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General Enquiries

content@managingwater.co.uk
Tel: 0845 2 575 575

Advertising

advertising@managingwater.co.uk
Tel: 0845 2 575 575

Editorial

articles@managingwater.co.uk
Tel: 0845 2 575 575

Subscriptions

subscribe@managingwater.co.uk
Tel: 0845 2 575 575

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Relbon Ltd
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Relbon House
27, Derwent Close
Huntingdon
Cambs, PE29 6UT, UK
admin@relbon.co.uk



Flood Risk





House of Commons
Environment, Food and Rural
Affairs Committee

EFRA has published the Government response to Managing flood risk report

The Government has responded to the Committee's 3rd Report of Session 2013-14 - Managing Flood Risk.

Funding for flood risk management

In the report, EFRA criticised the relatively modest additional sums to be provided up to 2020, for funding risk, saying that they are not keeping pace with the increased flood risk. Defra must set out detailed evidence to demonstrate to HM Treasury that flood management capital funding must rise year on year by £20 million over the next 25 years to keep pace with increasing flood threat.

The Government responded by saying that the six year settlement from 2015/16 up to 2020/21 of £2.3 billion is a record level in terms of investment in capital improvement projects. They also said that long-term investment planning should not assume that all costs will be met centrally. Local authorities are estimated to spend an average of £100m per year in flood risk management in addition to Defra funding and contributions gained through the partnership funding approach. Defra will use its capital investment in flood risk management schemes between 2015/16 and 2020/21 to leverage at least 15% contributions from other sources to projects which lead to a reduction in risk to even more properties.

The Committee were also concerned that only small amounts of private sector funding have been secured to date but the Government responded by saying that early indications suggest that Defra's Partnership Funding approach would enable up to 25% additional schemes to go ahead in the coming years than if project costs were met by central Government alone. Defra has also commissioned an independent evaluation of the partnership funding approach, which is due to report in the autumn.

The Committee also raised the point that by using natural methods to prevent and manage flooding would enable the application of wider funding streams such as those available for EU agri-environment schemes. The Government response was that it is already Government policy that all options should be assessed when considering alternatives for managing flood risk, including flood management schemes that work with natural processes. Defra is sponsoring three multiple objective land management demonstration projects to more thoroughly assess the impacts that land management might make on local communities and flood risk. These are all partnership projects and the Department is committed to supporting the monitoring of the impacts of these projects (including an evaluation of the ecosystem services provided by the projects) until 2015.

The Committee raised the point that the current model for allocating flood defence funding is biased towards protecting property, which means that funding is largely allocated to urban areas and that the failure to protect rural areas poses a long term risk to the security of UK food production.

The Government strongly disagreed saying that over 95% of the arable land in England is either outside areas at risk of flooding from rivers or the sea or is in an area benefiting from a greater than 1:75 standard of defence. They made the point that the summer 2007 floods, which included a substantial element of surface water flooding in addition to flooding from rivers, illustrates the extent of the issue. The total agricultural damages caused by this series of events was estimated to be in the region of £50 million; approximately 1.6% of the total economic damages. This was an extreme series of events occurring at the most damaging time of the year for the industry with many farms having crops in the ground close to harvest.

Maintenance of flood defences and watercourses

Responding to the Committee's concern at the reduction in funding for maintenance of flood defences and watercourses the Government made the point that the Environment Agency works in close partnership with Internal Drainage Boards (IDBs) and regularly discusses local watercourse maintenance plans with them. The Agency is also keen to support IDBs in taking on responsibility for maintenance of some main river watercourses where they are best placed to do so. This could result in precept payments from the IDB's to the EA being reduced to take this into account.

This is already taking place in some areas such as on the Snow Sewer Drain in North Lincolnshire (Isle of Axholme and North Nottinghamshire Water Level Management Board). Later this month the Environment Agency will finalise Public Sector Cooperation Agreements with four pilot IDBs in the Anglian and Midlands regions (Black Sluice, Lindsey Marsh, Upper Witham and Trent Valley IDBs). These arrangements will facilitate the IDBs undertaking some maintenance activities on main rivers for a 5 year period, including works this year. A similar approach is being developed with other IDBs.

Sustainable Drainage Systems (SUDs)

The Committee's main concern was the 3 year delay in the implementation of Sustainable Drainage Systems (SUDs) under the Flood and Water Management Act 2010.

The Government appreciated the concern about the delay and said that they are working hard to implement this at the earliest opportunity. The aim remains to commence Schedule 3 in April 2014.

Planning issues

The committee were disappointed that the agreement to end unnecessary building in flood plains has not yet been translated into effective action and that planning guidance allows building to take place too readily in areas at high flood risk.

The Government responded by saying that the Framework is very clear that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary it should be made safe without increasing flood risk elsewhere. Technical guidance was published alongside the Framework so as to ensure effective implementation of the policy.

Household flood insurance

In response to the Committees concerns that the delay in announcing a solution has exacerbated the concerns of householders, the Government said that with Flood insurance being a complicated issue it was right that time was taken formulate the approach. They also said that there are still a number of aspects of the approach to work through before Flood Re can be implemented and they have been working hard with the insurance industry to resolve these, as well as seeking the necessary Parliamentary approval through the Water Bill.

With respect to the issues raised regarding the accountability of FloodRe, the Government said that it is important that Flood Re is an industry owned and managed entity and it is right that it should be regulated in the same way as any other reinsurance company.

For the Full response [CLICK HERE](#)

NFU says Defra must do more to tackle flood risk

New Government plans to maintain waterways are inadequately funded, leave many areas vulnerable to flooding and do not address a number of critical questions, the NFU has warned.

It comes following Defra's response to the Environment Food and Rural Affairs Committee's report into managing flood risk, which sidesteps key issues raised by the NFU and other organisations regarding watercourse maintenance and rural flooding.

NFU Deputy President Meurig Raymond said:

"While we are pleased to see that flood management remains a top priority for Defra, we are worried that some of the key concerns about rural flooding raised by the Committee's report have gone unanswered. Defra's response fails to answer questions the NFU and a number of other organisations highlighted regarding the maintenance of flood defences, and particularly watercourses.

"In its response, Defra emphasised the £5 million extra funding for maintenance work in 2015-16. However, it has neglected to

mention the £49 million worth of cuts to the Environment Agency's (EA) revenue budget since 2010. The NFU believes this will seriously undermine its ability to maintain waterways which, crucially, will only have £20 million spent on maintenance, a figure that should be substantially higher and is not enough to do the job effectively.

"As its revenue funding is restricted, the EA must deliver increasing value for money from its maintenance activities, with less work being conducted on key watercourses in rural areas. The worrying truth is that the majority of main rivers in such areas are judged by the EA to be 'minimum need' where only works for legal requirements such as health and safety are being delivered on the ground.

"While we welcomed the river maintenance pilots announced by the Secretary of State this week, we feel the department must address the strategic long term investment needed not just to build new defences, but to maintain our waterways to reduce the risk of flooding in a changing climate."

Source: NFUonline

New Minister responsible for flooding



Dan Rogerson, MP for North Cornwall has been appointed the Parliamentary Under Secretary of State for water, forestry, rural affairs and resource management.

The minister is responsible for water, resource and environmental management, rural Affairs and forestry, in the Department for Environment, Food and Rural Affairs.

His responsibilities, among others, will include:

- Flooding
- Coastal erosion
- Flood insurance
- Inland waterways
- Climate change adaptation and the environmental impacts of climate change mitigation.

Flood risk reduction proposals for Northern Ireland



Environment Minister, Mark H Durkan, has proposed new initiatives to reduce the risk of future flooding.

A Revised Draft Planning Policy Statement 15 'Planning and Flood Risk', has also been proposed which includes improvements to manage and recover from flooding events.

Included in the policy is a proposal to address safety in reservoirs. This will require developers to provide assurances about reservoir safety before planning permission is granted for any new development close to reservoirs.

Other key proposals are that developers will now have to submit a flood risk assessment within identified flood risk areas and demonstrate how these risks can be managed through, for example, building flood proofed buildings.

Within areas protected by flood defences but still at risk from flooding, under the proposals there will be increased safeguards. This means that new developments where the young or vulnerable are potentially at risk from flooding such as hospitals, schools, nursing homes and nurseries, will not be permitted. Similarly, developments housing hazardous substances that would pose a health risk in the instance of flooding would also be refused planning permission.

In coastal flood plains there will be greater flexibility to facilitate development when the flood risk has been mitigated through raising the land to an appropriate level.

There is also new guidance on sustainable drainage and the flood proofing of buildings in flood risk areas.

Mark H Durkan said:

"Up until the beginning of this year, there has only been one year (2010) that did not experience a serious local flood incident. Given the predictions for climate change, the frequency of these events is likely to increase in the future."

"While flooding is a natural phenomenon that cannot be entirely eliminated, we in government need to do all we can to address this recurring problem which can have devastating impacts on individuals and communities - especially the vulnerable. And let's not forget the impact on buildings, and the delivery of services and the hardship experienced by people in the recovery and clean up period. Flooding can also directly affect schools, hospitals, businesses, transport and infrastructure and is therefore detrimental to our economy and society."

"I believe it is important to ensure that the planning system continues to manage new development so as to

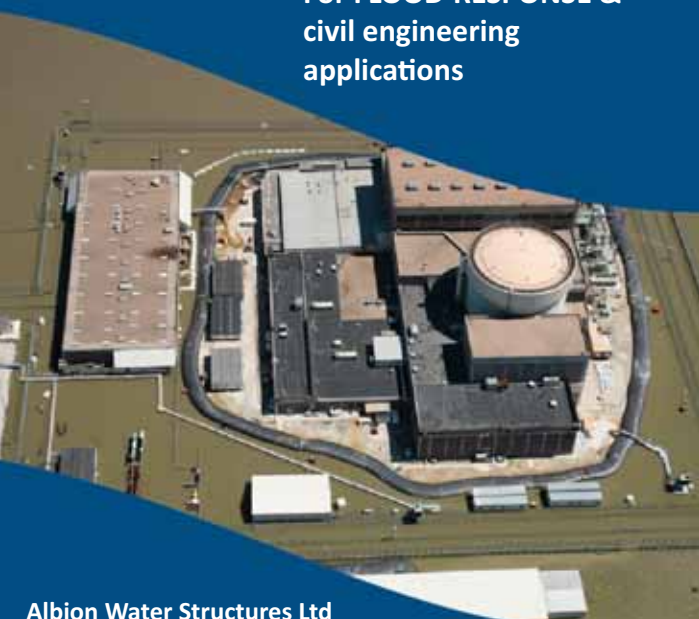
further reduce the risk of flooding to people and property. I also think that developers building near reservoirs should take responsibility for ensuring their safety – making this a planning condition should help create a safer environment."

Agriculture and Rural Development Minister Michelle O'Neill, who has responsibility for the Rivers Agency, added: *"I very much welcome this review of PPS 15 which will provide a clearer and more robust policy statement for government bodies, developers and their representatives on all aspects of flood risk arising from proposed development. My Department has been fully involved in the revised policy statement and I look forward to the outcome of the consultation process."*

The Environment Minister concluded: *"Government is committed to limiting the devastating impacts of flooding and there is much joined-up work being progressed alongside full use of new information on flood risk. I am particularly grateful for the valuable contribution of DARD Rivers Agency in the development of the revised draft PPS. This revised policy and updated guidance is something that can have an impact on many people's lives so I encourage people to participate in the consultation."*

The consultation is available at:
<http://www.planningni.gov.uk/draftrevisedpps15>



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Flood resilient property will showcase the latest solutions

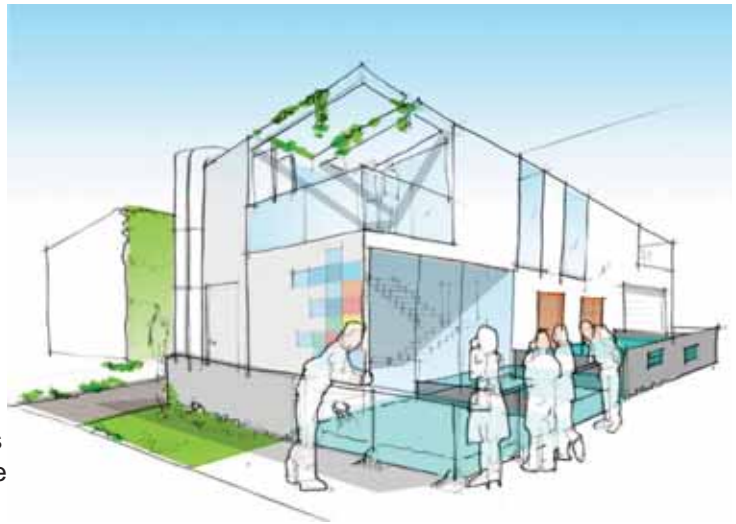
John Alexander, Aquobex

Aquobex, a leading supplier of consultancy and products for property flood resilience, has announced that it will be building a new flood resilient property at BRE, Garston.

The house, which has been designed by leading architectural firm Baca, will incorporate some of the latest solutions for keeping flood water out of properties as well as many cutting edge solutions that can be utilised in interior fit-out to minimise the damage and disruption should flood water enter a property.

John Alexander, Managing Director, Aquobex, said; *"We are delighted to have the chance to develop this property at BRE, which is as the forefront of showcasing new approaches and technologies in the construction market. Flooding is an ever increasing risk for many as a result of both climate changes and urban development. By showcasing some of the relatively simple measures that can be incorporated into both new built and retrofit projects we hope to encourage both designers and builders to think about incorporating flood resilience measures wherever possible."*

Featuring flood protection products from a range of suppliers, the Aquobex Resilient Property™ will showcase some of the latest innovative materials including nanoShell, Dragonboard, Sealwise and cavity wall insulation. The live demonstration building, which is due for completion in the summer of 2014, will highlight the deficiencies of some current building material and convey the effectiveness of flood doors and barriers, flood resistance interiors, sewer maintenance and FOG (fats, oil and grease) prevention. The Aquobex team will also showcase their expertise in rainwater harvesting and SUDs (sustainable urban drainage systems).



Sponsorship Opportunities

The Aquobex Resilient Property™ is still at the design stage and the company is keen to encourage other businesses and organisations with specialist knowledge in this area to get involved as a sponsor. *"In addition to having their name associated with this exciting project, sponsor companies will be able to use the house for their own sales and marketing events and activities,"* explained Alexander.

Anyone interested in finding out more about getting involved should contact John Alexander on 01923 518582 13 or email him direct on john.alexander@aquobex.com



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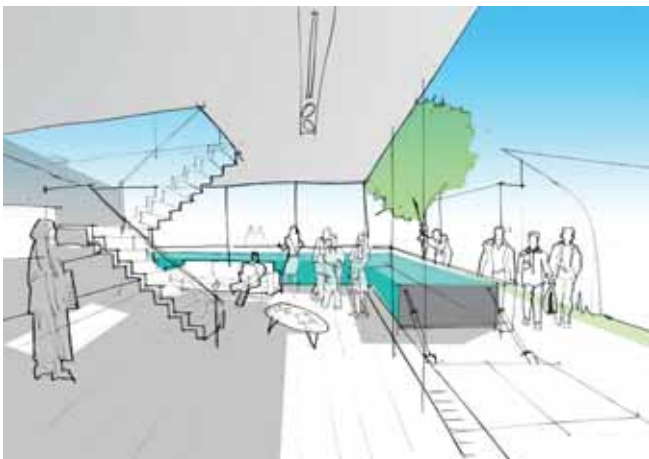


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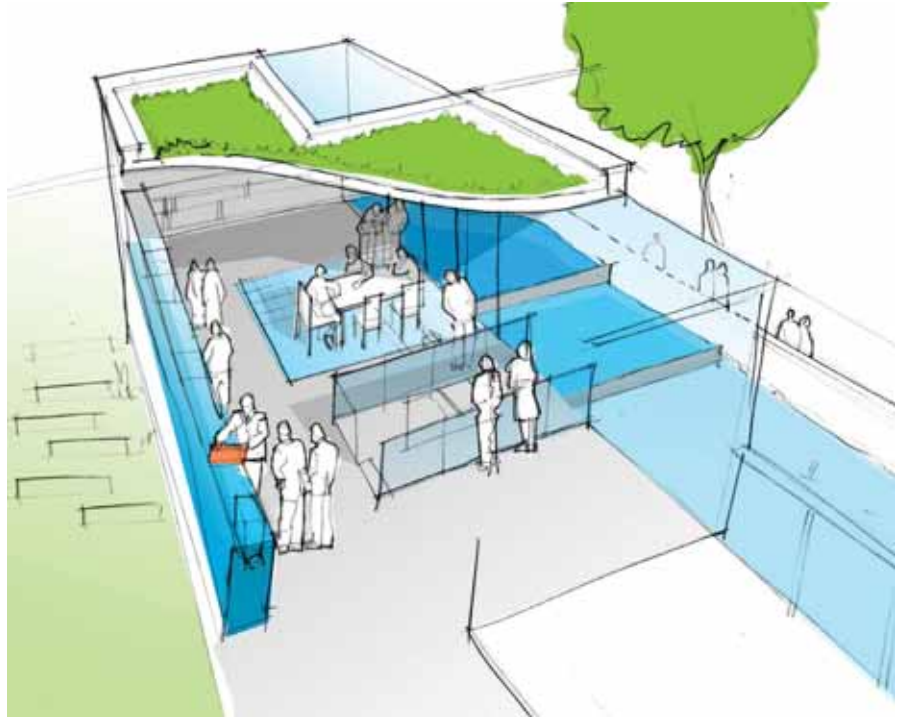
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Background

Aquobex has been formed by John Alexander from Revetment an established specialist flood protection company and Gavin George, one of the country's leading experts on flood protection solutions. Based at the Building Research Establishment (BRE) at Garston in Hertfordshire, Aquobex specialises in forming and integrating solutions to mitigate flood risk. The company provides services and products supported by extensive expertise and experience in this specialist market. The company's view is that any solution to flood risk should meet the following criteria namely, it should be accredited, guaranteed, independent and insurable. This means that the prevalent insurance issues as well as the flood risk can be managed and mitigated.

For more information on Aquobex please visit www.aquobex.com



West Berkshire Council obtains Defra funding for property level protection

Defra has granted funding worth up to £7,000 per property for flood protection measures for properties in Padworth.

In July 2007 the area suffered surface water flooding which caused considerable damage to their contents and properties. However the Environment Agency have said that flood alleviation works designed to control flooding of the magnitude experienced in that 1-in-200-year storm would be too expensive.

A survey will be carried out on each of the affected buildings to determine which measures would be appropriate in each case. The proposed measures could include flood guards or new sealed doors, air brick covers, non-return valves on drainage pipework and sewer connections, and the re-pointing and sealing of external brickwork walls.

The aim is that any property protection measures will be completed by Spring 2014.

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UK Flood Barriers

Haltwhistle,
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Client:

Home Group

Contract Period:

September - October 2013



Flood Angel® 160mm/110mm Non-Return Valve installed underground



Double Flood Angel® Flood Defender™ Doors installed to the rear of a property



Bespoke Flood Defender™ Door in Golden Oak



A total of 31 Flood Angel® Flood Defender™ Doors were installed for this project

Project Detail:

The Northumberland market town of Haltwhistle was hit by flash floods in June and July 2012 with residential area, known locally as "The Mart", particularly badly affected.

In August 2013, floodwaters once again threatened the properties. Historically, flooding has occurred from a neighbouring blocked culvert, but recently this has been exacerbated by surface run-off from streets and fields during periods of excessive rainfall, which have subsequently overwhelmed the local drainage systems.

Northumberland CC and the EA are carrying out further measures in Haltwhistle to reduce the risk of further flooding, but property level protection [PLP] was required for specific houses.

The Home Group owns 21 homes in The Mart and wished to support their tenants by investing in the latest flood mitigations measures to increase the flood resilience of the properties so approached UKFB for advice. Home Group were aware of recent flood mitigation work carried out by UKFB for Northumberland CC and that they are on the official EA approved list as a manufacturer and installer. It was because of these reasons UKFB were awarded the contract.

Solution:

The main issue was surface run-off floodwater entering the homes via standard air bricks, through front doors and glazed patio doors and with back-surges from the drainage system. UKFB carried out an extensive survey to each property where a range of Flood Angel® measures were specified. These measures included, Anti-Flood Airbricks, 160mm/110mm Non-Return Valves and a total of 31 Flood Defender™ Doors to both front and rear elevations of each property.

The Home Housing performance brief had stressed that the doors must conform to current standards i.e secure by design, meeting warm home thermal standards, and must be available in a selection of styles and colours to be able to offer the tenants a degree of choice. The Flood Angel® Flood Defender™ Door adheres to all of these standard requirements, holding three Kitemarks to PAS 1188-1:2009 and is manufactured for use on single, inward and outward opening doors, as well as double outward opening doors.

"From my side the initial dealings in terms of exploring options on what passive measures we can provide at this scheme, I found UK Flood Barriers were very supportive throughout in helping to determine the right solution. At the time of the initial contact, UK Flood Barriers were seeking BSI accreditation for a new

product that would give us the solution we're aiming for and it was decided that we would rather wait for this product to be available on the market rather than fit an inferior product."

Graeme Hoggins, Asset Manager at
The Home Group

£8.7m Lower Dove flood scheme officially opens



On the 11th October, the Environment Agency opened the Lower Dove flood scheme in Derbyshire, which has reduced the risk of flooding to 1,600 residential and major commercial properties.

Construction of the £8.7million scheme began in September 2012, and it consists of around 5km of new and improved flood defences on the border of Staffordshire and Derbyshire.

The work has involved improving existing defences along the Foston Brook in Scropton, and raising and extending localised embankments for the River Dove in Hatton, Scropton and Egginton. Improvement works to protect the railway embankment at Scropton have also been carried out.

The scheme, which has been largely funded by the Defra was officially opened with the unveiling of a plaque by Heather Wheeler, MP for South Derbyshire.

Defra Minister Dan Rogerson said: *"The new flood defences will protect more than 1,600 homes and businesses in the Lower Dove from the risk of flooding and build a stronger local economy by giving businesses the confidence to invest in the area."*

"We have invested more than £6 million in the project, while local businesses and communities have

shown the effectiveness of partnership working by getting behind the scheme and investing a further £2 million."

"This major investment is part of a £2.3 billion programme to tackle the risk of flooding and means that more money than ever is being spent to better protect communities like those in the Lower Dove."

Also present at the ceremony were representatives from Nestlé, which operates a site in Hatton and will be a major beneficiary of the scheme. The work to reduce the risk of flooding has enabled Nestlé to expand its site and create around 400 jobs for local people.

About the Dove Catchment

The River Dove catchment covers an area of approximately 500km² and has four major tributaries;

- River Churnet
- River Tean
- Foston brook
- Hilton brook

It also covers the Egginton Brook which passes through the area of interest. The river creates the demarcation of the Staffordshire / Derbyshire County border.

The area is characterised by alluvial, slow draining, flat

Continued on page 12

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Continued from page 11

lowlands used for agriculture.

Development reflects the regional focus on agriculture and food manufacturing. The Crewe to Derby railway line is located on an embankment running approximately parallel to the north side of the River Dove through the villages of Scropton and Hatton posing a restriction in the floodplain, this line is also at risk of flooding.

History of Flooding

The villages of Scropton, Hatton and Egginton have suffered extensive flooding on a number of occasions. The most recent major event occurred in Autumn 2000 which was estimated to be approximately a 2% Annual Exceedance Probability (AEP) event. Breaches and overtopping of defences occurred along the left bank of the river which resulted in the flooding of over 180 mainly residential properties in Scropton and Hatton. Key infrastructure including roads, the railway and sewerage pumping stations were also inundated during the 2000 event. The River Dove flood defences overtopped in December 1991 when a similar number of properties were affected. The village of Egginton was isolated for several days due to roads being inaccessible, including by emergency vehicles, during this event.

Medmerry sea defence and habitat creation scheme nears completion

An ambitious project to construct 7km of new sea defences inland from the coast together with a wildlife haven at Medmerry in West Sussex is nearing completion.

Construction of this £28 million project is progressing well and the flood defences are now complete. Work is nearing completion to carefully allow the sea slowly into the site in order to form a new intertidal wetland area, which will provide exceptional habitat for birds and other wildlife. This vital phase of the project is an important milestone, but there is still around one month of work still needed to make the site ready for opening to the public in November.

The original shingle bank was difficult and costly to maintain each year, particularly during the autumn and winter months when tides are at their highest and the weather is more severe.

The new defences at Medmerry will be amongst the best along the south coast, significantly reducing flood risk to nearly 350 homes, local infrastructure and the main road into Selsey. The scheme has also provided the opportunity to create more than 180 hectares of important new wildlife habitat which compensates for the loss of similar

conservation areas in and around the Solent.

The scheme, which covers the total area of more than 500 football pitches, will become an important local public amenity by the creation of 10km of new footpaths, cycleways and bridleways. Once the whole project is completed, the RSPB will manage the wildlife habitats and access and the Environment Agency will continue to manage the flood defences.

The scheme has been developed with the help of a wide range of community representatives. The Medmerry Stakeholder Advisory Group (MStAG), which the Environment Agency helped to establish in 2009, has been essential in engaging with the community and has ensured there has always been local input to the scheme design.

The Environment Agency's work to create the Medmerry sea defence scheme unearthed nationally important archaeology that has changed our understanding of how people lived along the Sussex coast 3,000 years ago. As clay was extracted to build the 7km of new flood banks, it uncovered the remains of an extensive Bronze Age landscape dating to around 1,000BC.



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UN selects Royal HaskoningDHV water expert Mathijs van Ledden for Disaster Assessment and Coordination Team

Mr. Mathijs van Ledden, Business Development Director for Flood Risk Reduction at Royal HaskoningDHV has been selected by the United Nations Disaster Assessment and Coordination (UNDAC) to become a member of their emergency response teams which are deployed during, and after natural disasters worldwide.

UNDAC helps the United Nations and governments of disaster-affected countries during the first phase of a sudden-onset emergency, mostly in the event of a natural disaster, when a disaster-affected country requests international assistance and requires additional international coordination resources.

Mr. Peter Muller, Humanitarian Affairs Officer at the UN: *"We selected Mathijs van Ledden to take part in the UNDAC induction course because of his technical background and experience with big floods. As water expert he can add great value working in an UNDAC team at water related disasters".*

Mr. Van Ledden said: *"After training, I could be called away at a moment's notice to anywhere in the world. This is a wonderful opportunity to help people and governments at a time when they are most in need".*

New Orleans and Bangkok

Mr. Van Ledden (born in 1975) graduated at the Faculty of Civil Engineering at Delft University of Technology in the Netherlands in 1998. He conducted an innovative PhD research project from 1999 to 2003 and joined the company that same year. He was located in New Orleans from 2006 to 2010, as project manager at the New Orleans District assisting the US Army Corps of Engineers with the 100-year levee design around the city including the new large storm surge barriers.

Mr. Van Ledden was active during hurricanes in New Orleans in an emergency response team and also during the Bangkok flooding in 2011.

Currently, he is Director Business Development Flood Risk Reduction and Leading Professional Flood Hazards at Royal HaskoningDHV and part-time Lecturer Hydraulic Engineering and Modeling at Delft University of Technology.



Giving back to society

Mr. Naren Bhojaram, River Deltas & Coasts Director at Royal HaskoningDHV: *"We are extremely proud of our professional staff who are passionate about 'giving something back to society' and sharing their skills and expertise in troubled times".*

United Nations Disaster Assessment and Coordination

UNDAC teams can deploy at short notice (12-48 hours) anywhere in the world and are provided free of charge to the disaster-affected country. In 2012 alone UNDAC teams were deployed in numerous emergency missions including flood disasters in Nigeria, Paraguay and Comoros.

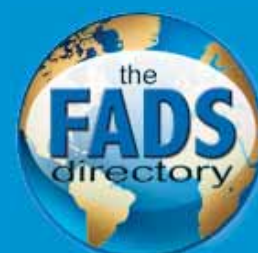
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UK's largest flood risk management contract

The Environment Agency has launched the bidding process to manage tidal flood risk in London and the Thames Estuary in what is the UK's largest flood risk management contract, valued at £485m.

The Thames Estuary Phase 1 programme will be made up of capital works, including:

- Major refurbishment works of fixed assets, such as tidal walls and embankments;
- Refurbishing works of active assets (including major flood barriers)
- New assets such as pumping stations;
- Capital renewals and replacements;
- Packages of major or complex maintenance works, such as repairing long lengths or fixed flood defence walls or subsidence of earth embankments.

With continual maintenance and improvement the EA expect the Thames Barrier to remain viable until 2070. A decision will need to be made around 2050 (based on government's current climate change guidance) on any changes to the flood risk management system so



changes can be planned and commissioned ready to use by 2070.

Adapting to climate change

Wide ranging studies and investigations were carried out to look at how tidal flood risk is increasing in the Thames estuary due to ageing flood defence structures; climate change and rising sea levels; as well as more people living and working in the floodplain.

The Thames Estuary 2100 Plan is the first major flood risk management project in the UK to have changing climate adaptation at its core. The Plan recommends maintaining, refurbishing, and replacing the tidal flood risk management structures and assets up to the end of the century. The first ten years of this capital investment is the Thames Estuary Phase 1 programme.

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This flagship programme is to be launched with an industry event on 18 September at the Thames Barrier. Interested parties have been invited to attend to find out more about bidding for this multi-million pound contract.

Peter Quarmby, Thames Estuary Flood Risk Programme Director said: *"This is a major investment which will create jobs and protect future generations of Londoners from tidal flooding and the impacts of a changing climate."*

"The Thames Barrier and associated tidal flood risk management infrastructure protects 1.25 million people, £200 billion worth of property, UK Government, major infrastructure and businesses. In London, every £1 we invest on protecting communities saves £38 in damage repair."

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Stormwater & SuDS





Alex Stephenson,

Alex has over 37 years experience in stormwater drainage design and related issues.

As well as being the UK Stormwater Director with Hydro International he is also Chairman of the British Water SuDS focus group. He is ideally situated to keep you up to date with the industry changes and legislation.

Talking SuDS

Are we approaching SuDS hell or SuDS heaven?

DEFRA 's good intentions are to make Sustainable Drainage Systems (SuDS) compulsory in England and Wales from April 1 2014 for developments of more than one property. However, their assurance of providing 6-months notice ahead of 'D-Day' has now been withdrawn.

Nobody knows, but we could be given as little as three months 'official warning' of commencement of the Flood and Water Management Act's 'Schedule 3', mostly due to the strictures of the parliamentary and Whitehall processes.

So, the question is – if the road is paved with Defra's good intentions, are we approaching SuDS hell or SuDS heaven?

There's no doubting the commitment, tenacity and hard work that the DEFRA team has put into delivering a set of National Standards and associated guidance that everyone in the industry can sign up to (even if we may disagree on some of the detail). As a member of the 'Task and Finish' working groups set up to review the draft standards and guidance, I attended the latest workshops at the end of September, and I believe there was a very positive mood amongst the delegates there.

There's still some details to be finessed, but SuDS standards seem to be in good shape overall and, in the main, entirely positive. Yes, it could be difficult for Local Authorities to prepare to set up SuDS Approving Bodies in a short notice period, but some have made great strides already and are practising the principles of SuDS without the letter of law. At the other end of the spectrum there are authorities that have adopted a more 'wait and see' attitude. But all Lead Local Flood Authorities have received significant funding towards capacity building so have the opportunity to prepare on the basis of an April 2014 start date.

Representations, particularly from housebuilders' lobby and the input of the Task and Finish groups themselves, have contributed to refining the wording and ensure the standards are workable alongside other pertinent legislation.

The positive principles that SuDS are expected both to control flood risk and to improve the quality of surface water are now well-defined. This will provide a robust regulatory framework in England and Wales for surface water

treatment for the first time, which is very encouraging.

Inevitably, most energy has been focused on developing the standards and guidance that underpin good SuDS design. The ongoing performance and maintenance of SuDS features still needs further definition. Indeed, it's highly likely that adopting authorities will take a few years to truly get to grips with the full operational, maintenance and costs implications of SuDS under their jurisdiction.

It's important to define the maintenance requirements for vegetated features such as ponds or wetlands alongside manufactured elements of a drainage scheme such as a vortex separator. For manufactured devices, providing a proven, predictable maintenance schedule and costs is straightforward. But how will the full costs and maintenance schedule of a pond be accurately defined?

Unfortunately, I know of even so-called 'exemplar' natural SuDS designs where subsequent poor maintenance has compromised the original design performance of the scheme. So, it's important to develop ways of predicting maintenance and demonstrating repeatable performance.

At Hydro we have developed an online Selection Tool which is available for anyone to explore the choices for surface water treatment features according to catchment area and receptor. The tool suggests an example treatment train, the resulting pollutant removal and indicative construction and maintenance costs. You can then change / modify the components in the treatment train and see the resulting changes in pollutant removal as well as comparing capital and whole-life costs.

So, to answer my own question, I believe we'll be on the road towards 'SuDS heaven' by April 2014, but we'll be a long way from achieving perfection. The industry will continue to learn and refine its practice on the basis of experience. Knowledge-sharing initiatives such as Engineering Nature's Way and Susdrain will provide a vital resource for all stakeholders as the body of exemplar schemes continues to grow.

www.hydro-int.com

Contact Alex by email: alex.stephenson@hydro-international.co.uk
Telephone: 01275 878371

Housebuilders' New Vision for SuDS

Sharon Lindsay



Berewood, artists impression

A new homes development in Hampshire by Grainger plc has established a blueprint for a pioneering Sustainable Drainage Systems (SuDS) infrastructure on large mixed-use developments which is providing a best-practice benchmark for developers.

FROM when it was first talked about, the new 2550-home, 521-acre development at Berewood near Waterlooville was going to strive for the highest environmental standards. The new mixed-use community, first established back in 1988 by the Hampshire County Structure Plan, would provide housing, as well as 100,000 sq metres of employment land and associated community facilities including shops, a medical centre, a park and a primary school.

Lead developer Grainger plc came on board in 1998 with a vision to ensure the site had as little impact on the natural environment as possible and a goal to eventually deliver a net

benefit to the local biosphere. There was a commitment to understanding and using best practice SuDS techniques.

Fifteen years on, Berewood is fulfilling its early promise, with a visionary SuDS infrastructure constructed and the phased development beginning to be rolled out. The strategic surface water drainage scheme for the site incorporates above-ground open-space landscaped SuDS features that are enabled and controlled by engineered SuDS devices – 9 Hydro-Brake® Flow Controls and 8 Downstream® Defender Advanced Hydrodynamic Vortex Separators

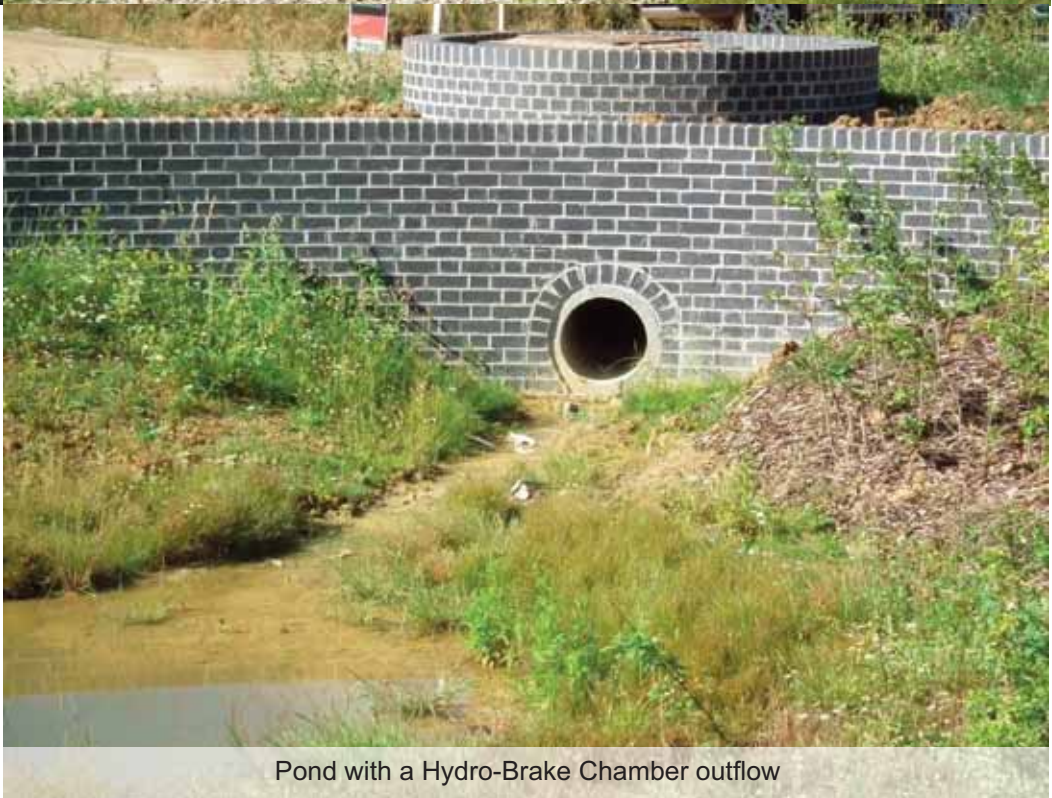
Already, the main approach to the site is taking shape, with its interlinked cascade of SuDS ponds, swales and ditches set to provide an inviting landscaped aspect to the development and invite potential homebuyers to join the new community.

A mix of SuDS techniques have been imaginatively combined to deliver efficient water volume and quality control on a site with challenging drainage conditions. Importantly, the future proof design achieves exemplary water quality standards over and above any current regulatory requirements to fully protect the local environment.



“We have aimed to create a sustainable community in every possible way at Berewood, and SuDs is a fantastic example of how a drainage system can be extremely efficient while also having minimal negative impact on the natural environment. Its sustainability makes it the perfect choice of drainage system for a development such as this, at this scale.”

John Beresford,
Development Director
Grainger plc



Pond with a Hydro-Brake Chamber outflow

Working in Partnership

Ensuring SuDS success for a development of the scale of Berewood required effective partnership from the outset. Set across the boundaries of Winchester City Council and Havant Borough Council, the site falls within the West of Waterlooville Major Development Area (MDA).

A close working relationship between all stakeholders was established early in the planning process. A vision for a SuDS infrastructure for the site was integral to the Masterplan and a SuDS Technical Group was established early on with the two developers for the MDA, Grainger and Taylor Wimpey. The partnership also closely involved the Environment Agency who took a strong lead from the early stages to establish SuDS objectives for the site.

The SuDS Technical Group met regularly to develop the SuDS principles and to plan for maintenance and adoption of the proposed SuDS measures within the scheme.

Working closely with the University of Portsmouth, the Environment Agency also established a monitoring programme for both water flows and quality from the site, as well as the ecology of the area. Extensive research undertaken by the university has provided an unprecedented level of data against which to benchmark future performance of the SuDS on the site.

Overall design of the SuDS volume and water quality controlled was designed by consultant engineers Mayer Brown.



Berewood Runoff event samples courtesy University of Portsmouth show quality of water outflow from pond



Pond Sampling

Site Conditions

The site has relatively challenging conditions and shows what can be achieved with SuDS.

The soil profile is a predominantly clay with poor capacity for infiltration and prolonged wet weather can lead to saturation in places. So planning and positioning SuDS measures had to account for a high potential for natural surface flow, both from existing drainage features and eventual increased runoff from hard surfaces. The ultimate discharge consent from the site is 5.06 litres/sec/HA for a 1 in 100year scale. The site discharges principally to the River Wallington on the northern boundary of the site and the North Purbrook Stream to the South West, which also enters the River Wallington.

Paul Stewart, Associate at Mayer Brown, was closely involved in the SuDS design for the site:

"Taking careful account of the natural topography, we designed an infrastructure and landscaping with a mix of vegetated channels, retention basins, wetlands, ponds and swales. All components play a part in achieving the water flow and quality requirements, but the overall water flow is attenuated via Hydro-Brake® Flow Controls including at the last outlet before discharge into the River Wallington."

"Further SuDS will be installed on a phase by phase basis within catchments, by developers taking on each of the housing and commercial packages and integrated into the existing surface drainage scheme. We have assumed that in each of the development packages, porous pavements will be used to encourage infiltration where possible."

"Controlling the water quality and quantity discharges on site during the building phases is also critical, so the hard engineered features play a vital role during the construction phases, before vegetation of the natural SuDS features is fully established."

"The hydraulics of the whole site are fully modelled in MicroDrainage software package. In a major storm event the Hydro-Brake® Flow Controls provide essential control of water quantity and flow on the site."



Key SuDS Features

- Carriageway edge swales and footway swales along sections of the highway will be adopted by Hampshire Highways. All other features will eventually be adopted by the local authority SuDS Approving Body.
- Linear basins with shallow pools at either end to provide habitat biodiversity along the main Broad Street that intersects the site with outfall controlled by Hydro-Brake® Flow Controls.
- A series of three cascading ponds near to the first junction at the entrance to the site, with marginal planting. Discharge from the ponds is controlled by Hydro-Brake® Flow Controls, and weir gully overflows with Downstream Defender® treatment devices.
- Large linear basins at the bottom of the site with micropools, a bog garden and wet woodland area. Discharge from the basins is controlled by Hydro-Brake® Flow Controls and Downstream Defender® advanced hydrodynamic vortex separators. The final discharge into the River Wallington is also controlled by a final Hydro-Brake® Flow Control and Downstream Defender®.
- Twin detention basins close to the centre of the site to provide attenuation and storage from the traditionally drained road, as well as providing back up storage for SuDS features. Outfall is controlled by Hydro-Brake® Flow Controls.
- A cascade of dry swales in the south west corner of the site, controlled by orifice plates on weirs.

"We specified the Downstream Defender® for a number of reasons," points out Paul Stewart. "The overall objective was that the design offers a reliable and consistently performing long-term technique for trapping silt and floatables, and provides intercept protection for minor hydrocarbon spillages."

The master SuDS plan has a number of ponds and swales to soak up the sediment as the surface flow drains down the slopes. The conventional approach would be to place catch pits at the outfall to entrap any sediment that escapes the ponds. Usually constructed as deep concrete pots, catch pits provide an additional defence when there is high



flow or high load. They can be visually intrusive and the open water surface provides a potential risk to residents.

"The Downstream Defender® delivers good SuDS practice," continues Paul. "They are effectively closed and buried, so do not require barriers and are totally compatible with the natural SuDS features; the units enhance the natural silt floatables trapping performance and act as back up protection during construction."

"This is not only important while the vegetation is establishing itself on the banks and on the beds of the features, but also if there is high silt loading during storm events or if construction work is less than perfectly contained. The construction phases will last many years, so ongoing protection is important, and on a residential site there are bound to be other incidents, whether a mower fuel spillage or a careless disposal of soil."

"It is intended that the SuDS features will be maintained by a private contractor engaged to maintain the whole site and funded by the residents. The roadside swales will be maintained by the Hampshire County Council through local taxation," Paul Stewart added.

The Environment Agency is continuing to monitor the site:

"We supported the development and its SuDS scheme from an early stage in the planning," comments George Woodward, Project Officer at the Environment Agency. "It was immediately apparent that the Berewood development was an important step forward in SuDS provision for flood risk management, water quality control and biodiversity."

"Here was the first major opportunity in the UK to study the environmental benefits of SuDS schemes before, during and after construction. To do this we set up a research project in conjunction with the University of Portsmouth and Mayer Brown. We were aided in this by the positive approach by Grainger plc, who embraced the benefits that SuDS bring."



"We have monitored the ecological and chemical quality of the River Wallington, with the initial evidence showing the effectiveness of SuDS in removing pollutants."

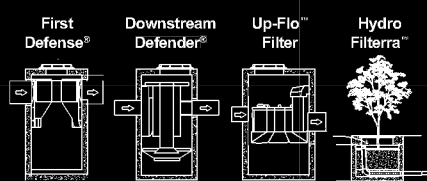
"We were confident that our design would improve water quality, but have been surprised by the extent. All the test samples demonstrate that

the water leaving the SuDS system is of a higher quality than the watercourse which we are discharging into," Paul Stewart added.

The initial phase of the Berewood site was completed in the Summer of 2013, but further phases will continue for the rest of the decade.

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SuDS Case Study:

St George's Primary School, Kidderminster

Author: Chris Hodson RIBA,
Consultant to Interpave

The trade association Interpave has published a case study (available at www.paving.org.uk) exploring a new, award-winning school in Kidderminster that takes an exemplary approach to SuDS.

Introduction

Architects Howl Associates were appointed by Worcestershire County Council to design a replacement primary school on the site of the existing St. George's School in Kidderminster. Completed ready for the teachers and pupils to begin the 2012/2013 school year, the building was the Winner of the RIBA Architecture West Midlands Award 2013 and BREEAM rated 'very good'.

The new school displays an exemplary approach to sustainable drainage, with a SuDS and landscape scheme designed by Robert Bray Associates integrated into the overall project from the very start,

enabled by a close working relationship between all those involved in the design. Solving complex issues, the drainage scheme utilises several SuDS techniques – including concrete block permeable paving – within a fully developed management train.

The design embraces the SuDS ethos of handling water on or near the surface and maximises opportunities for education and amenity within the landscape. Concrete block permeable pavements providing water storage are used extensively, surrounding and butting up against the building, as an integral part of the architectural design. But the project also exhibits a range of clever SuDS details using other readily available precast concrete products.

Site Layout Design

by Howl Associates

The site ground conditions prevent the use of any rainwater infiltration, requiring limited, controlled flows into the storm drainage system. The solution is a fully integrated landscape and SuDS strategy, starting with water attenuation on the living roof, then site features such as concrete block permeable paving – used extensively for car parking and access roads, as well as play areas outside classrooms – permeable asphalt, planted swales and a pond.

The proposal to move the primary access to the southern boundary introduced the main planning constraint, over and above the normal considerations for overlooking, parking, lighting and the like. The access from the southern boundary is tight and is adjacent to a mature oak tree. Measures had to be put in place for root protection as well as irrigation from concrete block permeable paving and the access road swale.



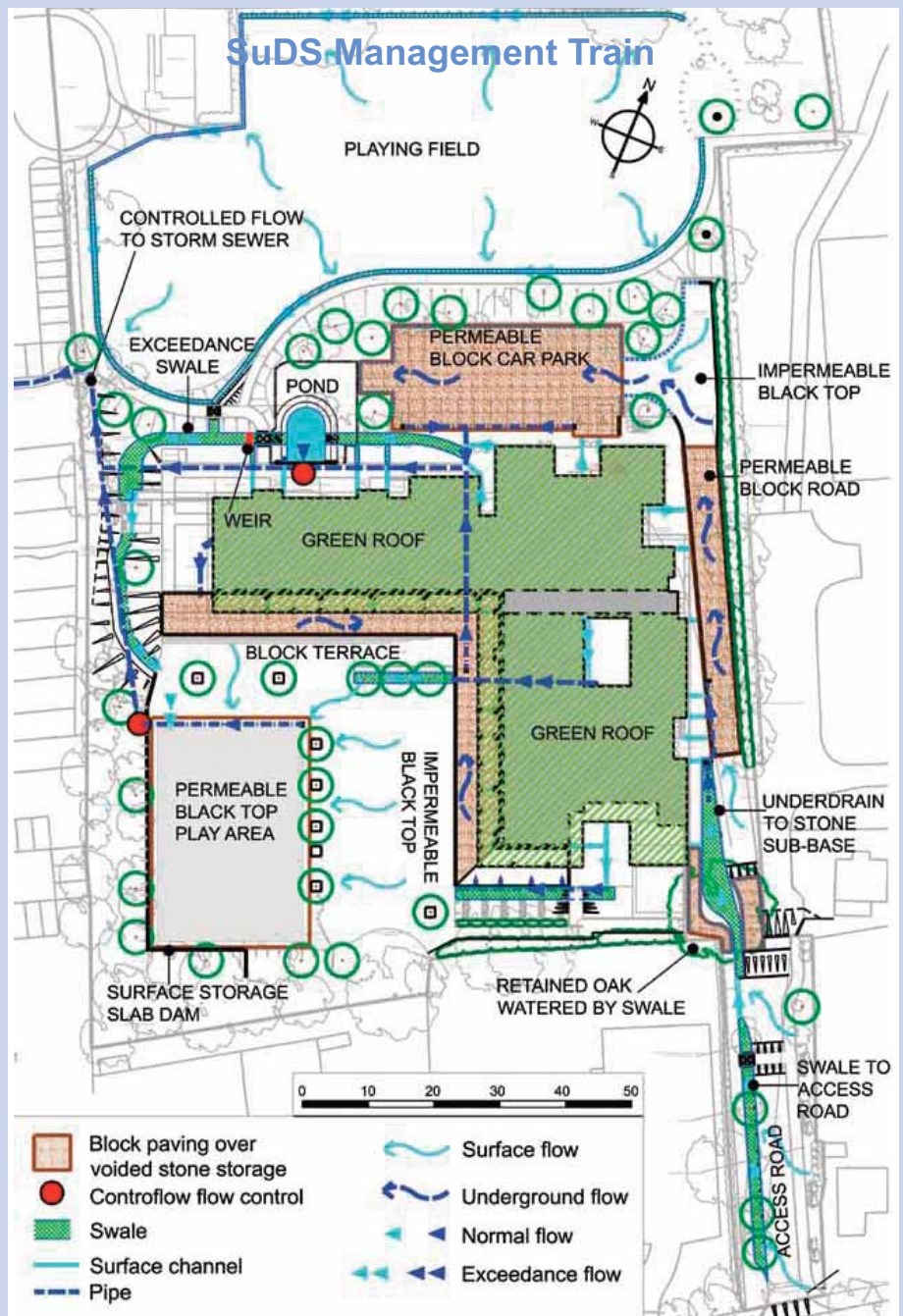
Permeable paving and a swale help irrigation of the mature oak tree.

SuDS Strategy & Landscape Design

by Robert Bray Associates

The drainage scheme has been designed to manage water on the site for the 1:100 year storm plus 30% allowance for climate change effects. As the site is on impermeable soils, surface water is stored near the school building and released at a controlled rate to the surface water sewer. The selection of SuDS techniques for the development allows for an initial loss on site of 5mm, called 'interception storage'.

Most of the school has a green roof providing approximately 40% reduction in runoff from the sedum roof areas. The remaining volumes of runoff from the site will be stored underground in voided stone below permeable paving, on the surface or in landscape features. There is no 'safe' exceedance route off the site, so an allowance has been made for storing excess water that might run off the upper playing fields, on the lower part of the site (in addition to that normally allowed for in SuDS schemes).



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SuDS Design

by Robert Bray Associates

Site Topography and Discharge

The upper half of the site where the previous school stood and a narrow band of land on the eastern boundary are virtually level. The rest of the site slopes westward into a valley, with the lowest point on the western boundary. The northern edge of the site is approximately 4m above the lowest point. The building, road and car park sit on a new terrace approximately half way between the highest and lowest levels of the site.

The whole site is drained by a controlled flow discharging to the surface water sewer in the adjacent housing area to the west of the site, at an agreed maximum rate of 5 litres per second.

The capacity of the drain is limited and cannot be used for overflows, and there is no 'safe' exceedance route from the site as housing now occupies the natural route.



Catchment and Containment Areas

Water is stored in lined or un-lined paving sub-bases, on areas allowed to flood over appropriate paved surfaces, in swales and in a pond. There are three containment areas:

- Top – the swale adjacent to the access road to the south of the building, which overflows to the Middle containment. Its catchment area comprises the access road and paths.
- Middle – stone sub-bases under the road and terrace, and on the surface of the car park, pond and a swale. These are all linked and form one storage compartment, discharging at 3 litres per second through a control chamber. Its catchment area comprises the building roofs, access road east of the school, terrace west of the school, car park and paths.
- Lower – within the stone sub-base of the permeable asphalt court and on it and the adjacent play area surface, discharging at 2 litres per second through a control chamber. Its catchment is the court, play area, overflow from the Middle containment area and overland flow from the playing fields north of the school.

Pollution Control

The roads and car parks are considered to be medium risk areas for pollution and have two treatment stages while roofs and play areas are low risk and have one treatment stage.

The upper section of access road to the south of the building is drained to a vegetated swale beside the road and a second swale leading to a voided stone sub-base under concrete block permeable paving, providing two-stage cleaning.

The surface water on the lower section of access road and car park drains through the permeable block paving into a voided stone sub-base. This form of filtering has been found to be very effective with this level of pollution risk and is considered the equivalent to a two-stage cleaning.

Water from roofs and all other paved surfaces either flow across vegetated surfaces or through permeable surfaces providing the required single stage cleaning.

SuDS Detailing

In addition to concrete block permeable paving, ingenious use of other standard precast concrete products has been made to enable long-term, effective performance of the SuDS scheme. Concrete flags, kerbs and edging have been used for carefully detailed water conveyance and inlet/outlet structures, dispersing water and maintaining low flows. For example, a standard 'bull-nose' concrete road kerb allows runoff to trickle gradually onto grassed swales.



Kerb quadrants direct water straight off the impermeable access road into a swale, softened by a concrete flag. Rainwater downpipes from the building roof discharge directly over ribbed concrete flags which channel the water across a footway.



Bullnose kerbs to the road and edgings to the footpath allow runoff to flow gently into a swale without erosion. A simple pedestrian crossing is formed with concrete paving flags.



Ribbed concrete flags simply channel downpipe discharge across a footpath straight into the pond.

Landscape and Paving

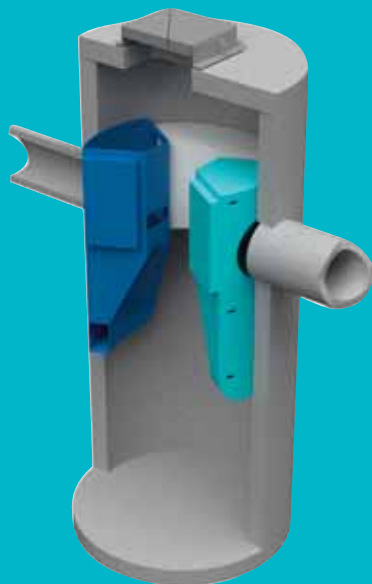
From an amenity perspective, water is carried on the surface in channels, swales and rills, providing animation and interest. Multifunctional hard and soft landscape SuDS features provide interesting places for play and are usually dry, except when it is raining – and even then, permeable paving surfaces are generally clear of standing water. Small-scale bridges, rills and other play features are provided to maximise opportunities for play and education, while the pond has been designed to have easy and safe access for study. Aquatic plants, wildflower areas, living roofs and native trees and shrubs provide biodiversity.

External paving has been considered as an integral part of the architectural design, with rectangular concrete blocks in a herringbone pattern flowing into the generous covered cloister play areas on the south side, while providing continuity in the car parking and access areas elsewhere. The charcoal coloured blocks combine with buff paving flags and areas of black asphalt, as part of the restrained architectural palette of materials.

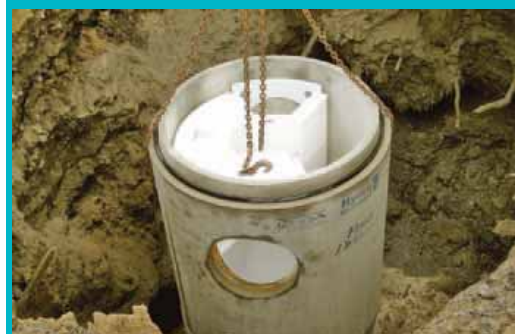


This, and other case studies, as well as Interpave guidance on permeable paving and SuDS, can be downloaded via www.paving.org.uk

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The smooth installation of 60 First Defense® separators at Revere Beach in Massachusetts provided a cost- and time-saving solution to removing sand, grit, litter, oil and debris from runoff



A much-needed small footprint solution to meeting regulatory treatment requirements on a confined site Ohio. The unit's compact size fitted the terrain and also met the need for speedy 'plug and play' installation that delivered considerable cost savings.

Hydro International's innovative First Defense® vortex separator is now available for the first time in the UK, in response to the growing need for economical surface water treatment on new developments, car parks and highways.

Already well-established and proven in the US, First Defense® uses a gentle vortex action to remove coarse particles, litter and oil from surface water runoff – a requirement which will become increasingly important as a result of growing regulation for Sustainable Drainage Systems (SuDS) in future.

The First Defense® has been launched as part of the Hydro StormTrain™ Series of surface water treatment devices, a comprehensive toolbox for silt, sediment and pollutant removal as part of SuDS.

"By introducing First Defense®, Hydro is adding a well-established, proven technology to its UK range of surface water treatment devices, creating the broadest choice of proprietary treatment products available," said Alex Stephenson, director of Hydro International's UK Stormwater Division. *"First Defense® provides an economical option where litter, oil and coarse particles need to be removed."*

Designed and developed by Hydro International, First Defense® is already proven in the US and has passed the stringent certification criteria of many US regulatory authorities.

Delivered as a pre-cast standard-size concrete manhole with internal components pre-fitted, First Defense® delivers repeatable, predictable, at-source pollution control for small- to medium-size catchments with easy installation and minimal maintenance.

The internal components of the First Defense® are designed to create a low energy rotational flow within the chamber, allowing sediments to settle to the sump, while oils, floating litter and debris

rise to the upper containment area. Harmful pollutants are therefore captured safely within the device, protecting public areas.

The gentle action of low-energy vortex separation eliminates excessive agitation of captured pollutants, ensuring they are not resuspended during peak flows. During peak rainfall events, the integral bypass also ensures pollutants remain within the chamber and are not washed out.

The orientation of the outlet can be adapted to suit site conditions. Single and multiple inlet pipes are also available, along with an inlet surface grate for maximum design flexibility.

"Deciding on the correct SuDS-compliant treatment solution to meet the requirements of the catchment and receiving watercourse can be difficult," adds Alex Stephenson. *"Hydro StormTrain™ Series offers a comprehensive range of options and the devices, including First Defense®, that can be used individually or in combination to achieve an effective SuDS management train."*

The expectations of the EU Water Framework Directive (WFD) are influencing the development of legislation in England, Wales and Northern Ireland, as well as driving the implementation of established regulations in Scotland. In every case, the Hydro StormTrain™ Series offers future-proof SuDS-compliance.

Hydro has developed a useful online Treatment Selection Tool to help users examine the options and consider the likely consequences in terms of cost and pollutants.

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River restoration & management





Piloting changes to the way river maintenance is regulated

In recent years wet weather has caused significant flooding in areas such as the River Brue in Somerset. But while river maintenance can make floods less likely in some areas, current rules mean that farmers who want to manage their own watercourses could be put off by bureaucracy.

The new River Maintenance Pilots, started on the 21st October, will last for one year and are designed to see how existing rules can be simplified without damaging the local environment. Currently, landowners have to apply for permission from the Environment Agency before carrying out certain maintenance activities on rivers crossing their land. Under the pilots, farmers and landowners in seven areas in England at risk of flooding will be allowed to carry out work to de-silt watercourses without needing to obtain a consent.

All maintenance work undertaken in the pilot areas will need to comply with environmental legislation, the Regulatory Position Statement and follow the Environmental Good Practice Guidance.

The Regulatory Position statement applies to landowners working with us to reduce flood risk by managing and maintaining the watercourses on their land during the one year trial in specified locations. The Environmental Good Practice Guidance will help farmers and landowners to maintain the rivers on

their land whilst protecting wildlife and fisheries.

The pilots will cover seven areas:

- Alt Crossens, Lancashire
- River Idle, Nottinghamshire
- Bottesford Beck, North Lincolnshire
- River Brue, Somerset
- Upper Thames, Oxfordshire
- Winestead Drain – East Ridings of Yorkshire
- River Duckow, Shropshire

The findings of the Maintenance Pilots will be used to develop a new improved system of consents for managing river maintenance by 2015, as part of the reforms being introduced in the Water Bill.



The Environment Agency has published the 'Environmental Good Practice Guide: a guide for landowners in pilot trials to desilt main river on their land which accompanies the Regulatory Position Statement. Click the guide to view.

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River of Life

Wetland Project

The River of Life is an exciting project that will transform over two kilometres of riverbank along the Thames, restoring wetland features and wildlife habitats that were more typically seen centuries ago. It will become a wild stretch of the iconic River Thames which will help save threatened wetland wildlife, improve water quality, and change the relationship that society has with its wetlands and wildlife.

“our vision is to create a truly wild stretch of river”

The Earth Trust

Over 4 km of the River Thames will become a continuous wildlife habitat creating an area of 150ha.

To create a new landscape scale area of wetland habitats

New habitats will include:

- Wet Woodland with stands of alder and willow
- Fen
- Reedbed
- Ponds and scrapes
- Seasonally wet grassland and neutral meadow

This will see approximately 50 hectares of Earth Trust land adjacent to the River Thames converted from species poor permanent pasture to habitats identified as being of high conservation value. (Biodiversity Action Plan [BAP] habitats).

The new habitats will include areas suitable for a wide range of wetland and woodland species, including water vole, otter, a wide range of birds, invertebrates and amphibians.



The new habitat area will link directly with an existing area of international significance for wildlife - Little Wittenham Wood SSSI/ SAC – transforming and extending an area of high quality habitat. This will provide a buffer zone to Little Wittenham Wood and provide a continuous area of 150ha of high quality wildlife habitat from the Thames basin up to the top of the Wittenham Clumps.

The project is located in a Biodiversity Opportunity Area or Conservation Target Area identified by Thames Valley Environmental Records Centre – the Thames Clifton to Shillingford Target Area. These areas were selected with a view to highlighting the best opportunities for recreating priority habitat at a landscape scale in Oxfordshire. This project provides potential to develop a landscape scale wetland area local to Oxfordshire where limited opportunities exist.





The projects will benefit the following BAP priority species that are already in the area or close by: -

Birds: skylark, yellowhammer, corn bunting, tree sparrow, lapwing, grey partridge and linnet

Mammals: brown hare, otter, water vole, noctule, brown long-eared and soprano pipstrelle bat

Herptiles: common toad, great crested newt, grass snake and slow worm

Invertebrates: Hornet robberfly (*Asilus crabroniformis*), South yellow Splinter (*Lipsothrix nervosa*), Red shanked carder bee (*Bombus*

rudarius), Blue Ground Beetle (*Carabus monilis*), Stag Beetle (*Lucanus cervus*) Rugged oil beetle (*Meloe rugosus*), and Sedge jumper (*Sitticus caricus*).

Other notable species include the Buttoned snout (*Hypena rostralis*), Money spider (*Saloca diceros*), Soldier flies such as *Oxycera analis* (Red Data Book) and the Nationally Scarce *Stratiomys potamida*, Ruddy darter and Club-tailed dragonflies, ground beetles such as *Bembidion* gilvipes and several species of hoverflies and crane flies.

To provide access routes to the newly created landscape and engage people in the creation of the habitats

The River of Life will provide significant opportunities for exploration and engagement with water, its conservation, wildlife, wetlands and the living history of the Thames for the local community, river users, walkers and visitors.

In time, physical access to these evolving habitats will be further enhanced through the provision of paths, boardwalks and a raised viewing platform. Relevant low key interpretation will interpret the story of these habitats and changes in water levels with time. The access routes would be linked up with the Thames footpath, joining it at Shillingford to the east and Days Lock to the west. The intention would be to create an alternative, wild experience where people can experience nature first hand. The proximity of the River of Life to the Thames Path, the Wittenham Clumps (which receives over 150,000 visits per year), a number of villages, the

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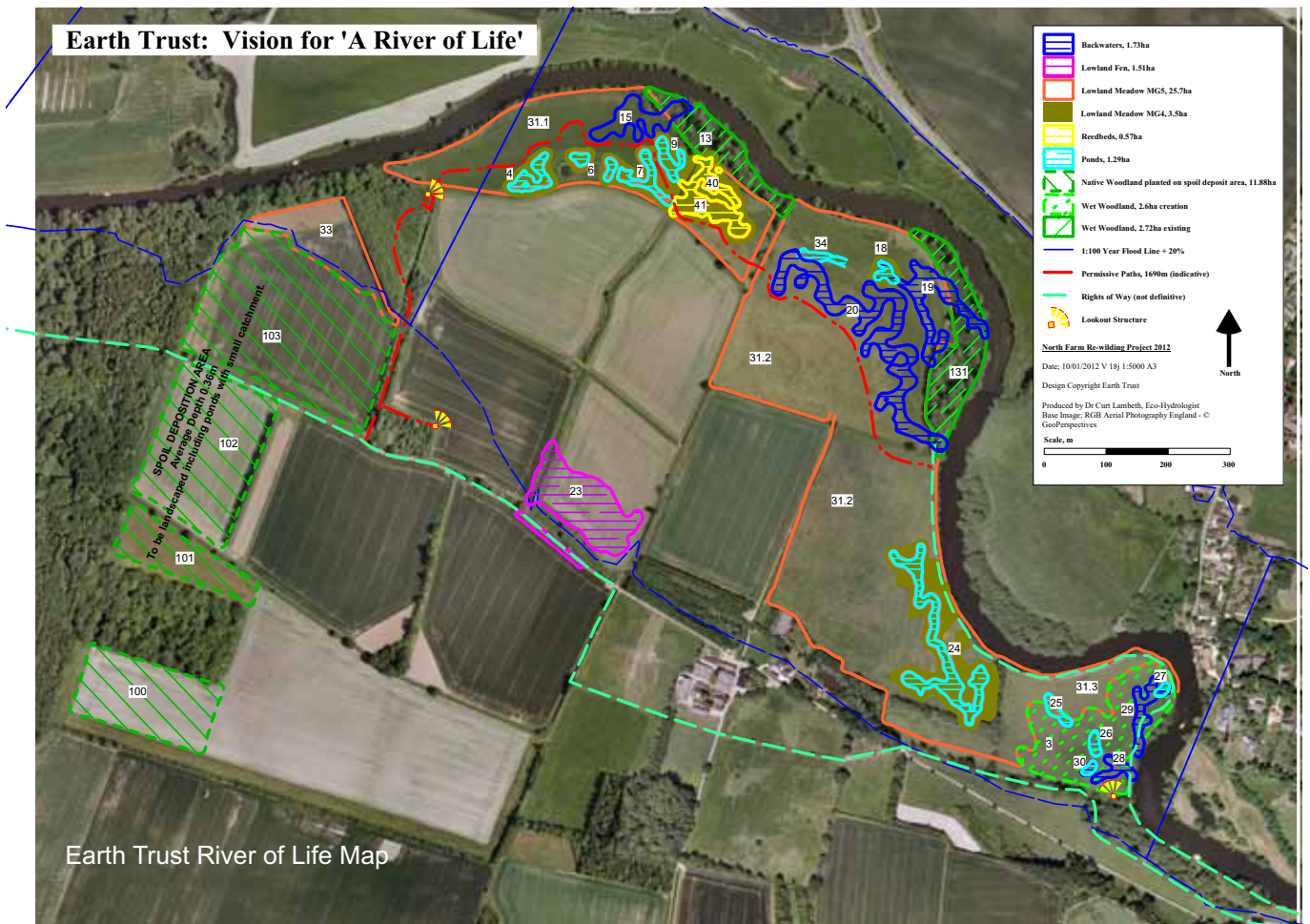
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towns of Wallingford & Didcot and the river itself means it is ideally placed to engage people with these habitats and the subjects of water, wetlands and our impact on these environments. There will be opportunities for remote learning, for example through web cams and the web. Key audiences involve schools and community groups, those of all ages wishing to develop heritage skills and there will be a focus on intergenerational learning.

There will be numerous opportunities for volunteering, both in development

of the site (e.g. building boardwalks, planting reedbeds) and ongoing management (e.g. species monitoring, practical conservation tasks). Organised activities will include Countryside and Wilderness skills courses, school workshops, public events, open days, and site tours.

To restore the shape and connectivity of historic backwater channels to improve fisheries habitat

Results from Environment Agency surveys demonstrate that, along the reach of the Thames for which the River of Life project is proposed, the River Thames is deemed to be failing for fish, as assessed under the requirements for the Water Framework Directive. These surveys also highlight the importance of backwaters and floodplain connectivity in supporting a healthy and abundant fish population - such features are currently absent on the Thames within the project area. The six backwaters proposed as part of the River of Life project will create valuable fish fry refuge habitat away

from the main navigation. Therefore it is expected that this project will result in a very significant improvement in fish productivity in the River Thames.

To enhance the value of ecosystem services

The term ecosystem services encompasses the range of benefits which people get from the resources and processes that are supplied by ecosystems. As described above, the River of Life project will help provide many ecosystem services such as habitats for biodiversity, fish fry refuges, recreational access etc. There are also less obvious services which the project will help provide. These will include flood amelioration (additional flood capacity totalling c. 34,600 cubic meters within the one in five years flood zone), carbon sequestration, flow regulation, improvements in water and soil quality (including nitrogen and phosphate levels) and food production.



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Soft engineering solutions on The Teme

Richard Edwards, Salix

The River Teme is a sensitive SSSI and SAC river and over 150 metres of severe bank erosion was threatening a National Grid pipeline.

Salix were appointed design and build sub contractors using a hybrid bank protection solution. The toe of the eroded bank was stabilised with a graded rip rap below average water level and then extensive soft/bioengineering works above.

The project represents one of the largest riverbank repair works ever undertaken by National Grid.

Innovative working methods included a submerged blockstone causeway that permitted fish movement and allowed access to the opposite bank to work. The alternative to work on the opposite bank was a 2.2 km access track across

wet ground involving importing and then removal to landfill of 2000 tonnes of imported haul road material. Thus over 2000 tonnes of aggregate was saved from the project producing a significant cost and carbon/sustainability saving as part of the sustainability review procedures.

Tree limbs removed for access were reused as part of the soft engineering revetment.



Salix grew, in-house, over 2000m² of reinforced grass/wildflower turf on 40m² large rolls to provide soft engineering protection above average low water level. The high erosion control performance of this turf meant that a soft solution could be used as a direct alternative to rock rip rap, saving over 1000 tonnes of imported material whilst creating a more sustainable and ecologically valuable solution.



The various soft engineering solutions presented by Salix represent a major cost saving over traditional hard revetments. Our Health & Safety risk assessment set maximum water levels and monitoring levels were installed at key working areas to determine safe working conditions.

Northern Divers dive team assisted the installation of a concrete plinth, supported on 12 "H" piles, to straddle the high pressure gas pipeline. A blockstone retaining wall was installed above the straddled pipe 2.5m below the river level to 1m above average river level. Above this a graded bank was created protected with Salix's Rock Roll Mattresses.

Works were not helped by the wettest recorded year in English history and amazingly there were five out of the six largest flood events in recent history whilst on site!



Post floods and two months after the end of the works, the River Teme is free from the ravages of erosion.



Improving fish passage on the Hogsmill River

By Toby Hull, The Wandle Trust

The Project

The Wandle Trust is continuing to improve connectivity for fish passage along the length of the Hogsmill River which flows from Ewell to Kingston.

The project has been funded by Defra, through the Catchment Restoration Fund, to improve connectivity along the Hogsmill River. This is because fish passage has been identified as being a major contributing factor to the river's current failing status under the European Union's Water Framework Directive (WFD).

At the start of the project there were 15 obstructions along the six mile length of the Hogsmill, resulting in the available habitat, of which much is heavily degraded, being highly fragmented and therefore limiting. This causes bottlenecks at varying life stages, ultimately leading to the survival of the fish species present being compromised and extremely vulnerable.

Weir removal

In August, following months of involved planning, the first two weirs on the Hogsmill were broken out, returning natural flows to the upper river. Land and Water were contracted in to help the Trust realise our aims. Design advice and guidance was provided by Cain Bio-Engineering Ltd. www.cainbioengineering.co.uk

Trees were removed from the weir areas to improve access and increase light levels and the brush was then reused within the bank stabilisation revetment. The extra light will also assist in vegetation establishing, which is key in the success of the chosen bioengineered bank solutions. The bank on the downstream weir was also benched to provide a stable platform for the machines to sit on.

Next came the fun bit. Armed with a breaker, the excavator was set loose on breaking out the downstream weir's abutment walls, shortly followed by the weir itself. The tough, re-inforced concrete put up some resistance but ultimately it succumbed with satisfaction as lump after lump fell. The ponded section of river upstream quickly drained.



The banks have been lowered, re-profiled and protected with two different techniques, one on each bank at each weir location. The first, which has been installed on the more isolated bank, is a traditional brush bundle (faggot) approach created from material won by the tree works



The far bank coir revetment being installed

that have taken place. Behind these is a line of coir geotextile to prevent wash-out before the banks have vegetated and are self supporting.



re-profiled banks with brush bundles and coir rolls

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On the other bank, which is subject to more footfall due to the nearby public footpath, a more robust technique was implemented. This involved a three layer method of a polyester Geogrid on the front face with a coir matting acting as the sandwich filling with a geotextile behind, again to prevent washout.

Natural stonework forming the existing hard engineered banks was segregated and reused to make up levels in the new channel and the concrete was removed from site for recycling. Imported gravels, selected accordingly to their suitability to the river, were used to redress the new channel bed providing potential spawning beds and improving the habitat potential of each site.

The low lying, soft engineered banks have been planted with a variety of riverine species, including greater sedge, lesser sedge, pendulus sedge, meadowsweet, hemp agrimony and purple loosestrife. Additionally, with permission in place with the Environment Agency, a variety of large, mature plants were trans-located from the river nearby which had the 'Changing Rooms' effect of instantly finishing the job. This will not only help to soften and naturalise the sections whilst offering a diversity of habitats but the root structure will be integral to the longevity of the banks. The planting was undertaken with the generous help of the Epsom and Ewell Countryside Team volunteers.

In total approximately 350 metres of river has been returned to a more natural flow regime providing potentially key spawning and juvenile fish habitat. The removal of the weirs now means that there is a 1.5km uninterrupted stretch of river.



Downstream Weir, before and after



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Upstream Weir, before and after

At the downstream end of this there was a lip with a head drop of approximately 200mm. The combination of these factors formed an obstruction, especially during low to moderate flow conditions.

The second issue was that 60m further down-stream there was another weir very similar to those previously removed. The weir was 7.5m wide with a concrete apron and sill with a head drop of 0.7m. This was a complete barrier at all times. The river through this stretch has historically been excessively dredged and as a result is over-wide, deep and with all of the gravels having been removed leaving a barren clay bed. The project also addressed these habitat issues.



The downstream weir



Following the removal of the first two weirs and the channel renaturalised, focus then moved to the middle section of the river where two obstructions lie off the Old Malden Lane/Worcester Park Road.

The problem here was twofold. Firstly, as the river flows under a bridge, the concrete footing which is 18m long and 9m wide caused the water to flow incredibly shallow.



The upstream bridge footing



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The solution was to completely remove the downstream weir, including the abutment walls. This alone would not rectify the problem. Firstly, the bridge footing would still be impassable but secondly the fall from the bridge footing to the downstream bed level is too large. If left to its own devices, erosion would cause the footing to become undercut and a series of large, impassable cascades to be formed. To remedy this, bed stabilisation was required along the length of the site.



The upper line of posts going in with the weir being removed in the background

Once the weir had been removed, the impounded water drained away revealing the river bed that lay beneath the deep sluggish water for so many decades. What became immediately clear was the impact that excessive historical dredging and widening has had on the river. The facade of being a large, deep river was lifted and the reality of the stream which the Hogsmill really is at this point in its journey unveiled. A river, no more than a metre wide snaked its way in the bottom of the eight to ten metre wide channel. The chalk fed source of the river 3.5km upstream will be running low at this time of year but the river looked markedly out of place in the over-sized channel.

Nine rows of chestnut posts were driven in, crossing the channel from bank to bank in shallow curves at regular(ish) intervals down the 90m stretch of river. In total 700 posts were used as I am sure the guys on site will testify to. Upstream of these, large gravel rejects (later substituted by gabion stone due to unreliable quantities of the large flints being delivered) were hand



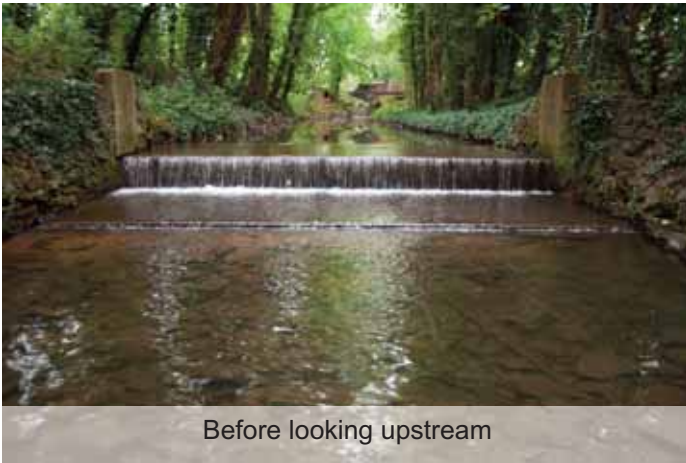
The true river revealed

placed behind the posts to prevent washout and maintain the head across each pool. These essentially produced a series of mini steps which act to stabilise the bed and drop the river in manageable 100-120mm increments. Along each line of posts, a low flow channel, approximately one metre wide, was created by driving the posts a little deeper. Creating a low flow channel will help to build the river's resilience to potential climate change.



The gabion stone is stacked behind the posts

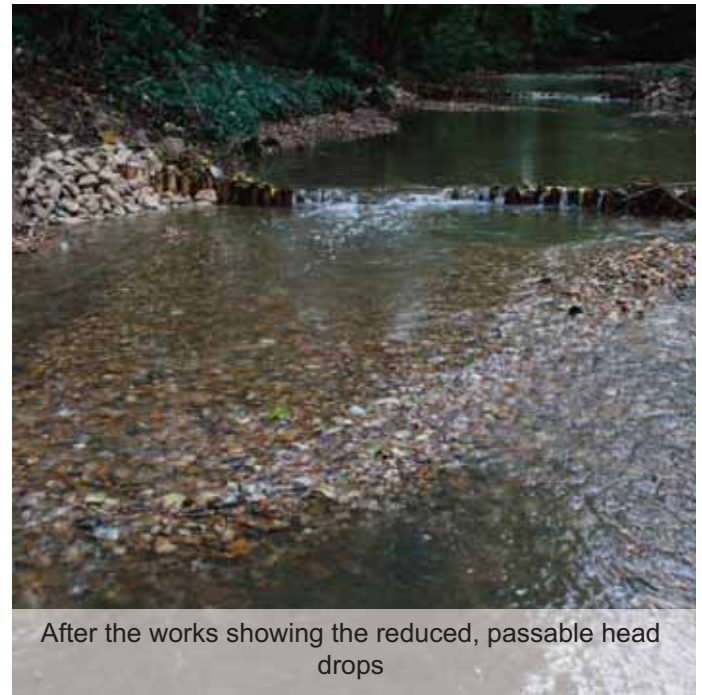
Once the rock ramps were in, gravels started to be introduced to narrow the over-wide channel, also creating a low flow channel between each rock ramp. The gravel orders were repeatedly made and delivery after delivery entered the yard. These were loaded onto the tracked dumper and moved to where they were needed in the river before being placed with the excavator. Trip after trip, tonne after tonne, the gravels were moved and introduced. The dredged channel appeared to eat the gravel up without as much as a burp! It rapidly became clear that our 200 tonne allocation was looking decidedly



Before looking upstream

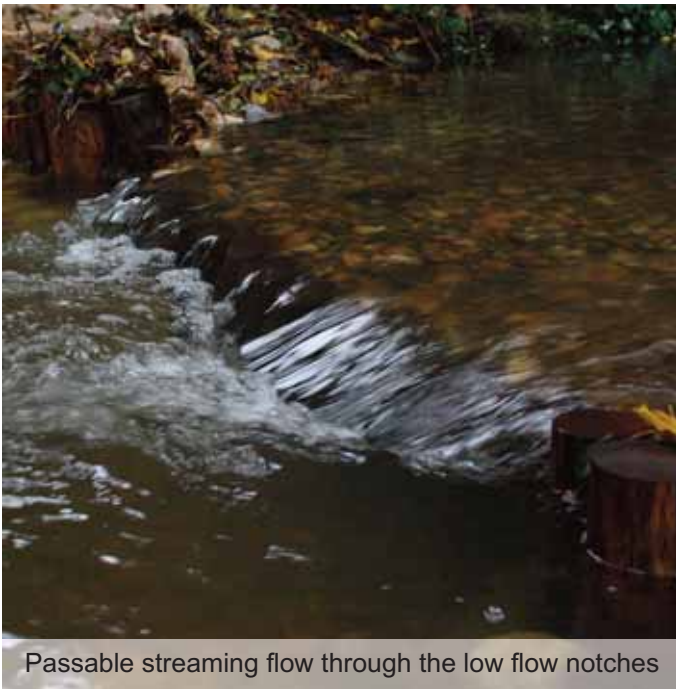
insufficient. Without more gravels the river would be passable, however the habitat would be lacking with wide, deep, sluggish pools similar to that of before.

The budget was checked and with a groan it relinquished more funds. By the close of play, 370 tonnes of stone had been introduced and the transformation now complete, although further narrowing and planting would help this stretch further but with budgets as they are given that there is still a further 11 weirs to address, this will have to wait. The upper line of posts has drowned out the bridge footing, providing a depth of approximately 300mm for fish to pass. From here, each ramp reduces the one metre head over the length of the site in approximately 100-120mm increments. The water now flows through the low flow channel in the form of a beautiful, streaming, passable flow.



After the works showing the reduced, passable head drops

positioning of the low flow notches in each line of posts has created a sinuous, meandering channel. Already a mosaic of habitats has been created which will provide the required niches for various inhabitants of the river to occupy. The rubbish strewn, brick filled clay bed has now been replaced with nice clean gravels, which will provide vital habitat for varying levels through the food chain from plankton to invertebrates to fish. Fish can now freely migrate up and downstream as they choose. A few tweaks will be required to the levels as the river adjusts and settles into its new form but essentially the job is done.



Passable streaming flow through the low flow notches

With the works just completed and with no time to settle in, the site was brutally tested by the apocalyptic weather that we experienced at the weekend. With bated breath I pulled up on-site this morning and was pleased to see that it had passed, everything was where it should have been. The river has started to react positively to the works. Deep pools have been scoured out, kicking the gravels up to form shoals and riffles. The varied



Deep pool with root structure habitat and gravel shoal

For more information on the Wandle Trust, contact: Toby Hull, by email: toby.hull@wandletrust.org or visit www.wandletrust.org



OPAL study creates first dataset on pollutants in English lakes

Kate Martin, Centre for Environmental Policy, Imperial College London

SCIENTISTS from the OPAL Water Centre at University College London have published an in-depth summary of results from a pioneering monitoring study at nine lakes across England.

The study represents the first time that some pollutants in England's freshwaters have been measured on such a scale, or, as in the case of brominated flame retardants, the first time they have ever been measured in English lakes.

One of the main aims of the Open Air Laboratories (OPAL) project was to promote a greater understanding of the state of the natural environment throughout England, but especially with people who, previously, may not have had the opportunity to become involved. As part of this objective, the OPAL Water Centre developed the OPAL Water Survey which aimed to encourage people to explore the ponds and lakes in their neighbourhoods and discover the animals and plants that live in and around them.

Alongside this, the scientists carried out their own monitoring study of nine lakes. The OPAL Water Centre Monitoring Report 2008-2012 explains how the study found that sediments from ponds can reflect local events, national events and even international events such as radioactive fallout from the 1986 accident at the Chernobyl Nuclear Power Plant.

The monitoring programme involved quarterly measurements over the four years supplemented by other less frequent activities. This provided new data on a



The nine lakes are spread throughout England, from Crag Lough in Northumberland to Slapton Ley in Devon. They were chosen for their interest to local communities, and are affected by diverse circumstances, such as urban and rural settings, proximity to land-fill and subsidence from mining.

River restoration & management

range of sites across the country; provided more information on some urban and disturbed environments and raised awareness of ecosystem health and how individual actions may affect lakes and ponds. The monitoring included physical measurements such as water temperature, conductivity, dissolved oxygen, pH and light, chemicals such as nutrients as well as potentially toxic trace metals and persistent organic pollutants (POPs) and biological monitoring of zooplankton, phytoplankton and diatoms. These data allow us to see how lakes change over the seasons and inter-annually as well as the extent of any local impacts.

Although monitoring can tell you a great deal about short-term changes, it takes a long time to see whether things are improving or getting worse. Lake sediment cores allow seasonal monitoring to be put into an historical context so that changes can be observed over decadal and even centennial time-scales. The sediment cores from each lake were therefore analysed for chemical and biological parameters to see these long-term changes. Each core was dated using radio-isotopes (^{210}Pb ; ^{137}Cs) allowing you to see not only the direction of change (whether contamination or water quality is improving or deteriorating) but importantly the rate at which any change is occurring.

The data collected has also benefitted communities in some of these areas who incorporated it into management strategies or used it in successful applications to restore sites.

The report is available to view and download [HERE](#)

"The data can be used to help illustrate how individual actions can have larger impacts. Our study demonstrates that environmental change is not something that only happens in remote and exotic places but happens all the time where we each live and work."

Dr Neil Rose, one of the authors of the report

"The information in this report represents an important first dataset and a critical baseline against which to compare future changes. As such, it is a valuable asset for all those interested in water quality in England, and particularly for local communities who use their lakes for recreation, care about its conservation value and who have shown a keen interest in this study."

Dr Linda Davies, OPAL Director at Imperial College London

"Such lakes would probably be avoided in 'traditional' monitoring schemes so we have provided data on lake types and impacts for which there was little information. This work has also added considerably to the knowledge of some pollutants and our understanding of them in these ecosystems."

Dr Simon Turner, lead author of the report

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Helping our Eel population

Safer passage for eels on the Cam

The Environment Agency has added a new pass to help eels move along the River Cam as part of their refurbishment of the Jesus Green sluice.

The refurbishment, at Chesterton Road alongside Jesus Green in central Cambridge, is part of an ongoing programme of repairs to ensure that River Cam flood defences continue to protect people and property from flooding. The eel pass is attached to the weir wall in the middle of the River Cam. It will allow eels and elvers (young eels) to navigate easily over the existing weir.

Kye Jerrom, Fisheries Expert for the Environment Agency said: *"The eel pass is a new design for us. It's made up of a series of bristle pads which are attached by brackets to the wall of the sluice."*

"The eel and elver use the bristles to navigate across the pads and up over the wall of the weir – it's a bit like a staircase."

"This is a great opportunity to improve the biodiversity of the River Cam but actually help with an international conservation issue."

"The sluice is an essential part of the flood defences for properties along the River Cam but it's a real blocker for fish movements. The new eel pass will definitely improve eel populations in the Cam, with lowland rivers and Fenland drains providing some of Europe's best eel habitat."

The eel pass has been built to ensure the site is compliant with the Eel Regulations 2009 which require that all structures within watercourses have the capability to allow free passage for eels. This means removing or providing routes around barriers to eel migration.

Eels are listed in the CITES (the Convention on International Trade in Endangered Species of wild fauna and flora) as a critically endangered



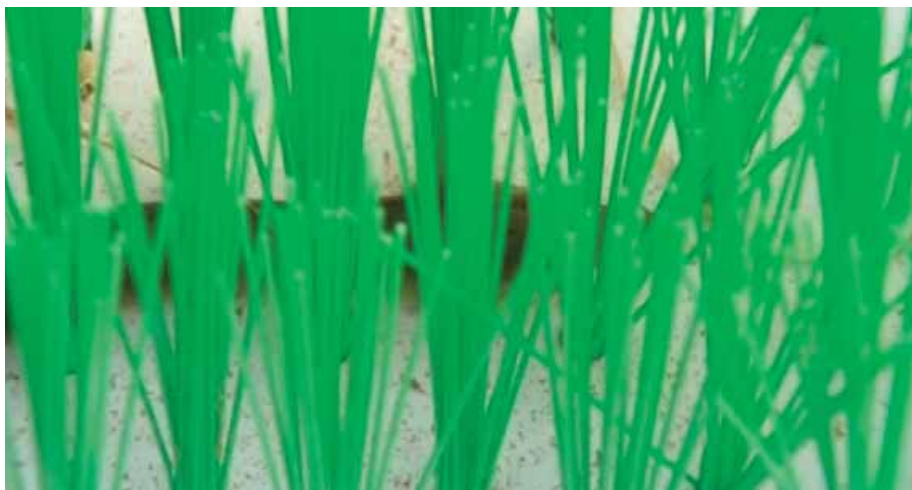
species, and Europe have imposed strict measures to reverse that trend.

Juvenile eels or Leptocephali make the trip from deep waters near the

Bermuda triangle into Europe and for us that means the English Channel, Wash and Great Ouse and it's tributaries before progressing further upstream to continue with their freshwater life-stage that can last up to 60 years.

The Environment Agency have a key role in ensuring that the biodiversity of our watercourses is enhanced and fish stocks are managed for the benefit of wildlife and people.

The organisation has ambitious plans to clean up 9,500 miles of rivers by 2015 – the distance from England to Australia, everyone has a part to play to help make our water and land more natural and sustainable for people and wildlife.



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Halting eel decline at Blagdon Reservoir

The Environment Agency has completed a project to install a trap and transport system for eels at the Blagdon Reservoir, near Bristol, in a concerted effort to halt the sharp decline of eels.

Working in partnership with Bristol Water, the Agency identified a bottleneck at Blagdon Reservoir where it had become partially disconnected from its river, the Congresbury Yeo.

The new system was officially unveiled by the Environment Agency, Bristol Water and Avon Wildlife Trust on September 23.

Development of the infrastructure had blocked the migration pathway for eels into the reservoir. An eel pass alone would need to be several hundred metres long to make the connection and maintenance would have been virtually impossible.

Trapping and transporting the newly migrating eels solved the problem.

The new Trap and Transport system has been built next to the historic eel trapping channel. It uses short sections of eel pass leading to a holding tank.

Bristol Water staff will monitor the trap, removing the captured elvers that have arrived overnight and move them up into the reservoir where they will grow for 15-20 years before migrating to the sea as adults.

Although the eels spend most of their adult lives in European rivers, they have to reach the Sargasso Sea off Bermuda in order to spawn.

The holding tank itself has been uniquely designed to allow easy capture of the eels and a safe 'shelf' arrangement to allow people to look into the tank at the captured elvers.

The whole unit is powered by a solar pv unit making for an environmentally friendly system.

The number of elvers arriving at British rivers has fallen by 95% in 20 years.



Andy Don, Environment Agency, said:

'We know that an eel pass in the right location can have an instant effect. The trap and transport system at Blagdon has already allowed hundreds of eels to get to ideal habitat, where they will live and grow for up to 20 years.'

'This has been a partnership undertaking with Bristol Water to improve eel populations locally, to contribute towards Eel Management Plan targets, to support compliance with the Eel Regulations and provide an educational facility for schools and colleges. More than 300 eels have already used this new facility. This is great news given the novel configuration of the solution.'



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