



**The Royal Society for the Prevention  
of Accidents**

Water Safety Review for:  
**Redditch Borough Council**

**April 2014**

16/06/14	1.1	DW	-	-	Final issue. One minor amend post w/g meeting.
29/05/14	1	DW	ND	-	Minor typos and clarifications.
02/05/14	0	DW	-	182/1314	Internal draft still waiting for some data. For internal QA.
<b>Date</b>	<b>Ver.</b>	<b>Own</b>	<b>Rev</b>	<b>Our Ref</b>	<b>Comments</b>

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## Executive Summary

RoSPA were engaged by Redditch Borough Council (Council) to conduct an inland water safety review. The overall aim of the review was to identify any areas where physical controls need to be changed to meet current safety expectations and to identify any overall management arrangements that need to be implemented to maintain an acceptable level of public safety across the Councils' portfolio.

In order to complete the review, a RoSPA consultant visited a selection of identified by the Council sites in April 2014, the majority being in and around Arrow Valley Country Park. Water related injury data was compiled from various sources and aligned with population data to provide rates of injury.

Observed non-fatal injury rates in Redditch are below the West Midlands average, whilst rates in Redditch are approximately three times fewer than Worcester. Every emergency admission for drowning is a serious event, furthermore there has been a fatality or significant near miss repeated approximately once every 13 months since 2009.

Three locations were evaluated as being at the higher end of the 'High/Increased risk' bandings, namely Five Tunnels, Paper Mill Weir and Lower Weir. The first two locations have numerous hazards, and are the scene of serious or fatal events. Further they will continue to present a 'High risk' level to visitors, even if the Council adopts the short term mitigation options we recommend. A substantial reduction in the level of risk at these locations will demand a comprehensive package of work enacted.

Overall we found the majority of the sampled sites to be distributed within the 'Increased risk' band using the RoSPA methodology. The principle lakes of Arrow Valley and Ipsley Pool present a 'Lower risk' and in the main are well managed and maintained.

Our recommendations cover a number of common themes:

- The need to establish a water safety policy, which among other aspects governs control of generic and specific hazards.
- Closer working under the community safety partnership framework to identify and share incident data.
- Further, to develop and share the emergency service key location database (gazetteer), and for the Council to hold a definitive list of all sites owned and assessed.
- Continue to promote the good community education and awareness efforts.

Important recommendations specifically for the three 'Higher/Increased risk' locations include:

- A longer term package of design and engineering works should be considered at Paper Mill Weir and Five Tunnels. This could result in a generally safer environment and a return to a more natural (i.e. less canalised) stretch of river.
- Short term mitigation measures to demark the hazardous areas at Five Tunnels and Paper Mill Weir include limited use of fencing, improved visitor safety information and possibly rescue equipment.

- Measures to restrict access and dissuade groups from playing, congregating or entering the water immediately above Lower Weir, including planting inhospitable bushes and removing 'desire lines'.

Council officers are aware of the issues, having taken positive steps to address. Staff require some further training to continue assessing locations safely, but broadly are well placed. RoSPA have agreed to support the Council in its efforts.

## **Introduction and Terms of Reference**

RoSPA were instructed by Redditch Borough Council (Council) to assess the current water safety arrangement within their remit. This work builds upon efforts already underway by the Council. The review primarily looked at physical arrangements and offers options for improvement.

Consideration has been given in our recommendations to Council policies, the implications of case law and duties arising from UK regulation and law.

### Limitations

In carrying out this safety review RoSPA would point out that audits and reviews are, by nature a sampling exercise, therefore the reviewer cannot guarantee to identify all safety hazards around the site. Opinion is formed by a site visit on a particular day; absence of comment on any issue should not be taken to imply that the site will be completely safe.

Consideration has been given in our recommendations to the implications of Case Law, changes to H&S Regulations and the findings of accident investigations where these have a bearing on water safety.

RoSPA has endeavoured to identify all the significant risks; however it is essential that the controls identified in the risk assessments are continually developed and reviewed in response to changing legislation, best practice documents, active monitoring and the investigation and outcomes of accidents and near misses.

### Methodology and Sources of Data

RoSPA used a mixed methodology to collate and analyse the relevant data. In order to complete the review, a RoSPA consultant visited the site across multiple days during April 2014. Factors influencing selection included Council officer's knowledge of use, incident profile, volume of users and proximity to residents. A mixture of sites perceived to be low to high risk were included.

The site visits were conducted during term time and school hours, so very few school-age children were present at any of the sites. Younger children (kindergarten/pre-school age) were present at some sites (especially the well-used parks), but were accompanied by adults and under constant supervision.

The consultant and Council officers used the RoSPA risk rating tool designed for reviewing waterways. This gives a scaled output based on a range of factors and questions. The tool utilises a risk rating scoring system to identify and score the likely risks for injury and drowning. This system gives a comparative score of the risk profile for each individual location. Many sites were segregated into different sections. Where this has been conducted the highest section score has been provided.

The scores shown relate to the table below.

Risk Rating Table	
0-30	Very low level of risk
31- 40	Lower risk level
41 -50	Medium risk level
51-70	Increased risk
71- 80	High risk level
81-100	Very high risk

This score assists in identifying key risk areas and allocation of recommendations, and therefore, priorities and resources.

Following the site visits we evaluated the individual findings and the overall risk profile for the portfolio. We compared the overall interpretation against similar locations around the UK.

Incident dataset was sourced from the WATER Incident Database (WAID)<sup>1</sup>, and was aligned with additional historical RoSPA data. A further retrospective study was conducted to source incidents from relevant agencies. Requests to local responders was also aligned in the dataset.

We reference risk assessments policies and asset list provided by the Council. Discussion with key staff and visitors: Several discussion were held with Council staff, and ad-hoc discussion with visitors or interested parties.

Using our knowledge of drowning and water safety guidance, we draw our conclusions and made recommendations.

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<sup>1</sup> <http://www.nationalwatersafety.org.uk/waid/>

## Results

### Community level risk

#### Non- fatal drowning and water related injury

Water related harm data was compiled from the Hospital Episode Statistics (HES) database and aligned with Office National Statistics (ONS) mid 2010 year population estimates. HES data for accidental submission and drowning injury in addition to non-specified water related harm was compiled<sup>2</sup>. An injury rate per 100,000 resident population is calculated, along with the West Midlands average from this dataset.

Figure one shows the Rate of Water Related Harm for the West Midlands during the period FY 2007-2012. Worcestershire authorities are displayed in blue for ease of reference:

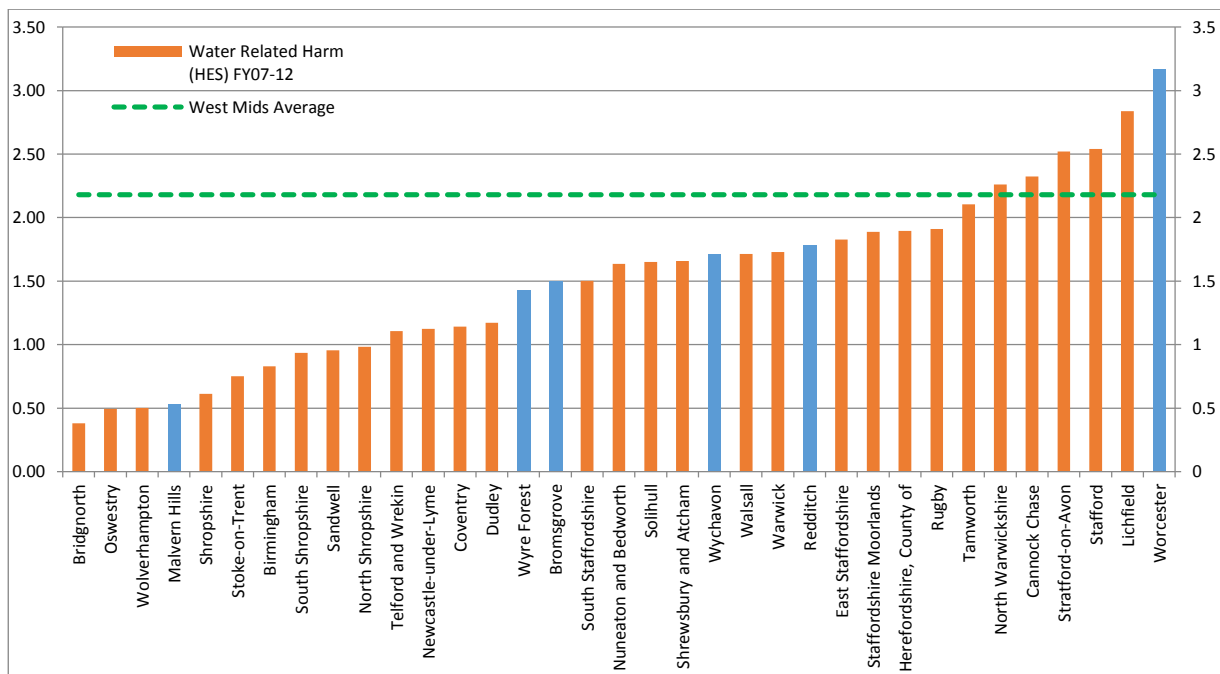


Figure 1: Rate of Water Related Harm Per 100,000 Residents in the West Midlands  
(Hospital Episode Statistics, FY07-12)  
(Note blue bars denotes Worcestershire Area)

There was 48 reported cases within the Worcestershire region, with Worcester city and Wychaven returning cases most frequently. There were 14 cases in Redditch or Bromsgrove. The most frequently used codes within the 48 cases were: (i) Unspecified (ii) Fall from cliff (iii) Other (iv) Dive/Jump injury...into water resulting harm other than drown/submersion (v) Drown/submersion into natural water.

It is not possible to identify the exact locality of the events from this dataset, or in any more detail.

<sup>2</sup> ICD10 codes used: V90-94,W15,16,65-70,73,74,W38,92,Y21



The average rate for the region is 2.18 admissions per 100,000 population, with six areas above this. The Bromsgrove rate of 1.50 (20/35) and Redditch rate of 1.78 (12/35) equate to a middle third banding within the region. Worcester ranks first (1/35) with a rate of 3.16.

Overall the reported rate of harm can be considered as being low when compared to for example traffic injuries or falls of all types. However the above dataset does not include fatalities.

Although the rates are low, it is worth noting the severity of the outcome. A study conducted using the HES data for the UK found that Water Related Harm admissions resulted in an average stay of five nights in hospital, and that for every one fatality observed there were three HES admissions.<sup>3</sup>

*In short any drowning and water related injury event resulting in emergency admission should be considered as a very serious event.*

#### Fatal and critical near miss drowning events

A search of the Water Incident Database (WAID) and RoSPA drowning inquest reports for the years 2005-2012 was completed. The following reports for Redditch and/or Arrow Valley Country Park were identified:

Table 1: **WAID/RoSPA incident database search results**

<b>When</b>	<b>Who</b>	<b>Narrative</b>	<b>Outcome</b>
March 2014	Teenage male, 15	Swimming and playing near Paper Mill Weir.	Fatality. Inquest opened.
July 2013	Young boy and girl	Were rescued from the River Arrow near Church Hill in Redditch. They were taken to hospital for treatment. (Other verbal reports suggest this location was Paper Mill Weir).	Near miss.
June 2010	Young boy	It is believed the boy was walking through a stream between the River Arrow and the Arrow Valley Lake when he fell into the weir. Fire-fighters got him out with a short extension ladder. It is also thought he was knee deep in water for an hour.	Near miss
February 2009	Teenage male, 17	Male fell into Arrow Valley Lake during snowy conditions. West Mids Ambulance responded, male was out of water on arrival. He was treated for hypothermia, reported being in water for 15mins.	Near Miss
August 2005	Eldery male, 63	Reported missing from his home on approx five days earlier, noted as being uncharacteristic. Found in Arrow Valley Lake.	Fatality.

Cases of intentional and criminal harm have been excluded from the above dataset.

<sup>3</sup> <http://www.biomedcentral.com/1471-2458/6/210>

Although the reported numbers of cases are low, it is clear that the majority of cases involved younger people, playing or swimming. Accidental falls into water do not seem to be a factor among this group.

*All five of the significant and fatal cases were within the country park; two/three were near to Paper Mill Weir or Five Tunnels section of the river. These events since have increased in frequency, possibly due to improved reporting. Since 2009 there has been an event approximately every 13months.*

*From the limited data available the majority of harm rests in a relatively small locality, and these events happen regularly.*

#### Other data sources

Discussions were held with Police and Fire service leads. Police officers will note interventions and log calls reported as for example 'nuisance' however it was unclear if any meaningful data could be gathered from Police systems.

Fire and Rescue Services utilise Vision, this has the ability to extract data on water related callouts. At the time of writing a request with Hereford and Worcester FRS data controller was being considered.

In addition to incident data, discussions regarding the emergency services location gazetteer was held. This dataset notes locations and access for emergency services and will be useful to realising a single-joint understanding of location based risks, particularly so if any meaningful location codes are to be used for by the public when calling emergency services.

No successful contact with the Ambulance service was made.

The 2013 Joint Strategic Needs Assessments (JNSA) for Redditch does not note water related injury as a priority, although it does note emergency injury admission for under 5's.<sup>4</sup>

A JNSA is a profile of the health and wellbeing of a particular area, it identify public health risks across a range national priority areas including road injures and death, activity, walking, educational attainment. It further identifies additional localised harm.

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<sup>4</sup> <http://www.worcestershire.gov.uk/cms/pdf/Redditch%20HWB%20Profile%20Final%2018-10-13.pdf>

## Site review findings

### Sampled locations

The consultant reviewed 12 locations with Council officers over a two day period in April 2014. The RoSPA risk rating scoring system was used to identify and score the likely risks for injury and drowning, other hazards on site were observed and noted, however the score given below relates predominately to the risks presented by open water. This approach provides a score of the risk profile for each individual location. A number of sites were segregated into different sections; in these instances we have reported the highest score, or provided the score for each section.

The majority of sites assessed were along the River Arrow, locations included weirs, natural-linear and canalised sections and meandering/dogleg sections. Along with the two substantial lakes within the country park. In total 11 locations were formally assessed, the initial score can be seen in table two below:

Table 2: **Site review scores**

#	Site short name	Initial score	Residual score (Potential)	Meaning
<b>Rivers</b>				
3	Paper Mill Weir	79	71	'High risk'
1	Five Tunnels	71	-	"
8	Lower Weir - Nr Broad Ground CP	67		'Increased risk'
12	Small wooden weir	65		"
10	Beach' S of Ipsley Pool	61		"
8	Middle Weir - Adjacent to Arrow Valley Lake	59		"
4	Abbeylea (Dolphin Rd Allotments)	58		"
9.1	River Arrow at Ipsley Pool	50		'Medium risk'
14	Underpass/Basketball Court	40		'Lower risk'
<b>Lakes</b>				
9	Ipsley Pool	39		'Lower risk'
7	Arrow Valley Lake	34		"
<b>Not visited or assessed formally</b>				
13	Pond & Weir, Old Mill Lane, Feckenham			
6	Upper Weir - Bridge at Proctors Barn			
11	Liner waterway			

**Note:** A blank score indicates no formal assessment undertaken. The residual score is explained in the main text, it indicates the potential gain if selected controls are introduced to the location.

All of the sampled sites have significant visitors and footfall in the vicinity; many of the scores are affected by the volume and nature of visitor activity on site, typically higher footfalls will equate to higher risk scores.

It is important not to extrapolate to scores for one location and apply it generically. There are a range of factors considered which give the overall score, some of these are weighted and given greater priority.

The majority (5/11) of the sampled sites fell within the 'Increased risk' score range, all of these locations were along rivers, whilst higher ranking sites had features such as weirs, sluices and deeper/variable water depth present.

The next group of locations fell into the 'Medium or Lower risk' range (4/11). The rivers were mostly linear and had no obvious hazardous features or structures which raised the score. The lakes in the main were well maintained, with no particular features that would give rise to a higher rating. Visitor behaviours and activities will be the main risk factors at these locations.

#### Higher risk sites of note

Paper Mill Weir and Five Tunnels scored at a 'Higher risk' rating. In particular Paper Mill Weir initially rated above all other assessed locations by a 10% margin.

**Five Tunnels (#1)** had multiple hazards in close proximity including a weir, sluice and is a known swimming spot. There is also signs of vandalism/fire and alcohol use. In addition to the water hazards, falls from height into water/objects is a significant factor at this location.

**Paper Mill Weir (#3 and Appendix 1)** is the scene of the last fatality and has a history of significant near misses. The combination of flowing, recirculating cold water, steep sided walls and very easy access from the footpath and main entrance points combined, with the presence of a weir and what - on the surface - looks to be a benign swimming/play spot, rates as a 'High risk' location. Further, at this location there are numerous slip/fall hazards: a broken leg or serious impact injury is also very likely.

At Paper Mill Weir, we also considered what the potential 'residual risk' could be if we altered or introduced a number of physical controls, including fencing/signage and public rescue equipment. Some of these measures potentially reduced the ranking to 71, meaning that there was a safety gain, but not a substantive reduction to the level of risk by the RoSPA methodology.

*At both locations engineering measures will be the most effective approach available to make substantives safety gains. Given the proximity of the two locations (approx 300m apart), and the known use at both sites, it is worth focusing efforts to manage risk at these locations above all others in the short and long term.*

**Lower Weir' (#8.1)** at a score of 67 is on the cusp of a 'High risk' location rating; this is due to the presence of teenagers and use in the locality, aligned with potentially dangerous water conditions. Weirs can present unique challenges due to the non-obvious recirculating nature of the currents, further they can and do regularly escalate into multiple casualty events.

The critical area is the upstream river left bank (highlighted in images), as access to above the weir at certain water levels could play a swimmer in a very dangerous hydraulic in the weir. Reinstating the planting barrier in the short term will give some reduction, along with measures to discourage play/congregation in this immediate area. However the longer term consideration of re naturalising the river will be the most effective approach.

### Other site sites of note

'Ispley Beach' (#10) scores 61, this is mostly due to the obvious presence of visitors at the location, the environment on the review day was relatively benign due to shallow gradients, good site vista and hazards that can be seen/understood by most visitors.

At Ipsley Pool (#9) it was not clear if the overhead power line had been assessed with fishing in mind. A check with the relevant power network should be made to establish if this has been considered and assessed to a methodology similar to that used by the overhead power line working group document, published by the Energy Networks Association<sup>5</sup>.

The complete site by site findings are below, we discuss mitigations options later in the report.

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<sup>5</sup> <http://www.energynetworks.org/electricity/she/safety/safety-advice/angling.html>



<b># 1</b>	<b>Five Tunnels, River Arrow CP, Redditch</b>	<b>High</b>	<b>70</b>
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Description: Meandering - dogleg - section of River Arrow adjacent to footpath and meadow area used for picnics. Signs of fire and vandalism and known play/swim spot. Sluice and weir in s-bend, deep water sections. Part of SAM designated area.

Incident history: Inconclusive. Probable high use and low confidence of reports.

Mitigation options: (i)S/M term: maintain monitoring and information regime. (ii) Longer term: Possible package of work to re-profile weir and sluice.

Other comments: Difficult site to effectively mitigate. Need to consider access from both waterside meadow (RL top image) and through fence on RR (Second image). Slip/Trip/Fall scenarios are more likely to be realised than swim/in water harm at this location.



**Principle hazards observed**

Water

- (i) Sluice structure - fall/height
- (ii) Culverts/tunnels
- (iii) Weir
- (iv) Deeper cold water.

Other

- (i) Steps STF on RL
- (ii) Height and remains of sluice structure.
- (iii) Signs of alcohol use adjacent to sluice.



Access: Closes vehicle access via Hither Green Lane > over golf course.

OSGRID: 405220268862

Lat/Long:

Postcode:

Site reviewed: 30/04/14, 1pm.





**# 3** Paper Mill Weir, River Arrow CP, Redditch

**High**

**79**

Description: Linear River Arrow section adjacent to footpath and fishing lake (>5metres). Small weir, deep pool with high freeboard on RL and beach on R.R. Known play and swimming spot. Obstructions in river both up and downstream. Culvert and mill working still present. Part of Scheduled Ancient Monument (SAM).

Incident history: Mar 2014: One fatality and rescuers in water. June-13: Near miss - Multiple person 'rescue' in water TBC. Probable high use and low confidence of reports.

Mitigation options: S/M term: Install barriers from footpath, indicate change in area from path. Possible PRE + Interpretive signs (see discussion). Long term: Package to re- profile location.

Other comments: Section is 250m downstream of 'Five Tunnels' consider both spots together when possible. i.e. public safety/order and design approaches.



**Principle hazards observed**

Water

- (i) Moving water
- (ii) Temperature
- (iii) Depth/Gradient
- (iv) Egress (iv) Proximity to footpath.(via) High freeboard on RL bank.

Other

(I) Numerous STF features i.e. Roots, old brickwork, mixed ambient lighting.



Access: Closes vehicle access via Hither Green Lane > over golf course.

OSGRID:405367268595

Lat:52.315429, Long:-1.922685.

Postcode:B988PX = Brooklands Lane.

Site reviewed: 30/04/14, 2pm.



**# 4**      **Abbeydale (Dolphin Rd Allotments), R.Arrow**

**Increased risk**      **58**

Description: Meandering 'natural' River Arrow section. Small dogleg through 70degrees, debris along outer RR bank, inner section pebbles/silt creating small beach. Footbridge upstream linking footpath adjacent to allotments. Planting covers majority of bank side, save small desire line. High footfall area and cycle users, desire line seems to be people taking dogs to the water.

Incident history: Inconclusive. Possible: high footfall in vicinity and desire line. Low confidence of reports.

Mitigation options: (i) Periodic monitoring and snag fixes. (ii) Watercourse clearing as part of flood mitigation approaches. (iii) Bridge snag/repair.

Other comments: Works planned (County Council) to upgrade bridge. At high water levels, bridge is partly covered.



**Principle hazards observed**

Water

- (i) Moving water
- (ii) Temperature
- (iii) Depth/Gradient
- (iv) Egress
- (iv) Obstruction above/below water line.

Other

- (i) Footbridge missing infill section, barrier still intact.

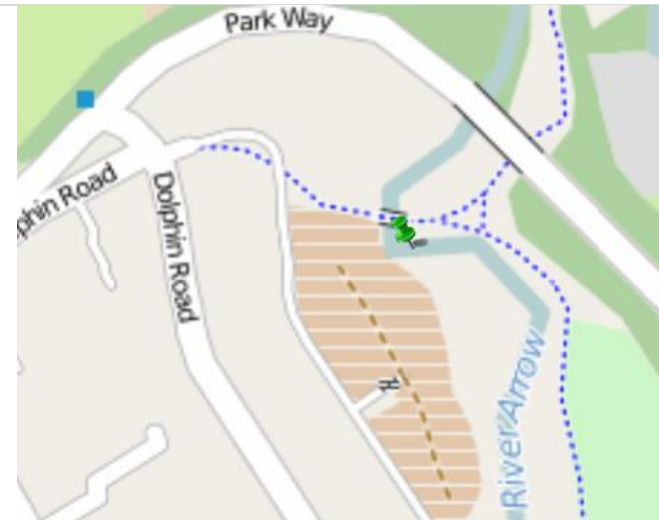


Access: Via Dolphin Road and Walk along National Cycle Route #5? To footbridge

OSGRID:405270268364

Lat: 52.313318, Long:-1.924134

Site visited: 30/4/14, 10am.



**# 7** Arrow Valley Lake CP, Redditch

**Lower risk** **34**

Description: High use visitor location, large lake with footpaths, visitor centre, fishing pegs. Overhead power line across one section (adjacent to centre). Large play area nearby. Lake is well managed with natural sections of planting/grading along with barriers placed along several key points. Footpaths are set back in the main, well lit and flat. River Arrow runs parallel to western lake edge. Watersports activity and lifesaving club on site.

Incident history: Inconclusive. Probable high use and low confidence of reports.

Mitigation options: (i) Ongoing monitoring and snag fixing.

Other comments: Principle site in country park. Main issues will result primarily from volume of users rather particular hazards on site.



**Principle hazards observed**

Water

- (i) Depth/Temperature
- (ii) Volume of users
- (iii) User behaviours on/near water
- (iv) Adjacent weirs on River Arrow.

Other

- (i) Power line overhead with fishing pegs in vicinity (signage in situ).

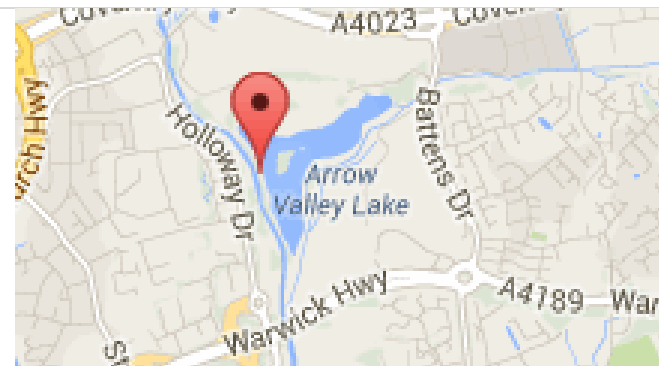
Access: Via Proctors Barn Lane. Height controlled barrier and car park at lake. Variable height, removable posts.


OSGRID: 405911267340

Lat: 52.304137, Long: -1.91473.

Postcode: B988YW = New Meadow Rd.

Site visited: 30/4/14, 2pm.



# 9	<b>Ipsley Pool</b>	<b>Lower risk</b>	<b>39</b>
<p><u>Description:</u> Small lake with fishing peg and footpath around. Adjacent to R. Arrow. Fishing peg on northern aspect, deeper meadow area on southern aspect, 'deep water' sign in situ. Ambient lighting good, road light also along SW aspect.</p> <p><u>Incident history:</u> Inconclusive. Possible - with low confidence of reports.</p> <p><u>Mitigation options:</u> (i) Ongoing monitoring (ii) Consider improving interpretive signage as part of wider borough work.</p> <p><u>Other comments:</u> Nice location, principle hazards are power line and slip/fall issues. Water safety issues arise from nearby R. Arrow (site #9.1). Observed some 20 cars parked onsite during the approx 1.5 hour visit.</p>			
<p><b>Principle hazards observed</b></p> <p><u>Water</u></p> <p>(i) Depth on southern meadow aspect (ii) Access to River Arrow mill section.</p>	<p><u>Other</u></p> <p>(i) <u>Over head power line near to car park and footpath - close to fishing peg.</u> (ii) Signs of drug use in locality. (iii) STF hazards around step on southern edge (iv) Erosion of bank along aspect o f southern edge.</p>		

Access: Via Old Forge Drive. Ipsley Pool car park has a locked restricted height barrier.

OSGRID: 406124266289

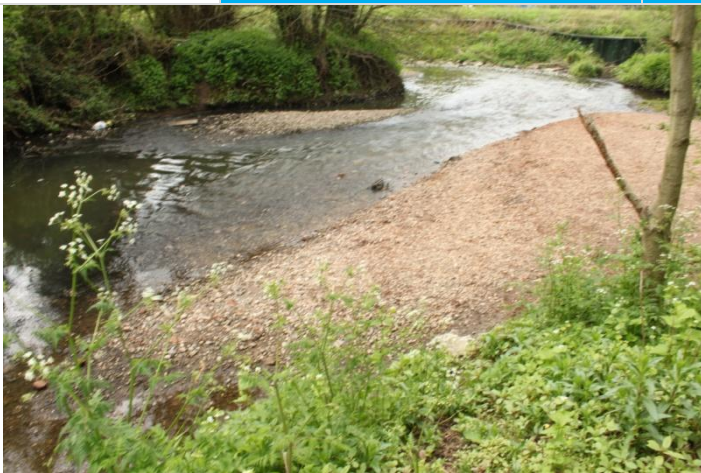
Lat: 52.294688, Long: -1.911621

Postcode: B980AJ = Ipsley Church Lane (NW of lake)

Site visited: 30/4/14, 2pm.





<b># 9.1</b>	<b>River Arrow (at Ipsley Pool)</b>	<b>Lower risk</b>	<b>50</b>
<p><u>Description:</u> Stretch of river running from reinforced bank at road section to bridleway and 'mill' workings. Post and rail placed alongside river bank at key locations.</p> <p><u>Incident history:</u> Inconclusive. Possible - with low confidence of reports.</p> <p><u>Mitigation options:</u> (i) Ongoing monitoring (ii) Consider improving interpretive signage as part of wider borough work.</p> <p><u>Other comments:</u> As per Ipsey Pool - principle hazard is power line and slip/fall issues. Observed some 20 cars parked onsite during the approx 1.5 hour visit.</p>			
<p><b>Principle hazards observed</b></p> <p><u>Water</u></p> <ul style="list-style-type: none"> <li>(i) Current</li> <li>(ii) Obstructions downstream</li> <li>(iii) Temp</li> <li>(iv) Falls from bankside at mill</li> </ul>	<p><u>Other</u></p> <ul style="list-style-type: none"> <li>(i) Falls form bankside</li> <li>(ii) Over head power line near_to car park and footpath - close to fishing peg.</li> </ul>		

Access: Via Old Forge Drive. Ipsley Pool car park has a locked restricted height barrier.

OSGRID: 406124266289

Lat: 52.294688, Long: -1.911621

Postcode: B980AJ = Ipsley Church Lane (NW of lake)

Site visited: 29/04/14, 11am



**# 8 Middle Weir, R. Arrow CP**

**Increased risk**

**59**

Description: Enclosed triangular weir with approx 2500mm concrete freeboard, surrounded by 1100mm flared balustrade. Weir is 2 of 3 along this linear stretch originally designed to take energy out of the river along this canalised section. Situated at W edge of lake, set back in meadow. No significant sign of swimming, although grass cut back on day of visit. No warning sign on location, equally no obvious sign of play/swim in vicinity.

Incident history: Inconclusive. Unlikely - with low confidence of reports.

Mitigation options: S/M term: Monitor. Long term: Remove as part of wider package of work to remodel flow and reinstated natural flow section using nearby brook.

Other comments: No swimming sign not present - logical as no sign of swimming at this location verses Lower Weir. All three weirs should be considered as part of possible engineering package. Note: Assessment of risk will change in higher/rising levels. Most likely that key at risk group are staff assessing/maintaining.



**Principle hazards observed**

Water

- (i) Hydraulic jump ('slot') at critical (undetermined) water levels.
- (ii) Depth and current below hydraulic
- (iii) Temperature
- (iv) Recirculation currents

Other

None noted.

Access: Middle Weir is adjacent (West) of Arrow Lake. Access via Arrow Valley CP car park (Proctors Barn Lane). Height controlled barrier and dropper posts. Circa. 10mins walk.

OSGRID: 405911267340

Lat: 52.304137, Long: -1.91473. Postcode: B988YW = New Meadow Rd.

Site visited: 30/04/14, 3pm



## # 8.1 Lower Weir, R. Arrow, Near Broad Ground CP

Increased risk

67

**Description:** Enclosed triangular weir with approx 2500mm concrete freeboard, surrounded by 1100mm flared balustrade. Access via 'Broad Road' car park or SE lake footpath. Bridleway adjacent to location leading towards basketball court and underpass, and housing estate. Weir is 3 of 3 along this linear stretch originally designed to take energy out of the river along this canalised section. Lots of footfall over bridge and signs of play at both RR downstream bank and critically RL upstream (above lip circled). Graffiti and worn areas (see images). No swimming sign and known (?) swimming spot.

**Incident history:** Inconclusive. Very probable: high use and low confidence of reports.

**Mitigation options:** S/M term: Encourage no access marginal planting at upstream RL bank. Long term: Remove as part of wider package of work to remodel flow and reinstated natural flow section using xxx brook.

**Other comments:** *Potentially very dangerous hydraulic at key water levels,* somewhat mitigated by bad weather. Worth assessing during/after peak flow to assess hydraulic risks. Critical period will be after higher water condition and nicer weather i.e. Visitors back on site immediately after rainy days. Note staff/maintenance risks as per middle weir.



### Principle hazards observed

#### Water

- (i) Hydraulic jump ('slot') at critical (undetermined) water levels.
- (ii) Depth and current below hydraulic
- (iii) Temperature
- (iv) Recirculating currents

#### Other

- (i) Fall hazard on RR downstream wall (end of barrier).

Access: Access options (i) Broad Road Car Park > 2mins walk. (ii) Via Arrow Valley CP main entrance > 15mins walk.

OSGRID: 405996266762

Lat:52.298947, Long:-1.913488. Postcode:B988YP = Broad Ground Rd.

Site visited: 30/04/14, 3pm



<b># 14</b>	<b>Arrow at Warwick highway underpass</b>	<b>Lower risk</b>	<b>40</b>
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**Description:** Basketball court adjacent to canalised section of river. Football set back some 5-8m from waterway. River section clear, no obstructions immediately up or downstream. Faster flowing water at higher flows.

**Incident history:** Fall/claim at location. Possible play spot.

**Mitigation options:** (I) Monitoring and site snagging.

**Other comments:** Useful location for allowing teens to congregate. Near to monitor impact of this in relation to 'Lower weir' (Site #8.1).



**Principle hazards observed**

Water

- (i) Variable current
- (ii) Canalised river
- (iii) Temp
- (iv) Play site adjacent

Other

- (i) Underpass, known congregation sue for drinking
- (ii) Underpass 'floods' are STF issues

**Access:** Access options (i) Broad Road Car Park > 5mins walk. (ii) Via Arrow Valley CP main entrance > 20mins walk.

**OSGRID:** 406009266758  
 Lat: 52.298909, Long: -1.913296 Postcode: B988YP= Broad Ground Rd

Site visited: 30/04/14, 3pm







**# 10 'Beach' South of Ipsley Pool**

**Increased risk 61**

Description: Dogleg section of River Arrow. Path leading down to beach/wooded area. River doglegs through some 70degrees in section. Steep bank on RR, beach on RL. Pools of deeper water with base current through, fallen trees and obstruction above and below waterline. Pleasant 'beach' space above with (which will flood?) during higher flows. Known play, visit and swimming spot. Close to bridleway and route to pool.



Incident history: Inconclusive. Probable high use location and low confidence of reports.

Mitigation options: (I) Ongoing monitoring (ii) Clearing watercourse (iii) Possible education / interpretive information i.e.. You are here.

Other comments: Pleasant location with good views form land side. Paths lead to location and is obviously a known visitor spot.

**Principle hazards observed**  
Water  
 (i) Deeper, flowing water  
 (ii) Temperature  
 (iii) Obstruction above/below waterline

Other  
 (iv) Visitor behaviours.

Access: **UNCLEAR.**

OSGRID: 406310265870  
 Lat:52.290921, Long:-1.908894  
  
 Site visited: 30/04/14, 3pm





## Discussion

The rate of water-related hospital episodes in Redditch sit moderately within the region and can be considered 'low' against other injuries (Figure 1). However given that drowning and water related harm often results in severe and long term outcomes these findings should not be taken as a sign for complacency.

Accidental fatalities cluster around a relatively small area, predominantly within Arrow Valley Country Park along the river.

There are three sites; Fives Tunnels, Paper Mill Weir and Lower Weir that present 'High' or 'Increased risk' levels to visitors (Table 1). At each of these locations there are a number of controls that can be placed that either adjust access to the most hazardous areas, provide warning to visitors, or help those in the water.

Substantial reductions in the level of risk presented at these locations will require a wider package of work that might include reengineering the canalised section of river, removing weirs and features that present fall from height risks. These will involve a capital investment and, as they are within the Scheduled Ancient Monument (SAM) area, more complex negotiations to achieve an acceptable outcome. Having noted these issues, there is also an opportunity to restore aspects of the river to a more natural state, whilst possibly improving flood mitigation efforts.

Other locations assessed fall within a 'Medium' to 'Lower risk' level; ensuring these sites are monitored and snagged is the most cost effective measure available. These locations can broadly be described as (i) Natural linear rivers section (ii) Natural dogleg/meandering river sections (iii) Lakes with natural edges (iii) Rivers with steep/cliff edges (iv) Bridges and crossings with fall risks. It may be productive to develop generic assessments of these types of features, with similar control measures options, to which a comprehensive list of sites can be categorised within. This will enable the focus of effort to be on inspection/snagging and maintenance.

At Paper Mill Weir, a combination of better placed information, fencing along the path edge and rescue equipment was discussed. The rationale for the fence/sign is to demark the area, so that visitors who choose to go beyond this point are aware of the risks presented.

Sitting rescue equipment can be problematic; it is easily stolen, vandalised and in some circumstances may be perceived as an encouragement to swim at that location, rather than provide support at a particularly hazardous location. If the decision is made to site equipment at the location then a reach pole or throw-line and a float may be the most appropriate equipment.

If the equipment is to be sited, using a 'three-strike' policy may be effective in engaging the local community and offsetting the longer term issues from vandalism and theft. In short, the 'three-strike' approach, considered by authorities in the UK and more widely used in Australia works as follows:

- Local community is involved in discussion re. use of rescue equipment and its limitations. Basis and rationale for placement is set out i.e. a last chance resort and will only be maintained for 'three' losses in any one year/period.
- Inspection regimes notes and logs ongoing.
- First loss/vandalism – replaced.
- Second loss/vandalism – replaced, but noted in local press and with community.
- Third loss/vandalism – replaced with discussion and/or support of councillors.
- Fourth loss – removed, noted publically.

Ultimately the aim is to provide equipment only where absolutely necessary and most useful. The rescue equipment is community asset for public safety, loss etcetera should be noted among the community, and if needed pushed as a local political issue.

Approaches to community education and awareness programmes, in particular swimming and water safety lessons in school, additional workshops with key schools were discussed and should be commended.

Staff who are expected to assess, and maintained water side locations should be equipped and trained in basic personal water safety awareness and rescue skills.

### **Conclusions**

The majority of the sites assessed were found to be in good condition, not presenting undue or non-obvious risks to visitors.

Three sites presented higher risk, mainly due hazards inherent in the feature and ease of visitor access, these will need short term measures whilst a longer term package of work is considered. Some sites have a significant number of trip hazards, along with structures that present fall from height risks.

Across the sites as a whole, information could be improved, but there is a logic behind placement (or not) of safety information.

It is clear that officers are aware of the risks, and are taking steps to manage these. Improvements can be made to written risk assessments and recording. It is less clear how internal works raised, snagging and maintenance is monitored.

Although the reported hospital admission rates are low, given the volume of activity, and proximity of water, managing water safety should remain a priority issue for the Council.

Wider efforts to engage the community to address water safety should continue to be encouraged, including at a political level.

### **Recommendations**

A number of recommendations have been made within the site specific sections. The following should be considered across the Council.

<b>Key Recommendations</b>			
<b>#</b>	<b>Description</b>	<b>Target</b>	<b>Lead</b>
1	Engineering improvements efforts should be considered and focused upon (i) Five Tunnels (ii) Paper Mill Weir (iii) Lower Weir.	12-18months.	
2	Ahead of #1, short to medium term improvements should be developed to the above locations.	3-6months.	
3	A water safety policy should be drawn up by the Council.	12-18months.	
4	Ahead of #3, a series of updated risk assessments and monitoring regimes should be updated and agreed. A mixture of generic and location specific approaches can be applied to Council assets, creating a graduated approach.	Underway. Target 12-18months.	
5	A definite list of the significant water spaces owned by the Council should be agreed. Linked to #7 (Gazzeter)	Underway. Target 6months.	
6	Prioritise building and gathering a joint Police/Fire/Ambulance dataset. This could utilise and work with the national WAID system.	ASAP. Community Safety Partnership.	
7	Prioritise access and sharing of the location gazetteer.	ASAP. Community Safety Partnership.	
8	An updated and consistent/balanced approach to visitor safety information should be developed. In part developed on access to #7 (Gazetteer)	8-10months. Open spaces team.	
9	Key staff expected to assess locations should have water safety awareness training (preferable SRT1 or equivalent).	When practicable. Open spaces team.	
10	Patrols and awareness raising efforts at key times/locations (#1) and within catchment schools/communities should be commended and continued. Ideally the effectiveness of these efforts should be evaluated.	Underway.	

Table 3: **Key Recommendations**

## **APPENDICIES**

### Enclosed

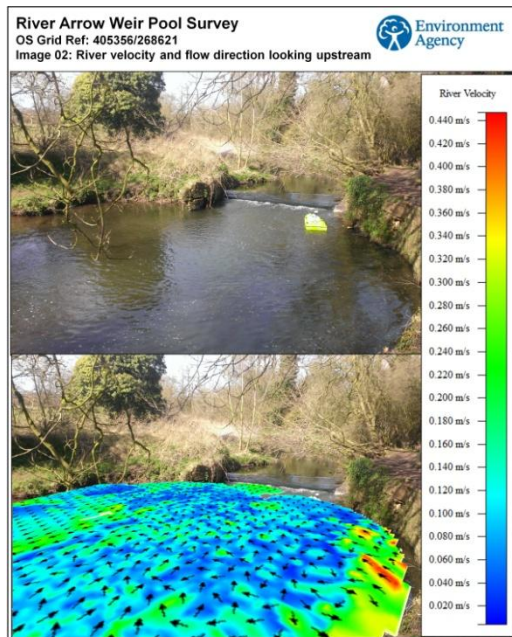
- Selected images from Paper Mill Weir flow/depth survey by Environment Agency

### Separate

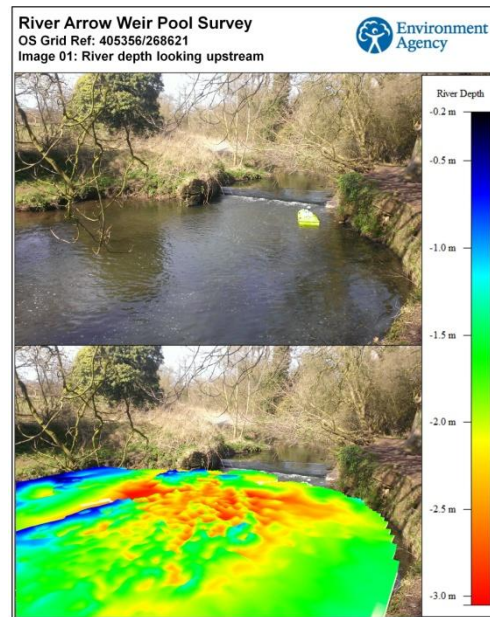
- Public rescues equipment
- Inland risk assessment
- Template RA for generic areas
- Excel sheet holding site review findings and releasable incident data

## Appendix 1: Environment Agency site survey images and comments, April 2014

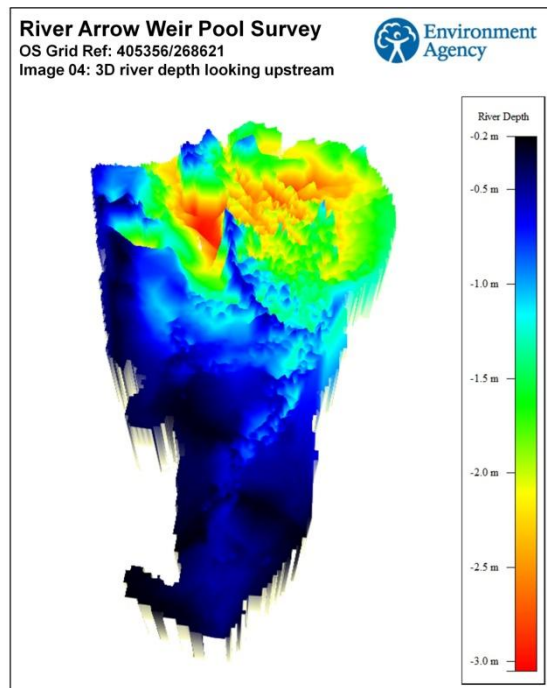
Selected images and notes are from EA staff:



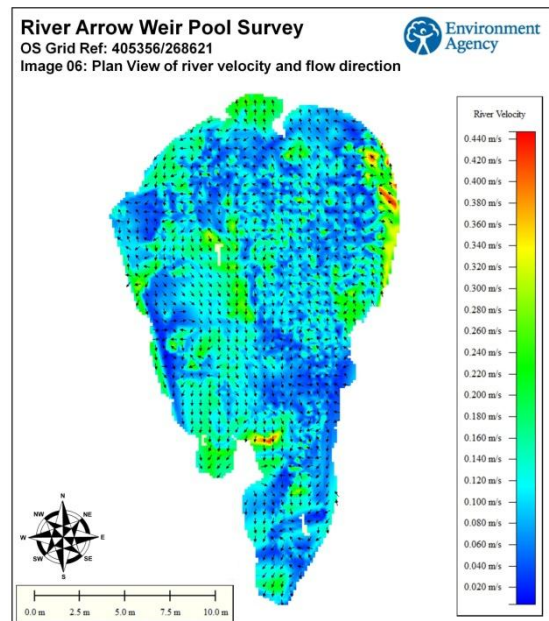
This shows the average velocity at any given point. Velocities are generally relatively low, apart from a section on the near bank which is approaching 0.45 m/s. The arrows show evidence of considerable radial flow patterns (backwards and circular flows), especially so on the bank near the camera. The highest measured velocity is directed backwards towards the weir.



The river seems relatively benign, however the depth in the weir pool exceeds 3m with some particularly deep voids in the river bed. Within the visible section in image 1, the river is generally deeper than 1.5m however there is a narrow section (well away from the banks) which is perhaps only knee deep and then falls away into a 3m deep pool on approach to the weir.



This is a 3D view looking upstream. Again it shows the relatively shallow water at the downstream entry point with deep water in the weir pool.



This a plan view (looking down from above) showing the river velocity and direction. It shows evidence of a very confused flow pattern in the deep weir pool. The arrows should generally align in the direction of the river flow (as they do in the bottom half of the image), however in the weir pool the river is demonstrating whirl pool characteristics with no clear direction of travel. The radial flow patterns show a re-circulation back towards the weir, and the force of this would likely attract floating objects back towards the weir.

