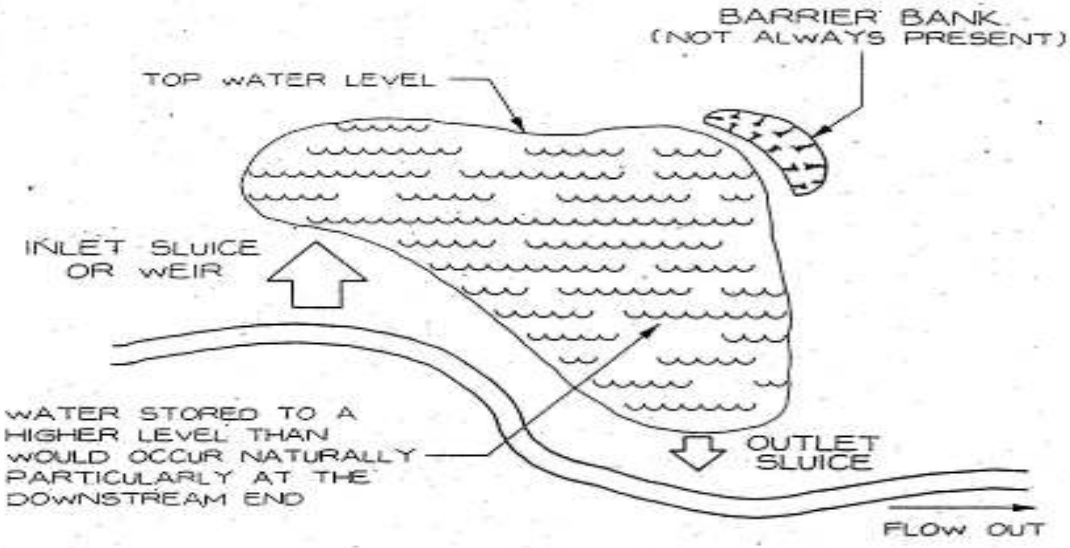
Example Balancing Pond



1. THE OUTLET SLUICE WILL CONTAIN A MOVEABLE PENSTOCK OR A THROTTLE PIPE IN ORDER TO MAINTAIN A DIFFERENTIAL HEAD BETWEEN STORED WATER LEVEL AND THE RIVER FLOOD LEVEL AT THE POINT OF DISCHARGE.

TYPE B

OFF-LINE CONTROLLED WASHLANDS

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