The good, the bad but we won't show you the ugly…

OUSEBURN CATCHMENT ACTION PLAN

April 2009

OUSEBURN CATCHMENT STEERING GROUP

www.ouseburnplan.blogspot.com

EXECUTIVE SUMMARY

Over the last 3 years the OCSG has worked with the public and professional bodies to create a forum for information exchange and debate within the Ouseburn catchment. The abundance of local interest and the pressing need to address flooding, water quality, ecology, access and amenity issues throughout the catchment make the findings and recommendations of this report vital to future European Water Framework and Flood Directive and flood alleviation plans. The kind of joined up thinking that we propose here should allow ***all*** the partners to benefit from holistic solutions to environmental problems in a time of land use and climate change. The group has gathered all the relevant information and people together to give a single set of proposed actions that could greatly improve the Ouseburn area in the short and long term. The report reviews all the relevant legislation and activities that affect the Ouseburn area. The importance of new information, ideas, scientific studies and new technologies are reviewed to show that there are new ways to manage the Ouseburn in the future. The need for professional bodies to collaborate and create joint solutions may be obvious but is it not yet a practical reality. Equally the need for professional bodies to listen and respond to the needs of the local population, even if it has improved greatly, is still weak with regards to follow up actions after public consultation. We hope the evidence and actions listed here will promote a series of solutions that will address catchment scale issues like flooding and pollution whilst creating a better place for us all to live.

The key recommendations to tackle fundamental flood and water quality issue problems in the Ouseburn are listed below. Many of these recommendations arise from the Making Space for Water Project carried out in the Upper Ouseburn, followed by a number of smaller studies carried out by Newcastle University

- The Sustainable Urban Drainage Systems (SUDs) scheme in the Newcastle Great Park development is a great asset to the Ouseburn and there is no evidence that new estate is causing flooding or giving any significant water quality problems. The issue of disruption and trash arising from the development continues to be an issue of great contention and all parties must make efforts to keep the Ouseburn 'visibly' clean.
- The SUDs need to be adopted by the city and developed as valuable parkland for all. The issue of whether the SUDs was built as designed has been a severe waste of time (taking several years). Nature, in its own way has provided all the evidence we need to resolve this issue. Newcastle University has established that the SUDs do work correctly. The September 2008 flood has shown that the SUDS will overtop and that no water backed up from the pond into Melbury estate. There is now clear evidence that a large source of water is entering the SUDs which may make most of the original design criteria relating to storage capacity rather obsolete. The SUD seems to be well built but are now filling slowly with sticky, but quite clean sediment.
- The potential to divert Ouseburn river flow through the SUDs has been considered and rejected by a joint working group of the Environment Agency (EA), Newcastle City Council (NCC) and Northumbrian Water Limited (NWL). We recommend that the reintegration of the River Ouseburn with the SUDs is an obvious intervention. However, we do accept that the current complex bureaucratic and legal situation of makes the proposals to manage the SUDS in a more holistic way, unlikely to occur in the near future.
- Further studies carried out by the university reflect the chronic nature of the pollution levels in the Ouseburn and have made a good case for using the SUDs as passive reed bed treatment zone for most small to medium storms. Larger food flows would continue to operate in a similar way as seen inthe September 2008 floods.
- An option to raise the main overflow level of the SUDs is also possible, as the SUDs can store significantly more water and will not cause flooding in the Melbury estate. The ability to remove high flow from the Red House Farm (RHF) close to the Combined Sewer Overflow (CSO) outfalls would reduce flood risk and improve water quality issues in the Upper Ouseburn. Please note, these actions would have great benefits but will not alone eradicate the flood risk and water quality issues but they could be one step towards an overall solution.
- The Kingston Park (KP) sewer outfall can contribute up to 70% of the river flow in the Ouseburn and can create problems in the Red House Farm area and Gosforth. It is also very clear that water quality from the KP outfall is terrible, giving a range of high faecal, BOD, TOC and heavy metal contamination.

- The KP residential and industrial estates must be retrofitted with green roofs and SUDs and flow from KP may need to be partially filtered or treated before it enters the Ouseburn.
- The issue of urban runoff is quite simple but rather difficult to resolve. Generally, the design of sewer outfalls assumes that there is only a small amount of water running in the river. The impact of this design "flaw" is that the outfalls' are almost certain to be drowned out in any significant storm event. £3million pounds worth of expenditure has lowered flood risk in some of the RHF estate but has in fact just moved flood flow from Red House Farm area to the Gosforth area. The drowning out of the CSO issue RHF itself was not addressed and Acomb Crescent was once again flooded in September 08. Whilst we believe that NWL cannot afford to fix or raise the outfalls, the kind of large capital expenditure potential of NWL would be better placed in reducing the amount of water entering the sewers in the first place and reducing the deluge of water that reaches the Ouseburn. There is a need for both new and old estates to help tackle the large volumes of runoff being produced by impermeable areas. Water **must** be stored, attenuated and infiltrated locally on residential/industrial properties or within estates at suitable locations. This will require a considerable paradigm shift in thinking at NWL, EA and NCC as suggested by the Pitt review.
- Tackling the KP outflow issue flow could benefit greatly by diverting some flow into the Melbury SUDs.
- We propose that large amount of flood flow and sediment arising from the rural areas needs to be trapped and stored within riparian zones. The potential to mange runoff in this way has been explored in the Ouseburn area and trials in the Belford area show that it is technologically possible. We would envisage many ponds and wetlands being established throughout the Ouseburn, ranging from the expansion of Callerton Ponds and numerous features within farmers' fields. The potential for these sites to give new ecological habitats and offer more access and amenity is also obvious.
- Jemond Dene Lottery funding is greatly improving a valued area of the Ouseburn; however there is no funding being used to tackle watery issues, for example by helping to store, clean and convey flow through the parks. Water issues need to be addressed by the lottery funded redevelopment of Jesmond Dene.
- The Ouseburn barrage has gone ahead and so there is an urgent need for work and study in this area. The impact of high flows of both riverine and estuary origin have not yet been satisfactorily resolved. The amount of sediment, and its poor quality, in the area is being underestimated. So there is a need to evaluate the situation in the Lower Ouseburn and any future development of the area and the local tunnels.
- The potential to carry out more scientific studies in the area is also vital; the small amount of evidence gathered so far has greatly improved our knowledge of the functioning of the Ouseburn. Studies to tackle the intrinsic water quality problems and food risk are needed. The implications of further land use change and climate change need to be addressed. The water quality standards for the Ouseburn are either wrong or non-aspirational and need to be reevaluated in the light of new evidence.
- Conveying to the message to the public about the complex nature of the Ouseburn is still needed. The public do not want to be patronized and just need to know as many facts as possible. Public and local pressure groups are a great asset to the action plan. There are many issues on local ditches, golf courses, allotments and parks that the local population can help to resolve if they are asked. Most interventions could follow the simple suggestions outlined in this report. Faith in the public and the increased funding of local rangers and local groups is an immediate win win option for all.

Thus we make these recommendations in the hope that, for relatively small investment, that great improvement to the Ouseburn can be achieved. The joined up approach with jointly funded activities have the potential to help all the parties trying to address these issues in the Ouseburn. Our lasting memory of the last three years is that all parties are keen to address the issues and have actively contributed to the public debate. The problem has always been that people are very busy, the area of their remit is too large and basic difficulty in putting together jointly funded initiatives remains a fundamental barrier to future progress. This barrier will not be easy to remove but is more likely to happen when all the parties see that they would benefit from this simple, catchment scale, holistic solutions to local problems.

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ABBREVIATIONS

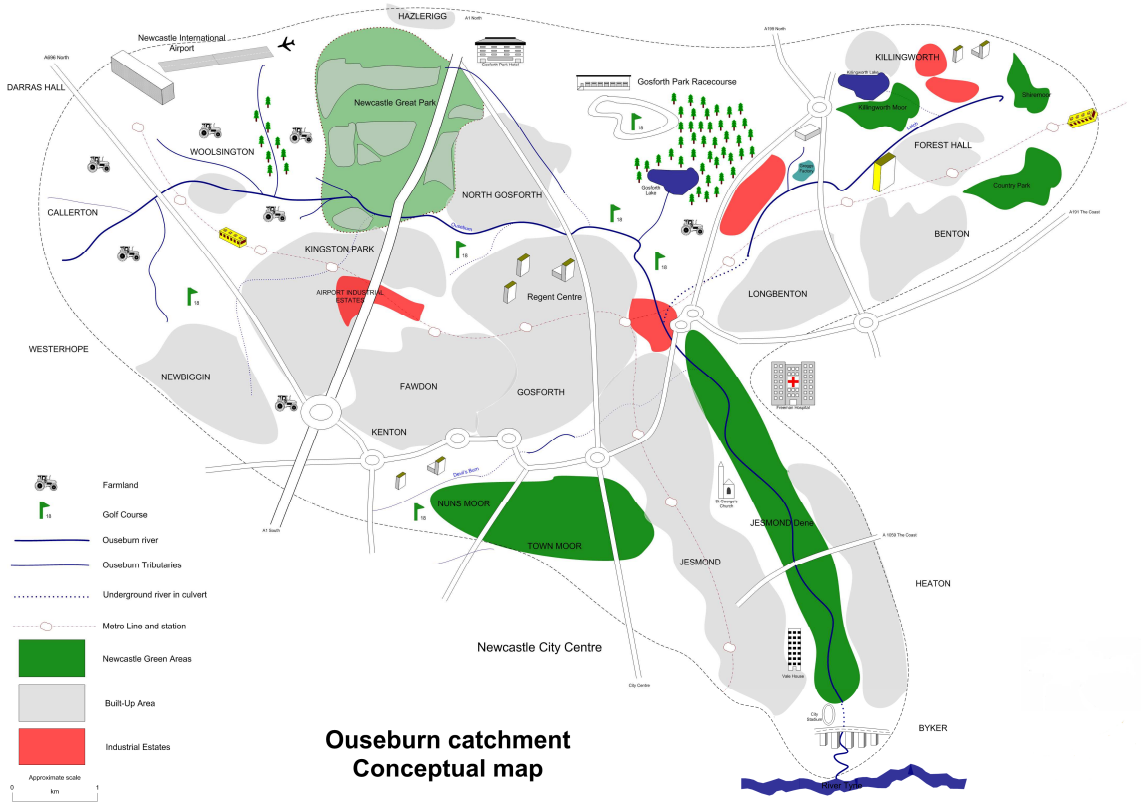
CAA	**Civil Aviation Authority**
COW	**Critical Ordinary Watercourse**
CLUWRR	**Centre for Land and Water Resources Research**
CSO	**Combined Sewer Overflow**
DEFRA	**Department for the Environment, Food and Rural Affairs**
EA	**Environment Agency**
EU	**European Union**
KP	**Kingston Park**
IUDM	**Integrated Urban Drainage Management**
JBA Consulting	**Jeremy Benn Associates Consulting**
NCC	**Newcastle City Council**
NGP	**Newcastle Great Park**
NIA	**Newcastle International Airport**
NRA	**National River Authority**
NWL	**Northumbria Water Limited**
NWT	**Northumberland Wildlife Trust**
OCAP	**Ouseburn Catchment Action Plan**

OCSG	**Ouseburn Catchment Steering Group**
ORUG	**Ouseburn River User Group**
RHF	**Red House Farm**
SEA	**Strategic Environment Assessment**
SUDS	**Sustainable Urban Drainage Systems**
SNCI	**Site of Nature Conservation Importance**
SSSI	**Site of Special Specific Interest**
UNEW	**Newcastle University**
WFD	**Water Framework Directive**

Acknowledgement

The OCSG would like to acknowledge all those people who helped contribute to writing this action plan, however the role and the input of Sebastien Tellier, The OCSG Coordinator, has been especially high. Sebastien has now returned to France and will no doubt begin to sort out all their problems too.

Figure 1: Ouseburn catchment conceptual map



This document has arisen from three years of engagement with the different local, regional and national partners working within the catchment. Our main mission was to create a forum where the public and the professionals could discuss catchment issues (flooding, water quality, development control, ecology, etc). Over the years we have increased our knowledge on these issues and we have passed on the information to all our members. We believe that being better informed can lead to better decision making and that is exactly what we would like to see for the Ouseburn in the next five years.

This document first looks at the previous reports on the Ouseburn from different organisations (Newcastle City Council, Environment Agency, JBA, Tyne Rivers Trust and Atkins) and proposes a short summary with the most relevant information for our action plan. The second part will review the recent Pitt Review and the Water Framework Directive and looks at its recommendations and how we could link them to our proposed actions. Finally we introduce the Ouseburn Catchment Action Plan (OCAP) which may help integrate the efforts of all our members for a better and more holistic management of the Ouseburn catchment. You can find in Appendix A the list of our active members.

LITERATURE REVIEW

This short literature review contains two sections, the first one focuses on reports specifically on the Ouseburn and plans collected during the last five years and integrates their key points it into the OCAP. The second section looks at the Pitt Review and highlights the relevant recommendations for the OCAP.

1. National River Authority (NRA) consultation report for a catchment management plan for the Ouseburn (February 1993)

This consultation document from the Environment Agency represented the first step towards a catchment management plan as it listed the different catchment management issues (flooding, ecology, amenity, etc) and proposed objectives and actions to achieve improvements. Unfortunately this document was not followed by a real catchment plan as it was neither fully adopted by the different local authorities (Castle Morpeth, North Tyneside and Newcastle City Council) nor even the Environment Agency. In total 16 objectives were drafted and some of them are still relevant to this day (improving riverside amenities, improving diversity of the invertebrates, reduce flood risk to properties by creating medium flood storage ponds along the Ouseburn and improving and maintaining fisheries in the catchment, etc). On page 46, the following quote can be found "in order to achieve maximum benefit to environment and flood management there is a preference for a small number of larger storage areas rather than several small ones with limited enhancement potential".

The different parties involved in these objectives addressed some of the objectives as part of their ongoing activities in the last 16 years but fell short of achieving the holistic goals proposed in the plan.

Following floods in 1978 and 1979 half a metre of silt was taken out from the invert of Three Mile Bridge. The improvement was carried on upstream with desilting of the watercourse along the perimeter of the Newcastle Golf Club extending through the farmland up as far as Brunton Mill. Minor desilting was also done between Salters Bridge and the Gosforth Golf Course at Whitebridge. Water levels at Brunton Park were lowered by about 400mm by this work.

2. River Ouseburn Strategy Scoping Study (CLUWRR – Centre for Land and Water Resources Research, August 2002)[1]

In 2002 CLUWRR conducted a scoping report for Newcastle City Council to gather the views of the three main regulatory bodies working in the Ouseburn: Environment Agency, Northumbrian Water Limited, Newcastle City Council. This document was also written as Newcastle City Council (NCC) was awarded an INTERREG IIIb project (PURE project) where catchment-wide strategy and management was to be applied in the Ouseburn. One of the main report recommendations was to improve the communication between the three organisations and also with the public and draw a catchment plan for the Ouseburn. Newcastle Great Park was mentioned as an opportunity for the Ouseburn in terms of flood control and water quality improvements. The document identified the most pressing issues as below:

- Increase the river's visibility and the Ouseburn identity;
- Promote river restoration;
- Address flooding concerns;

[1] Amezaga, J. M. and W. Spice (2002). River Ouseburn Strategy Scoping study. Newcastle University and Newcastle City Council.

- Update the Biodiversity Action Plan;
- Clean the river;
- Exploit the amenity value of the Ouseburn.

Newcastle University (UNEW) and NCC worked together on a European Project called URBEM (Urban River Basin Enhancement Methods) between 2002 and 2005. The Ouseburn was one of the case studies and it was an opportunity to meet the various parties and develop a relationship.

3. Strategic Environment Assessment (SEA) plan for the Ouseburn (December 2004)

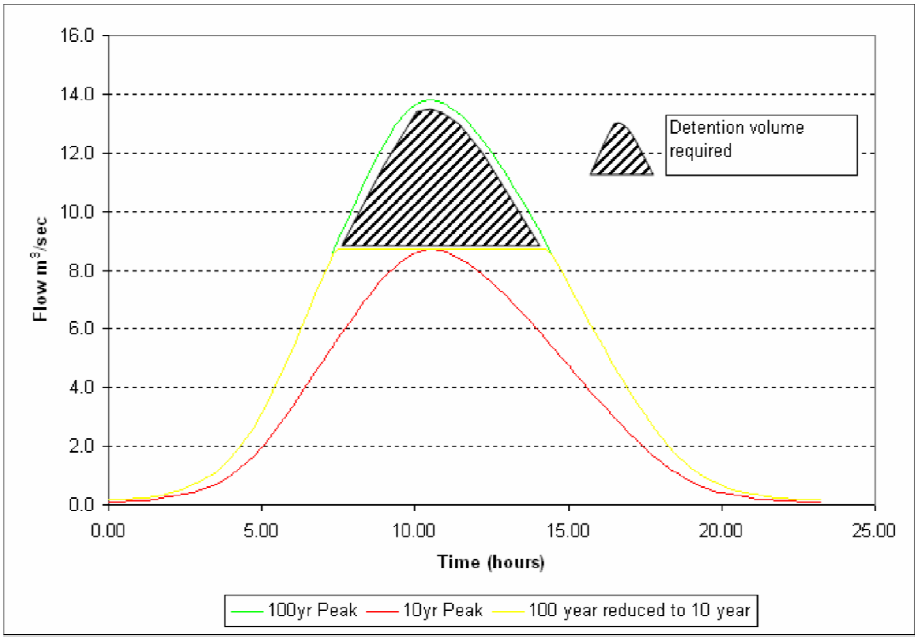
The SEA was commissioned by Environment Agency to Atkins and was released at the end of 2004. This document is used to identify and assess the impacts of flood management strategy onto the existing environment. Within the catchment there is one Site of Special Specific Interest (SSSI) with Gosforth Park and four Sites of Nature Conservation Importance (SNCI) (Fencerhill Wood, Callerton pond, Jesmond Dene and Ouseburn Meadows).

Section 4.2.2 of the report states the key issues and objectives for the Ouseburn catchment in 2004 and can be found in Appendix A of this report. Now, five years later, it could be relevant to update the status of the different objectives.

4. Pre-feasibility study for Ouseburn (November 2005)

The Pre-feasibility study for the Ouseburn river was undertaken by Atkins and a draft document was released at the end of 2005. This study took into account the SEA and proposes new flood defence schemes in the catchment. However as the proposed schemes have a very low score (0.91 is the best score amongst the proposed schemes with 15 being the threshold for DEFRA to fund a scheme), none were ever implemented. Atkins recommended to store 80,000m^3 to limit flooding downstream of the A1. This volume of water corresponds to the difference between the 100 and 10-year return period event as shown below.

Figure 2: Volume of water to store to reduce the 100 year event to the 10 year event



This value remains an important talking point and is cited every time the Ouseburn floods. Atkins assumed that the 100-year return period event will occur during the same time as the 10-year event.

This is unlikely as larger events are not just about more rain falling during the same duration but can also be due to a combination of factors (high intensity rainfall, very wet soil generating large amount of runoff, storm duration longer than 24 hours, etc). The OCSG would like this value to be either re-calculated using the data collected by UNEW in the last three years as it includes a range of events for the Ouseburn or a more generic commitment from NCC and the EA to greatly increase the physical storage and attenuation of runoff within the catchment.

5. Pitt review (June 2008)

After the Summer 2007 floods in England, the British government commissioned Sir Michael Pitt to review the lessons to be learnt after the events. The final report was published in June 2008, a year after the floods. During these events 55,000 properties were flooded and around 7,000 people were rescued from the floodwaters by the emergency services and 13 people died. The report is very comprehensive and we decided to focus on the recommendations we see the most relevant to the OCAP (the text from the Pitt Review is in italic):

- The Pitt Review recommends *"a wider brief for the Environment Agency and asks councils to strengthen their technical capability in order to take the lead on local flood risk management. More can be done to protect communities through robust building and planning controls. The last twenty or thirty years have seen the technical departments of local authorities significantly diminished and in some places closed or merged and he observed that around a quarter of the homes flooded during the summer were built during the last twenty- five years in areas of flood risk"*. Here, Newcastle City Council had never been confronted with flooding until recent years and therefore might not have in its team enough officers to tackle this issue in terms of experience and technical knowledge.
- *Groups who want to take action to alleviate floods risk in their communities. At the moment, this kind of scheme can end up being too low a priority for the Environment Agency. The Government should be encouraging more local communities to promote innovative schemes, including contributing towards the costs themselves, with appropriate technical support from local authorities and the Environment Agency. Locally funded flood defences should become a bigger feature of this country's flood risk management, not an exception brought about through unusual circumstances as they are now*. This is something we would like to happen in the Ouseburn and will urge all parties to address it.

> *"Integrated Water Resource Management should be expected to result in the increased adoption of multi functional solutions; for example, the creation of wetlands to simultaneously tackle water quality problems, provide flood storage, and enhance biodiversity. However, multifunctionality has at present to be delivered through single function budgets. In particular, the only significant capital budget available to the Agency is that for flood and coastal defence. Whilst Defra is currently funding a study on how best to implement multifunctional solutions through the single functional budgets of different stakeholders, it is a pity that the Agency does not have the power to raise some broader 'catchment improvement' levy which could be used for such multifunctional schemes. This would probably make it easier for it to work with the other stakeholders in delivering such schemes. Such funds might have been raised through charges for abstractions or discharges."*
>
> Evidence by Colin Green, Flood Hazard Research Centre, House of Lords Select Committee on Science and Technology – Inquiry into Water Management, August 2005

- Installing new or retro-fitting green roof technology on people's house, creating small ponds and controlling runoff in garden and driveways may help to reduce and control storm runoff but the OCSG sees it as an excellent incentive for residents to feel more connected with flooding and maybe water use. We believe that financial incentives should be in place to support this technology and the Ouseburn could have two demonstration sites (new and "old" housing stock) to promote Newcastle's adaptability to climate change.

The EA is only entitled to act in main rivers and they are powerless to influence the management of ordinary watercourses which, under the Land Drainage Act 1991, are the responsibilities of local authorities, who

have the power to take action against land owners to maintain the watercourse to a suitable standard. Some of the watercourses are included in a list of high risk sites, designated as Critically Ordinary Watercourses (COW). The EA has recently been commissioning Flood Risk Studies to assess local flood risk.

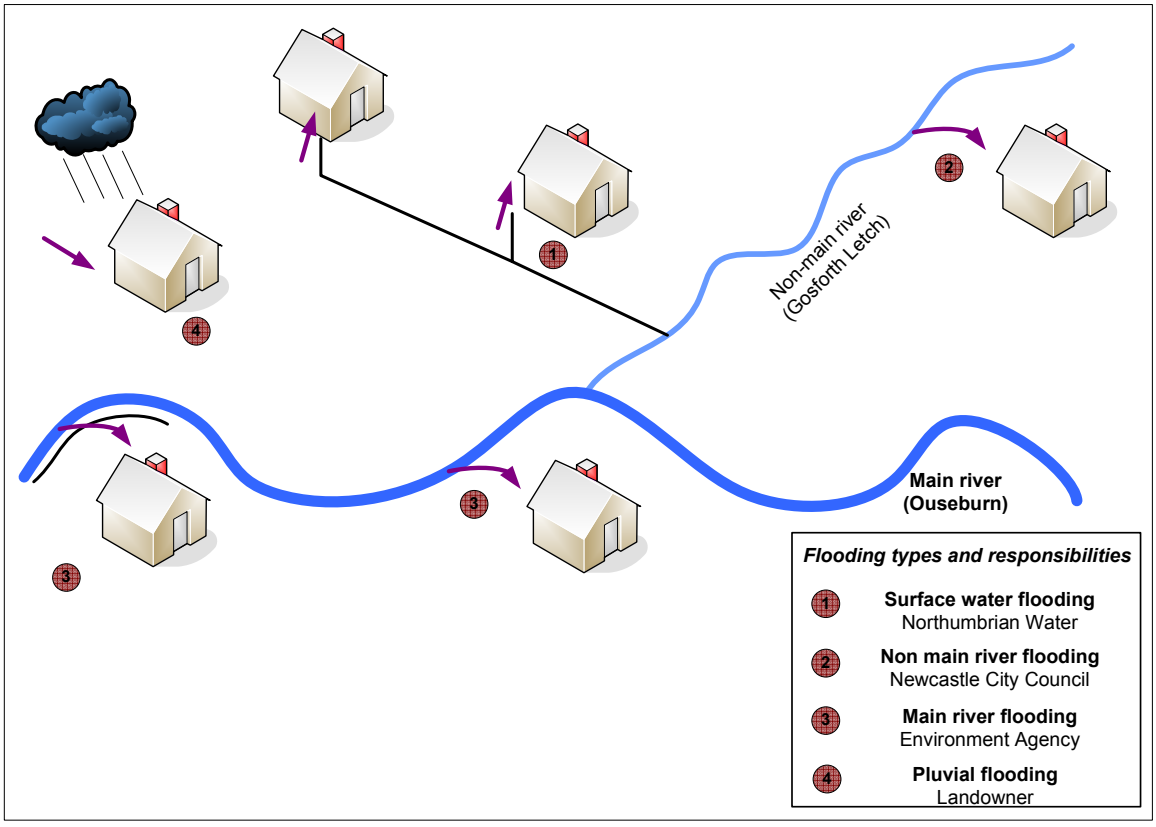
Government Response to Pitt review (December 2008)

The government responded to the Pitt Review in December 2008 and agreed to work towards most of the recommendations from the review. It also entails a detailed timetable until December 2009 in the Annex C of the response, with milestones up to 2013. This represents a very detailed commitment from the government and we will have to wait to see how it is translated into actions on the ground and what it could mean to the Ouseburn in the coming years.

Draft Water and Flood legislative bills (first semester 2009)

With the European Flood Directive coming into place in the next couple of years (see the table below, extracted from the Pitt Review) there is a need to make clear the responsibilities for all sources of flooding through new Flood and Water legislative bills. The main changes are for the local authorities as they will have to manage the drainage assets in their area, take ownership of Sustainable Urban Drainage Systems (SUDS), set a collaboration between the different actors for sharing information, draft surface water management plans, etc. The Environment Agency will keep a strategic overview role and also add groundwater flooding as their responsibility. Figure 3 illustrates the current ownerships and responsibilities for the different sources of flooding. Please bear in mind that the real is not as organized as suggested in figure 3 and more often than not there is an overlap of responsibilities.

Figure 3: Flooding and the different responsible agencies



The following table is extracted from the Pitt Review document and gives a brief description of the Flood Directive and the milestones associated with its application in Europe.

Table 1: EU Flood Directive impacts on UK law

EU Floods Directive in UK law

The EU Floods Directive provides a framework to help member states reduce the risk to human health, the environment and economic activity associated with floods. Its main requirements from a UK perspective are:

a) to undertake a **preliminary flood risk assessment** for each river basin district, including associated coastal zones. This assessment includes mapping, descriptions of past floods, flooding processes and any development plans, an assessment of the likelihood of future floods and a forecast for the estimated consequences for human health, the environment and economic activity by December 2011;

b) to use this preliminary risk assessment to designate river basins (including associated coastal zones) or their constituent smaller parts as either liable to potential significant flood risk, or not. Significant flood risk is not defined. The preliminary risk assessments are to be completed by 22 December 2011;

c) to prepare flood risk maps for those areas designated as being at potential significant flood risk, showing extensive detail of expected flooding, and of potential damage to human health, the environment and economic activity. Flood risk maps should be prepared by 22 December 2013;

d) to prepare and implement **flood risk management plans**, establishing what they regard as appropriate levels of protection, and including measures aimed at achieving that level of protection. Flood risk management plans are to be published by 22 December 2015 at latest, and implemented from 23 December 2015;

e) to ensure the active involvement of all interested parties in developing and subsequently reviewing flood risk management plans, and to make the preliminary flood risk assessments, flood risk maps and flood risk management plans available to the public.

River Basin Management Plan for Northumbrian Rivers (December 2008)

Finally, the draft Plan for Northumbrian Rivers and the Tees, Tyne and Wear was released by the Environment Agency in December 2008, as the main instrument for the application of the Water Framework Directive in our region. This piece of legislation gathers several previous European directives into one document and focus on the protection, improvement and sustainable use of the different water resources (river, lakes, coastal water out to one mile, groundwater) and their ecology (plants and wildlife). There is a six-month consultation phase until the 22nd June 2009 and the final plan will be released in December 2009. ***The OCSG will send this current document to the WFD team at the Environment Agency for them to consider and adopt our action plan for the Ouseburn.***

OCSG ACTIVITIES

The OCSG have worked in the last three years in the Ouseburn and you will find below a short history of our findings through our project work and also what we are going to work on in the next 3 to 5 years.

1. PURE deliverable: draft Ouseburn catchment action plan (April 2006)

Newcastle City Council released a draft Ouseburn Catchment Action Plan for the PURE project in June 2006 as part of the deliverables of the INTERREG IIIb project. The OCSG contributed to the early drafts and NCC wrote the final version of the document. This document included views from residents and the main stakeholders on the catchment. The draft plan was sent to the participants of the different workshops held during the project but it was never amended and translated into a final action plan as no more funding was made available to finalise it. The PURE project represented a good exercise to expose a local authority to catchment management principles and the draft plan reflected more of the future work of NCC on spatial planning policy and water issues (flooding, water quality, amenity). The other benefit of this project was that during the last three months of the project, the OCSG was created and we worked towards creating a forum for discussion for catchment management issues in the Ouseburn.

Throughout winter 2001/2002 the Environment Agency desilted and reprofiled the river upstream of Three Mile Bridge to the level it was in 1978. This happened on Newcastle Golf Course, opposite to Brunton Park Estate and helped to move the flood water faster along this section. Unfortunately, it is still interpreted by some of the residents in Brunton Park as a confirmation of the detrimental effect of NGP development on flood risk in the area. As this development is taking place over 15 years, it had, has and will impact on the river (house construction phase, ponds building, moving soil over the river, etc) but it should lessen the flood risks when it is completed.

2. DEFRA Making Space For Water project reports (April 2008)

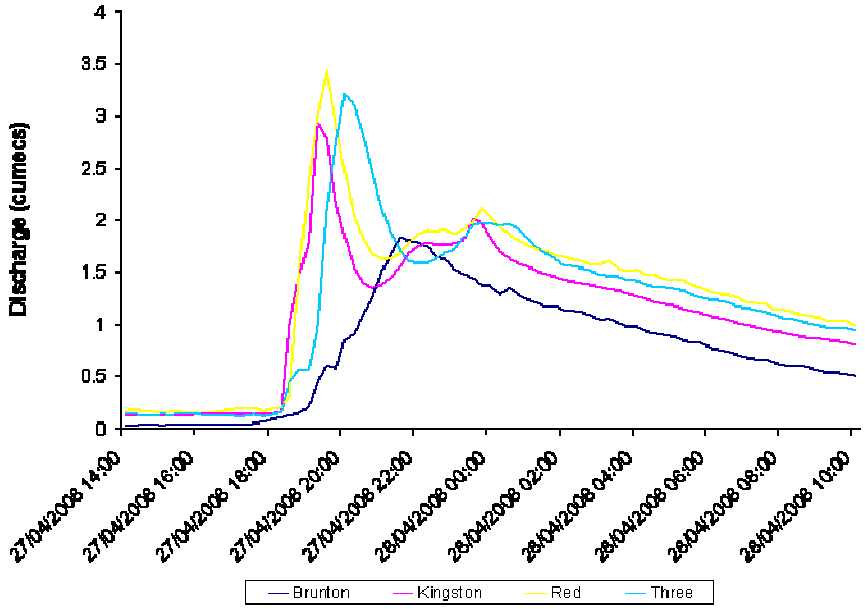
The Ouseburn catchment in Newcastle-upon-Tyne was selected for one of the 15 pilot schemes, here DEFRA are concentrating on; sharing data to better understand the causes of flooding; addressing the institutional barriers to the implementation of Integrated Urban Drainage Management (IUDM) schemes; and, looking at the planning process to develop and test surface water management plans. OCSG and UNEW, JBA, Environment Agency and Newcastle City Council were the partners involved in the project:

- OCSG delivered the public participation component of the project (quarterly evening meetings and 2 large public meetings to disseminate project findings). The main project outcomes were delivered to the public in March 2008 where both scientific, socio-political implications of flood management and land use change where debated in full for the benefit of all participants (residents, Environment Agency, Newcastle City Council, Tyne Rivers Trust, etc).

- UNEW developed a better understanding of the nature of the flood risks around Newcastle Great Park development using new river level and rainfall instruments network in the upper part of the catchment. Even if no large rainfall events were captured during the time of the study (February 2007-April 2008) the study highlighted the large uncontrolled discharge from Kingston Park outfall. This surface water pipe is owned by NWL and drains a 1.73km^2 catchment into the Ouseburn on Cell G. This pipe has a 2025mm diameter and was identified as the largest contribution to the Ouseburn flow through measurement by UNEW and modeling by JBA. This was also confirmed by NWL as they installed a flow gauge within the pipe for the first three

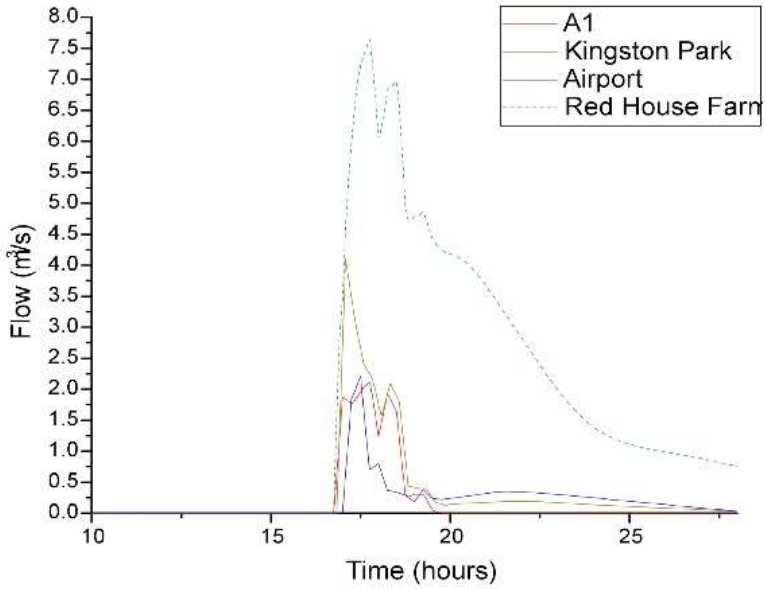
months of 2009. Figure 4 shows the observed urban flow to be up to 80% of the Ouseburn flow during July 2007 event). It also shows the response from the main sources of runoff: the rural (upstream of Newcastle Great Park) and urban components (every residential areas draining to the watercourse) of a flood event in the Ouseburn.

Figure 4: UNEW record of the 27th April 2008 event



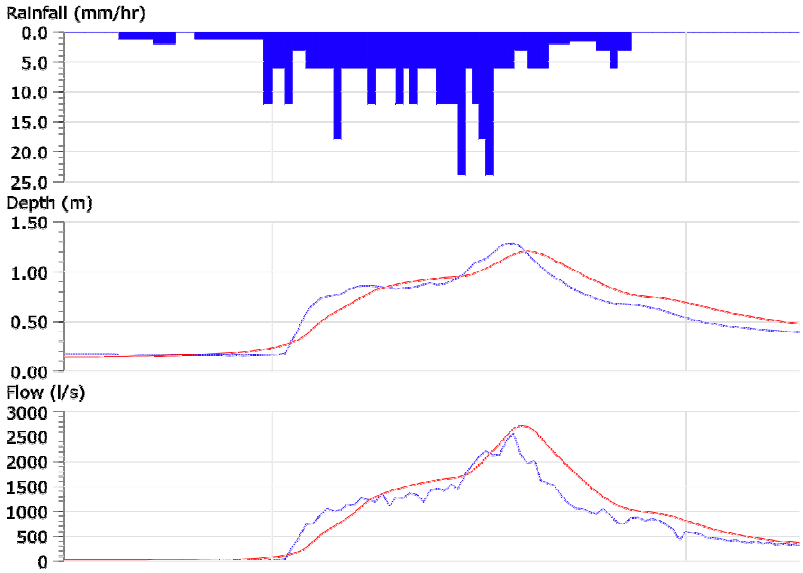
- The importance of the urban component during the June 2005 flood at Red House Farm was also confirmed by the modeling exercise undertaken by JBA Consulting as it demonstrated for the June 2005 event, 50% of the flow was due to Kingston Park outfall discharge. This is illustrated below:

Figure 5: JBA reconstruction of June 2005 Red House Farm flood



- This was confirmed by NWL own estimation for three events in the first quarter of 2008 where they installed a level recorder in the Kingston Park pipe. The graph below illustrates the largest recorded event (27th April 2008 with 24mm rainfall during a 2 hour event) and shows a 2.5m^3/s peak in the sewer pipe.

Figure 6: 27th April event recorded in Kingston Park sewer pipe



Thanks to ENTECUK and Northumbrian Water for lending us their data for the report

- Runoff from the rural catchment during winter events is higher and can dominate the whole runoff regime. If we had a typical long duration winter event and high intensity short duration storm (such as a summer event) we are more likely to get a river flooding through the whole of the Ouseburn study area. This hypothesis was confirmed in September 2008 during the largest flood event recorded in the Ouseburn.

- Property in the various part of the Ouseburn catchment (Red House Farm, Brunton Park, Woodbridge close) are at risk of flooding when the outlets of the sewer system (Surface Water, Combined Storm Overflow - CSO) are drowned by the watercourse. The assumption of free draining sewer outfalls is major problem throughout NGP and Gosforth. The new NWL works at Red House Farm will not change these circumstance, hence the flood risk (although much reduced in Red House Farm) has not been addressed. The likely cost of fixing sewer outfall and CSO's is prohibitively expensive so a more holistic solution is needed that can lower the flow rate in the NGP and Gosforth area (see the action plan)

- As part of the project, Newcastle City Council worked on a study on the changes in the percentage of permeable land found within selected residential neighbourhoods. The study looked at aerial photographs of 11 urban areas taken in 1996 and 2005 and calculated the changes in permeable areas (front and back gardens). The main nature of these changes is attributed to the building of conservatories and extensions at the back and gravelling and paving at the front. The reports found out a 35% increase of impermeable areas over the study area between 9 year period. This finding confirms previous findings from Royal Horticultural Society's 2006 study[2] nationwide in which they report that "almost a quarter of front gardens in the North-East of England are now completely paved, with 47% of front gardens having more than 75% paved with impermeable materials". These two studies demonstrate the need to look at old and new housing stocks and creating "no runoff" houses.

3. Flood levy project (June 2008 – April 2009)

UNEW and OCSG were contacted by the Environment Agency Flood Levy Team to carry on working on the Ouseburn by maintaining UNEW hydrometric network in the Ouseburn and also looking at possible remediation measures to lower flood risk in the catchment. During Summer 2008, OCSG and the different organisations working in the Ouseburn (NWL, EA, NCC, NGP) met to discuss how to lower the risk and increase water storage within the catchment.

We learned during these meetings that surface water outfall pipes are designed assuming free discharge to the watercourse i.e. without taking into account the level of the river during a storm event. We believe that this assumption had an impact on two largest flood events in the Ouseburn in recent years:

- Red House Farm flooding in June 2005 (surface water sewer network was over-surcharged and could not discharge into the river as river level was higher than pipe level) and

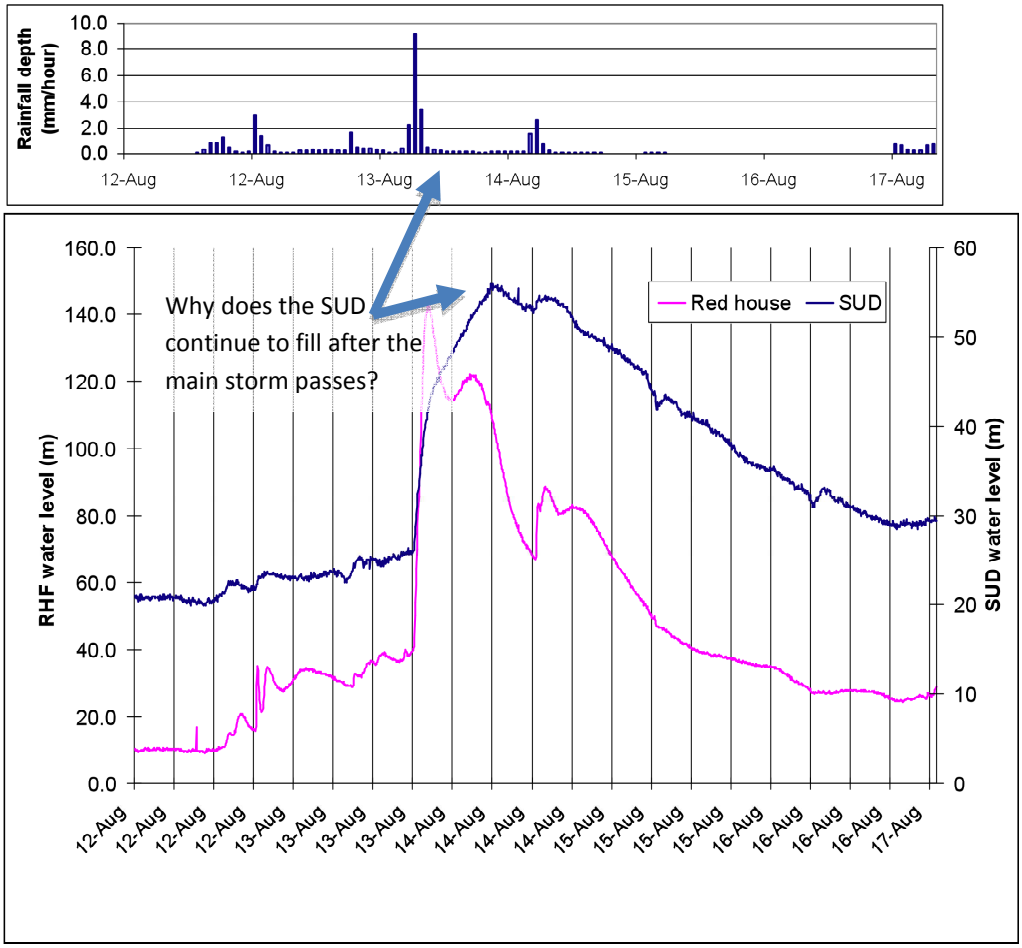
[2] Royal Horticultural Society (2006) Gardening Matters. Front Gardens: Are We Parking on our Driveways? Do Driveways Cause Flooding? www.rhs.org.uk/learning/research/gardeningmatters/documents/frontgardens.pdf

- Brunton Park estate flooding in September 2008 was also severely flooded during a river/surface water flooding event. This was not unfortunately the first incident in Brunton Park in recent years as some residents are regularly flooded as the surface water discharge pipes can't drain to the Ouseburn due to back up issue.

The OCSG would like to point out if the level of the river was controlled (using upstream storage areas), the surface water pipes at these two main flood risk areas may be less subject to drowning out homeowners' property. The weakest link is the sewer network, as their outlets are designed assuming free discharge, i.e. the river level is always low and cannot submerge the pipe. This design flaw is proving to be costly to Gosforth residents and it is very expensive to amend (such as increasing pipe size or moving the location of the outlet).

The OCSG presented in collaboration with the Environment Agency on the 6th September 2008 to Newcastle Great Park Advisory Committee meeting several propositions (create upstream storage of Newcastle Great Park, diverting the flow of the Ouseburn into the existing SUD on Cell I, etc). This meeting happened just after the largest flood recorded in the Ouseburn where the SUD in Cell I was flooded (but no houses on Melbury Park were flooded) in an approximately 70 year return period rainfall event. Following the flooding event, Newcastle City Council commissioned a survey of the SUD in December 2008 to ascertain if it was built as designed (supposedly designed to accommodate the 1 in 140 year return period rainfall event). If the survey result is positive, the Council will start the handover phase and will become responsible of the management of the green spaces along the Ouseburn (including the SUD). If the survey is negative, it is understood that the handover will not take place immediately and the green spaces will remain managed by NGP until the pond design is finalized and every parties agrees on a way forward. Despite the dispute about the dimensions and the operation of Cell I, it is clearly an asset and it could easily operate better and have a multifunctional role (as stated in the Pitt Review). In the end, the SUD will overtop as there is clearly a large source of water entering the pond, equivalent to a river tributary during storm events as shown on figure 7.

Figure 7: 13th August 2008 event - Cell I still filling up 6 hours after the rainfall event

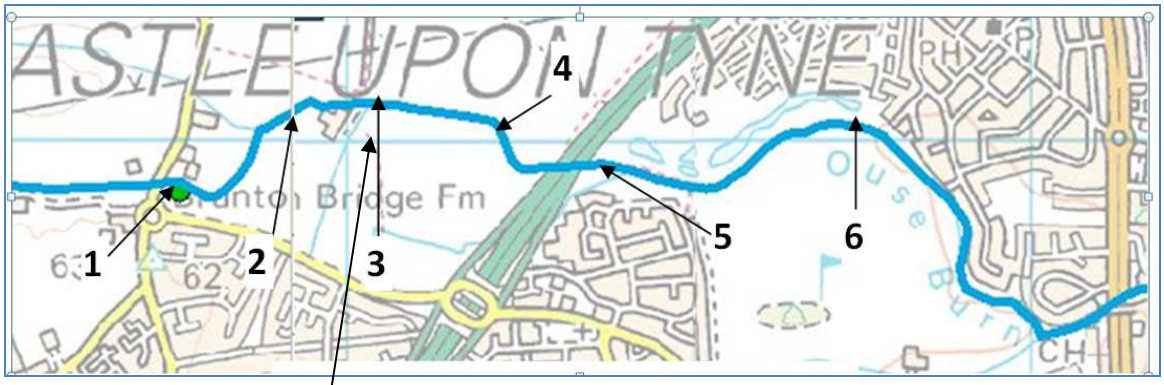


4. Student dissertations (Kevin Hickey, Benjamin Callard, September 2008)

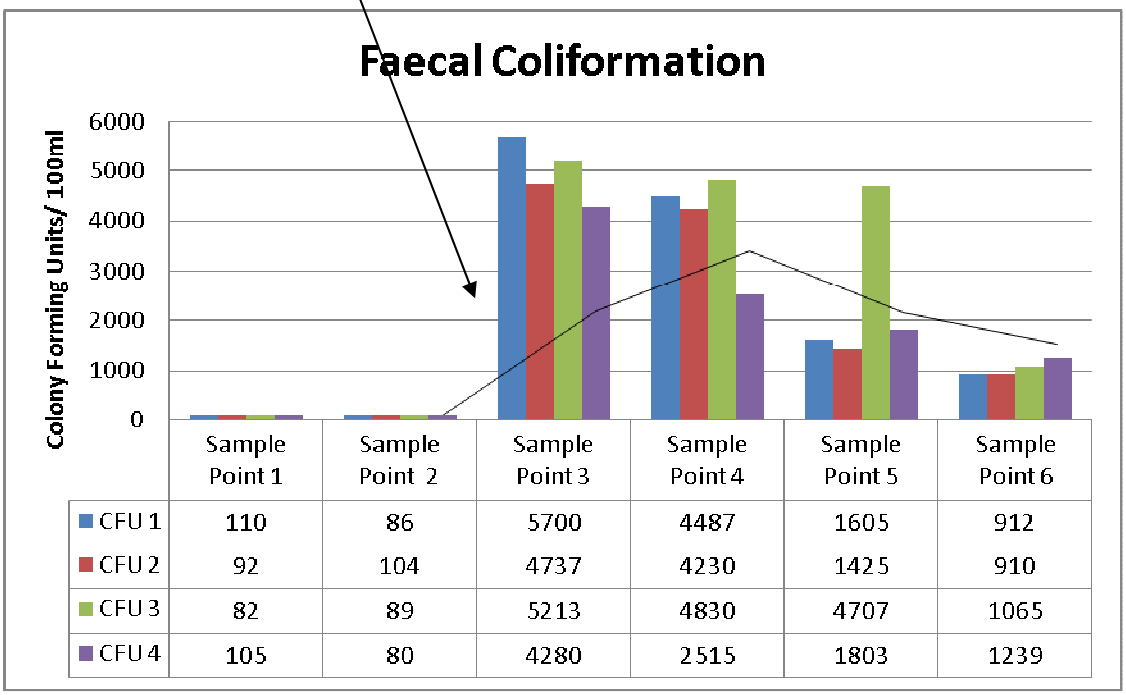
Two students worked on the Ouseburn in 2008 for their dissertation, Kevin Hickey and Benjamin Callard. Kevin studied the impact of climate change on rainfall patterns for the Ouseburn catchment (predicted increase of 20% of the rainfall in the future) and also proposed an alternative to the £2.5M NWL scheme built on Red House Farm estate after the June 2005 floods. This alternative proposes to store water using a combination of swales, under pavement channels and collection ponds instead of the existing underground pipe scheme.

Benjamin assessed the existing water quality data from the Environment Agency for the Ouseburn and noted an improvement in quality between the period 2000 to 2006, however the biological data could not be assessed as the sampling regime was inadequate for a valid statistical analysis (number of sample different for the 6 sites, not equally distributed during the sampling period, etc). The second part of his dissertation focused on finding possible sites along the Ouseburn to create multiple storage features. ***Callard identified 13 possible sites and the OCSG will work on them when funding and political willingness are present in the catchment.***

In 2009, there are more UNEW students working in the Ouseburn, looking at sediment quality, water quality sampling along the Ouseburn, SUDS in Cell I, improving the existing design to store more water and finally a study on the urban value of Newcastle Great Park development. See appendix C. Typically all the evidence points to the problems at the Kingston Park Outfall, for example in figure 8, there are significant faecal contamination arising from KP:



KINGSTON PARK OUTFALL



	Sample Point 1	Sample Point 2	Sample Point 3	Sample Point 4	Sample Point 5	Sample Point 6
CFU 1	110	86	5700	4487	1605	912
CFU 2	92	104	4737	4230	1425	910
CFU 3	82	89	5213	4830	4707	1065
CFU 4	105	80	4280	2515	1803	1239

Figure 8 **Impact of the Kingston Park Outfall on the water quality of the Ouseburn**

Equally the capability of the Ousburn to clean itself is seen in a study of the sediment water quality, where significantly high amount of heavy metal in the sediment at the KP outfall quickly fall again by the time we measure at RHF. Some smaller amount of metals from RHF and from the outfalls into the SUD were seen but they are below accepted safe limits, shown below in Figure 9.

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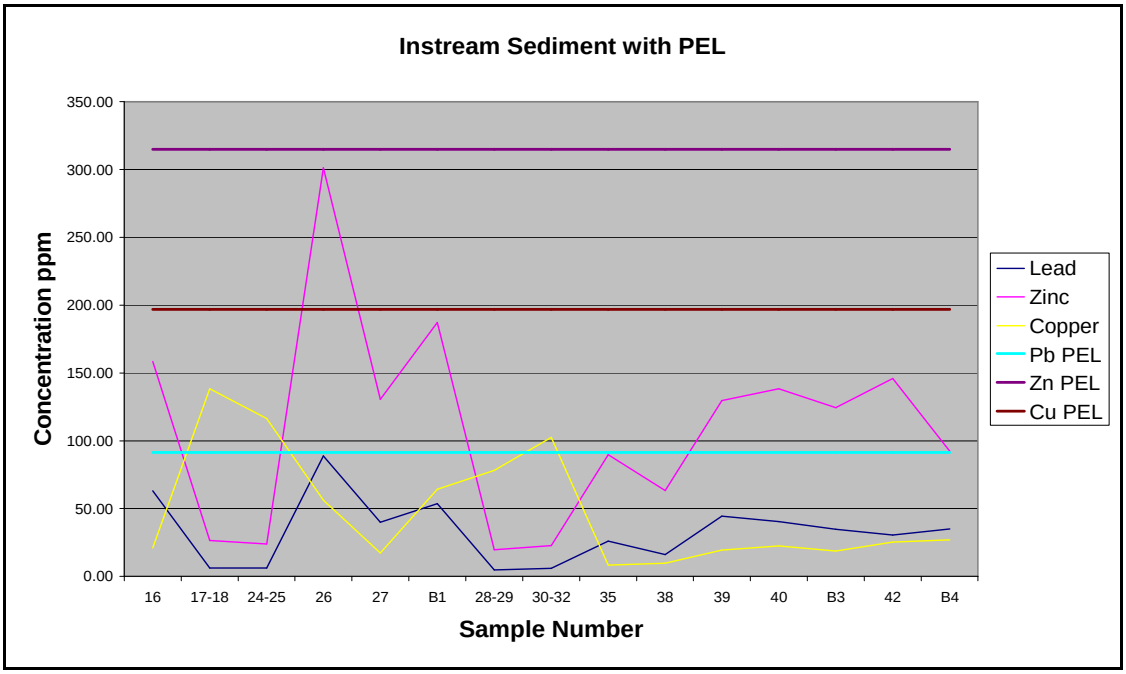
Figure 9 Heavy metals in the sediment in the Ouseburn



Samples 25-27 are after the KP Outfall, and these are above the PEL (the Predicted Effects Level). Most of the channel is below the PEL level.

5. Newcastle International Airport and birdstrike issue in the Ouseburn catchment

Newcastle International Airport (NIA) is located in the upper part of the Ouseburn catchment and plays a significant role in planning control and has a long history of water quality issues (large pollution event in the 90s due to glycol spread on the runway) and has since developed a strategy to tackle this issue. The land owned by the airport (between Woolsington Woods, Havannah Nature Reserve and Gosforth Park to the east) is carefully managed and has permitted wildlife to establish itself (flora and fauna).

- Planning control issues for creation of water storage features within a 15km radius of the airport (Civil Aviation Authority (CAA) guidelines regarding possible birdstrike issues). Prior to 2003, CAA had to comment on planning control issues in UK regarding bird hazards linked to landfill sites, domestic refuse site, building height, reflectivity and wind farms. Since then the CAA delegated this power to British airports and NIA is complying with CAA guidelines and its goal is to minimize any increasing hazard around the airport. This risk exists but is quite low (equivalent to 1 fatal accident to a jetliner in one billion (10^9) flying hours[3]) and civil planes can only be hit during takeoff and

[3] Thorpe, John (2003). "Fatalities and destroyed civil aircraft due to bird strikes, 1912-2002". International Bird Strike Committee, IBSC 26 Warsaw.

landing operations, which take place in the same direction from the runway. The fact that NIA has also military aircraft landing on their premises increases birdstrike occurrences as military airplanes fly at a lower altitude than civil airplanes. We would like to argue that the 15km radius zone is split between high, medium and low risk based on the existing flight paths of civil planes using Newcastle International Airport.

- Controlled discharge into Sunnyside drain, a tributary of the Ouseburn which originates at the airport. NIA has created storage ponds on their own site to store polluted runway runoff (glycol is used as de-icer) until the concentration in glycol is safe to be discharged into the watercourse. The volume of storage has recently increased in capacity from 6000m^3 to 25000m^3 (from 1 to 3 ponds). The NIA environmental officer considers that the existing storage capacity is sufficient for one large storm but if the ponds are full, they can take up to 2-3 days to empty. If a second storm occurs shortly after the first one, there is a risk of polluted discharge overflow into the Ouseburn. To prevent such a pollution incident, NIA would like to increase its discharge consent to NWL sewer and increase 8-fold to cope with future climate uncertainty. However it is well known that the sewer network is close to capacity and NWL cannot accommodate this extra flow. To cope with the situation, NIA has arranged with the EA to discharge into the Ouseburn at a higher rate in advance to a large rainfall event. This is a temporary measure and as NIA is developing further its site (new hotel and car park) there is a need to address the root of the problem, i.e. too much surface water runoff.

OCSG accepts that the NIA and NGP will expand in the future but we have to make sure that the catchment will benefit from it through a better ecology, less flood risks and improved amenities for the residents. We intend to consult with NIA at an early stage on the feasibility study to create water storage features along the Ouseburn.

6. Lower Ouseburn barrage

The barrage will be completed in summer 2009. In 2004 firm plans were made to regenerate the lower Ouseburn and the barrage was se as major component of the scheme. NCC took the lead role is driving the proposal through to construction. Plans were approved in 2006 (shortly after the establishment of the OCSG). A public enquiry was held in 2007 and the scheme was approved. The development of the barrage became a topic of great debate in the OCSG. Whilst we were active in contributing to the debate and acted as the forum for information exchange, it was obvious that the group could not effect the decision making progress. We invited the Ouseburn Trust and the NCC to all our meetings. OT has never attended our meetings. NCC kept us up to date with progress and attended our meeting devoted to the barrage development in 2008. We live in hope that the core message arising from the OCSG (which included EA, NWT and NWL) is that we expect the Lower Ouseburn to be left in an environmentally sound and safe condition will be headed. The head of Sustainable Development at NCC stated that was also their goal and they would work with the OCSG and help to develop the OCAP further with regards to the Lower Ouseburn.

The OCSG also engaged with the Ouseburn River User Group but after several meetings we were unsure of what the role of the ORUG was. In the end we decide it had no direction, funds or mandate and we agreed to work directly with the NCC.

The key needs for the Lower Ouseburn are flood concerns, water quality concerns and ecological concerns. Some assessment of the prevailing water quality and sediment quality conditions is needed. We want this to become part of a broader assessment of the Ouseburn in general. The Lower ousburn must also appreciate the role of land use and climate change impacts happening upstream in the Ouseburn.

7. Jesmond Dene Park

For the past three years, we met with several Newcastle City Council officers (Amanda Watson, Sue-Stokel-Walker), Jesmond Dene Park Rangers (Sarah Capes) on several matters (review their water quality statement for the Ouseburn, discuss the Heritage Lottery bid, liaise between NWL and the Park Rangers on broken manhole covers in the park). Unfortunately, we came too late to influence the content of the phase 1 of the Lottery bid as we think it is a too "terrestrial" project (mostly landscaping and new visitor centre) and not enough river orientated (wetland creation).

In the next years, we would like to work with the NCC officers to promote the creation of water storage feature within the park as a demonstration exercise, to show that water can be stored in a multitude of places.

Water quality should also be tested during storm event within the park as youngsters are often spotted jumping in the river in the park, where we believe there might be some sewage fungus at the bottom of the river (deposited during storm event by Combined Sewer Overflow outlets). ***We consider the park to be the "crown jewels" of the Ouseburn catchment and therefore we would like to investigate these two proposals in collaboration with NCC, the Environment Agency and NWL.***

8. Longbenton Letch

We recognized that the OCSG has been too focused on the Upper Ouseburn and we haven't yet created any activities for the Longbenton Letch. The main reason being that our funding came from flooding money and centered on the NGP area. We contacted North Tyneside Council when we created the OCSG to have a representation of the local authority for this watercourse, but we failed and the officer was not able to come to any of our meetings. ***The OCSG would like to get involved in the near future in this sub-catchment either through activities or student dissertation to find out more about its management as it is also looked after by the Environment Agency (but not monitored for water quality purposes to our knowledge).***

OCSG ACTION SUMMARY TABLE

ISSUES	ACTIONS	LOCATION	PARTNERS	COST (£)	SOURCE OF FUNDING	LINKS TO OTHER ACTIONS
SHORT TERM ISSUES 2009-2010						
Water Quality & Flooding	CSO monitoring	catchment-wide	NWL, UNEW, NCC, EA		NWL, EA, OFWA, NCC	
Water Quality & Flooding	CIRIA Workshop for council officers	N/A	NCC, EA, NWL		CIRIA, NCC, EA, NWL	
Water Quality & Flooding	Low urban runoff houses	Upper Ouseburn	EA, NCC, UNEW		EA, NCC	
Water Quality & Flooding	Water storage feature upstream of NGP	Rural Ouseburn				
Aesthetics	Improving weir in Jesmond Dene	Jesmond Dene				
MEDIUM TERM ISSUES 2009-2012						
Ecology	Callerton Pond re-design	Source of the Ouseburn				
Flooding – adaptation to climate change	Gosforth Golf Course green and fairway adapted design	Gosforth Golf Club	Gosforth Golf Club, NCC, EA, OCSG		Gosforth Golf Club	

River Watch Programme	Tyne Rvers Trust programme	Catchment wide	EA, TRT, NWL, UNEW			
Flooding	Flood Resilience Information	Catchment wide	EA, NCC, NWL, UNEW			
LONG TERM ISSUES **2009-2015**						
Education	Education pack and site visit to talk about planning issues and climate change	Catchment wide	EA, NCC, NWL, UNEW			
Communication	OCSG newsletter, website	Catchment wide	EA, NCC, UNEW			
WFD	Implementation of WFD	Catchment wide	EA, UNEW, OCSG			
Water Quality & Climate Change Adaptation	Retro-fitting commercial properties in Kingston Park	Kingston Park catchment	EA, UNEW, OCSG			
ECOLOGY	Jesmond Dene Fisheries feasibility study	Jesmond Dene, Gosforth Park, Killingworth Lake	EA, NCC			
FLOOD DIRECTIVE APPLICATION	Input to Surface Water Management Plan		EA, NCC			

OCSG CATCHMENT ACTIVITIES MAP