Building on Success

Suggestions for medium-term measures
to further reduce the risk of flooding
in Oxford and the surrounding area

Oxford Flood Alliance, March 2010

Building on Success

Since 2007 there have been substantial improvements along the waterways in the Oxford area, reducing the risk of people being flooded. This is thanks to to the investment of effort, expertise and money by the agencies concerned. For illustration, three projects are shown here. In this document we make suggestions as to how one could build on this success.

Before

After

Weir at Towles Mill, 2006

New weir: Environment Agency, 2007

Old culvert near Redbridge

New culverts: Environment Agency, 2009

Redundant bridge on Hinksey Drain, Main River

Bridge removed: Network Rail, 2010

Building on Success:

Suggestions for Medium-Term Flood Measures for Oxford

In January this year, Robert Runcie, Environment Agency Director of Flood and Coastal Risk Management, said:

> "The 2007 flood cost homeowners, businesses, emergency services and others some £3.2 bn. The high costs of flooding underline the importance for continued investment in reducing flood risk, particularly as climate change means that we are likely to see more severe and frequent flooding in future."

We agree. It is neither right nor sensible that deficiencies, many man-made, which contribute to the flooding of people's homes and businesses, are allowed to remain when they could readily be put right. Hence the suggestions which follow.

Introduction

As the Environment Agency's (EA) 1 in 75 year flood risk reduction scheme for Oxford and immediate area (OFRMS) will not go ahead in the foreseeable future we would like to suggest several smaller scale, much less expensive projects which, taken together, would do a lot of good at a reasonable cost. We should be making the best of what is there already. Our suggestions would improve conveyance through the floodplain to the west of Oxford, helping to keep homes and businesses dry.

This document is not meant to be a complete medium-term flood strategy. It covers only works to improve conveyance on waterways. It does not set out to cover other important elements of flood risk management such as effective control on building in the floodplain; the effective maintenance of waterways large and small; the optimal operation of locks and weirs; the provision of adequate surface water drainage; and building in resilience, and resistance, including pumping where appropriate, to individual properties. Finally, we are dealing only with Oxford itself, rather than the whole Upper Thames catchment, consideration of which would form part of a broader long-term strategy.

Much of the data collection and modelling which may be needed for these projects will presumably already have been done as part of OFRMS. So it should be possible to start work soon, completing within three years.

None of our suggestions would be wasted were a bigger scheme ever to go ahead. On the contrary, many prepare the way for a larger scheme by doing some of the necessary work now.

If the suggested work were done, further work, done incrementally over time as funds allowed, could make things better still. This would again be consistent with, and contribute towards, the subsequent implementation of any larger scheme. See also *Looking Ahead*, page 21 below.

We believe that none of our suggestions should make things worse for anybody else.

Two proposals require urgent and determined collaborative action. There are golden windows of opportunity: if missed, achieving the same benefits later will be very difficult, if not impossible, and massively more expensive, leaving many properties at a high risk of flooding which could easily have been avoided. The proposals are those to do with *Lamarsh Road* and that to do with *Stroud's Bridge*. It would be a great mistake not to grasp these opportunities.

The floodplain on the west side of Oxford

Oxford's major floods are a result, not of water falling onto the immediate area, but of water which has fallen as far away as the Cotswolds coming down the valley of the Thames. The floodplain on the west side of Oxford, with its several waterways, is where the main problems arise.

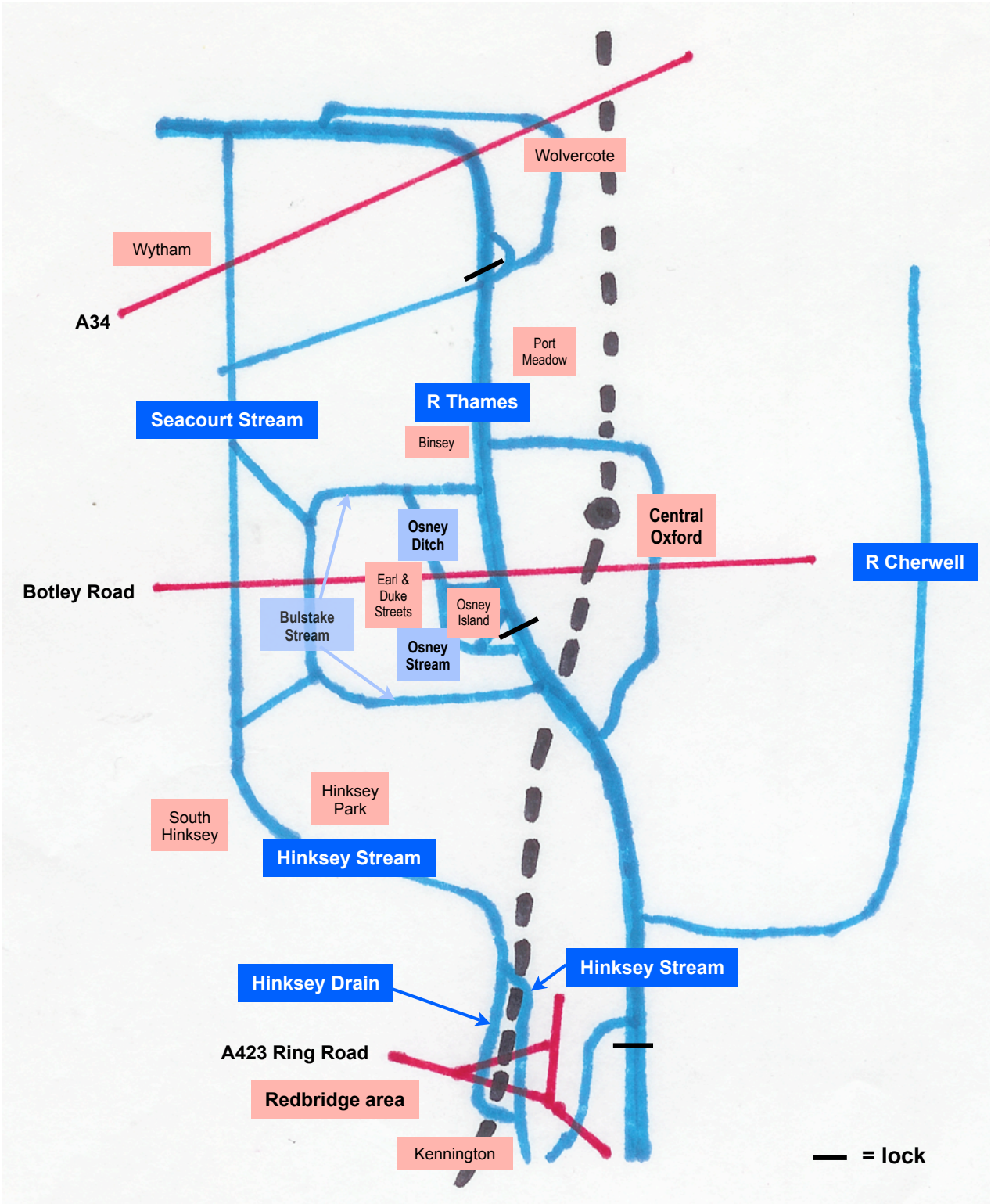

Fig. 1. Schematic representation of the floodplain west of Oxford. Only the larger waterways and those mentioned in the text are labelled. All those labelled are designated Main Rivers.

The areas discussed are:

- Redbridge
  - Munday's Underbridge
  - Stroud's Bridge
  - Hinksey Drain from the bridge on the old Abingdon Road to the above bridges
  - The old Abingdon Road bridge itself
  - Hinksey Drain as it approaches and passes under the railway access road
- Hinksey Park/Lake Street
- Botley Road area - Earl and Duke Streets and Lamarsh Road
- Osney Island
- The west bank of the Thames above Tumbling Bay
- Binsey

These are arranged moving upstream from Redbridge. The order does not reflect relative importance or urgency.

Redbridge

The importance of the Redbridge area

The previously wide valley narrows sharply down to less than 800m in the area known as Redbridge, near the old Abingdon Road on the south-western edge of Oxford.

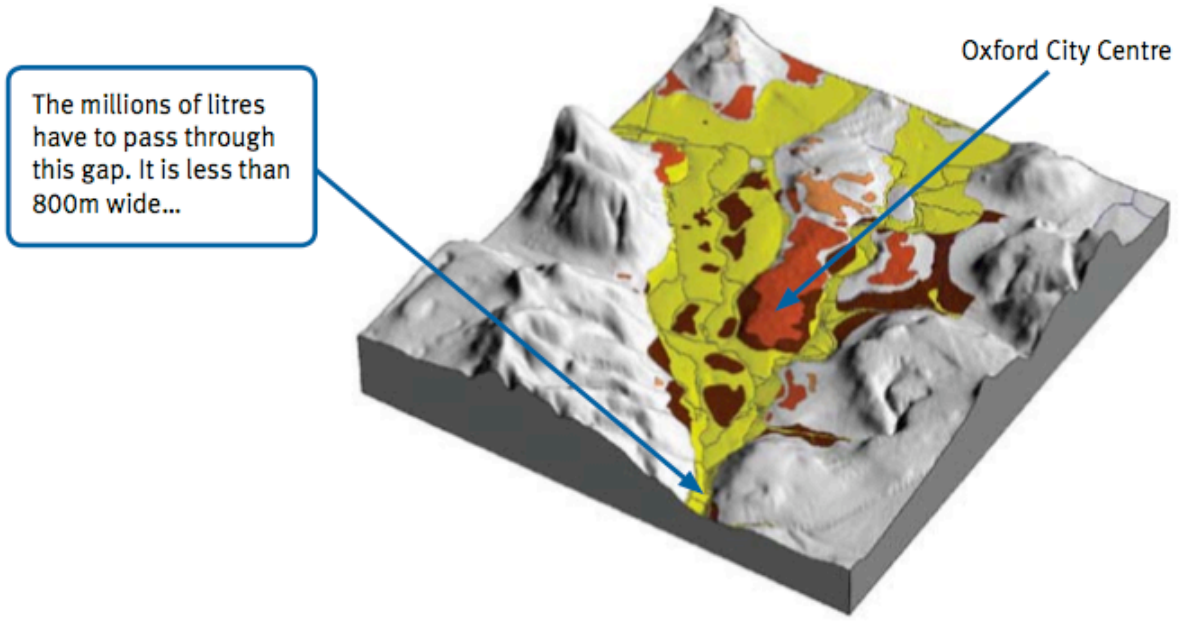

Fig. 2. Topography of the floodplain west of Oxford

This natural narrowing has been made worse by man. Many things have been built in this small area. These include: the main line railway, railway access road, infilling of floodplain by landfill tipping, roads - including the A423 flyover, Park and Ride and Waste Reception Centre. In most cases this seems to have been done with little or no regard for their effect on flooding. Tens of millions of litres of water quickly accumulate here at times of flood because they cannot get away fast enough. The water is held back to the west of the railway line. The accumulation extends upstream and properties flood. Two principal watercourses serve this area: Hinksey Stream and Hinksey Drain: both are designated Main Rivers.
In previous floods water levels have been up to 60cm higher on the west side of the railway than the River Thames on the east side. This means there has been a build up of water in the floodplain upstream, leading to the flooding of properties. This difference must be abolished by getting more water through Redbridge and under the railway more quickly.

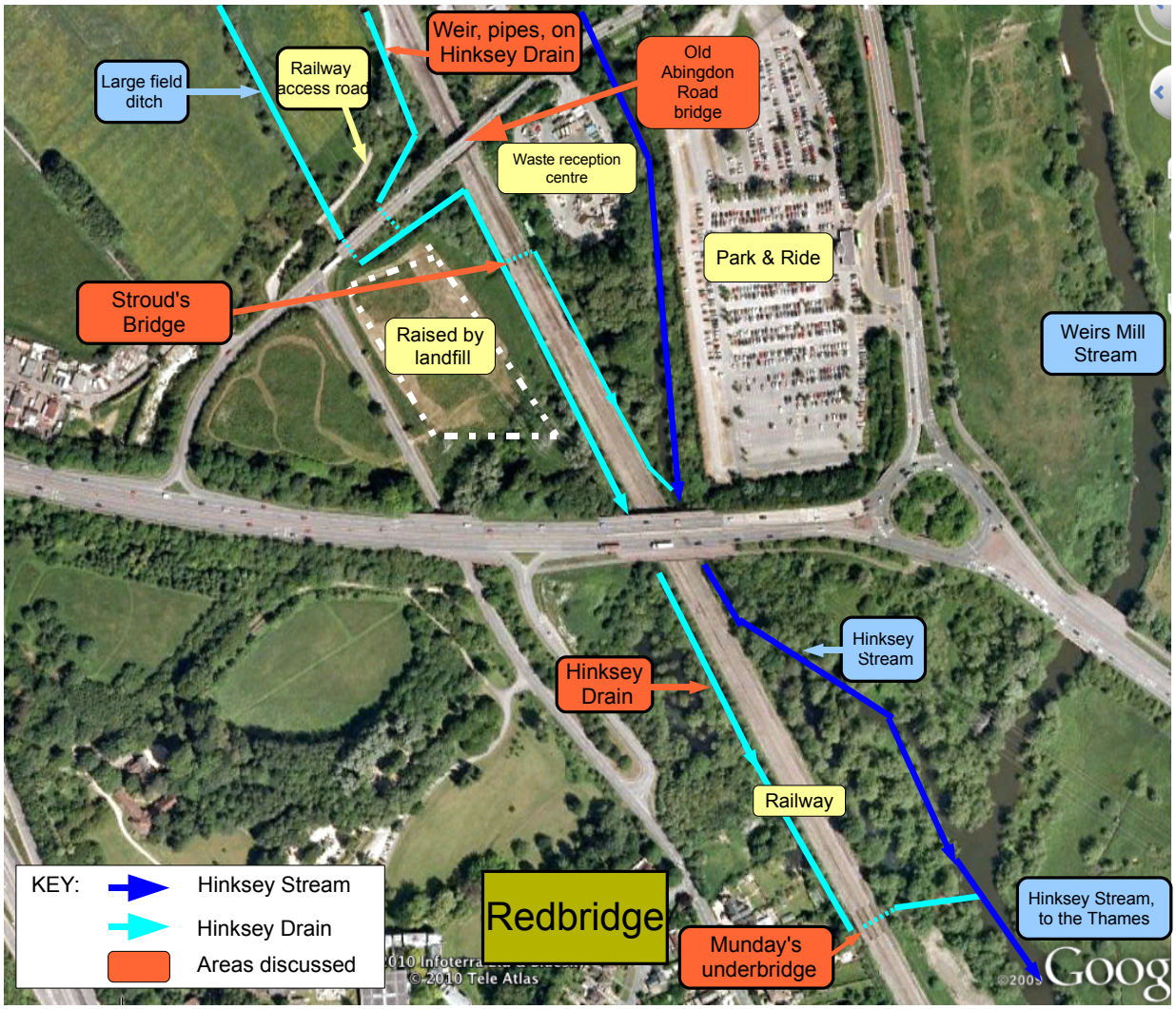

Fig. 3. Redbridge

Fig. 4. Main railway line just below the Abingdon Road bridge, with Hinksey Drain over its banks in the foreground (2008).

Fig. 5. Looking south from the Abingdon Road bridge. Hinksey Drain runs alongside the line on the right of the photograph, flowing south.

Munday's Underbridge

A 19 m wide bridge under the main line railway, conveying water from west to east and into the Thames.

Importance: it must work to full capacity to avoid water building up in the western floodplain.

Ownership: Network Rail (NR); Hinksey Drain is a Main River, so EA has powers. Road drain: Thames Water.

Work done by the Environment Agency in 2009 has helped to open the bridge up - by desilting and clearing the channel beyond, removing a concrete wall (sic) across the stream leading to the bridge, and clearing a short length of the channel upstream from the bridge. This is welcome. There remains more to be done to get the bridge back to working at full capacity.

The approach channel (Hinksey Drain) is narrow as it nears the bridge, being only about 4.8 m wide (Fig. 6).
A 0.9 m road drain pipe from Kennington Road sticks well out into the stream leading to the bridge, restricting the channel. Consequently the downstream part of the bridge silts up quickly (Figs. 7 and 8).

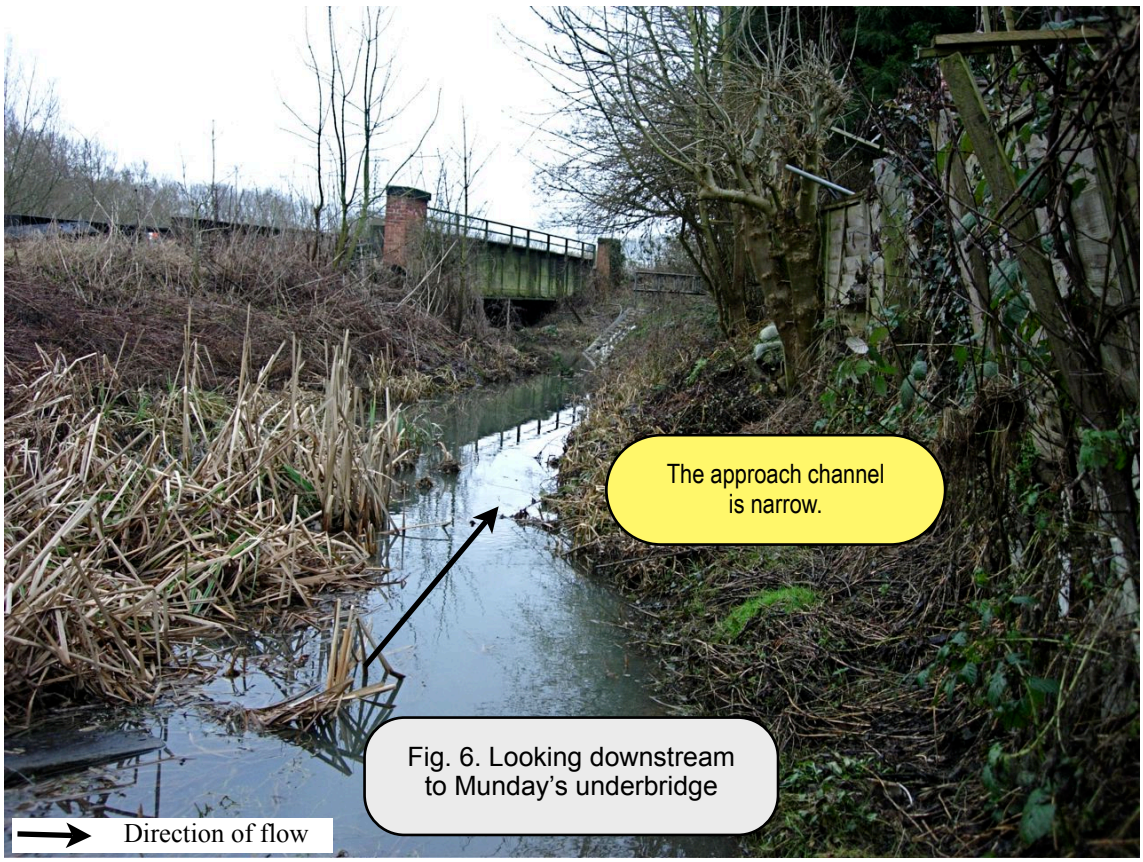

Fig. 6. Looking downstream to Munday's underbridge

Suggestions (Fig. 9):

- The road drain pipe should be cut well back and a new headwall built.
- The soil in front of the far end of the bridge and the soil and silt under it should be cleared.
- The approach channel is discussed below on page 11: *'Hinksey Drain from the bridge on the old Abingdon Road to Stroud's and Munday's bridges'* .

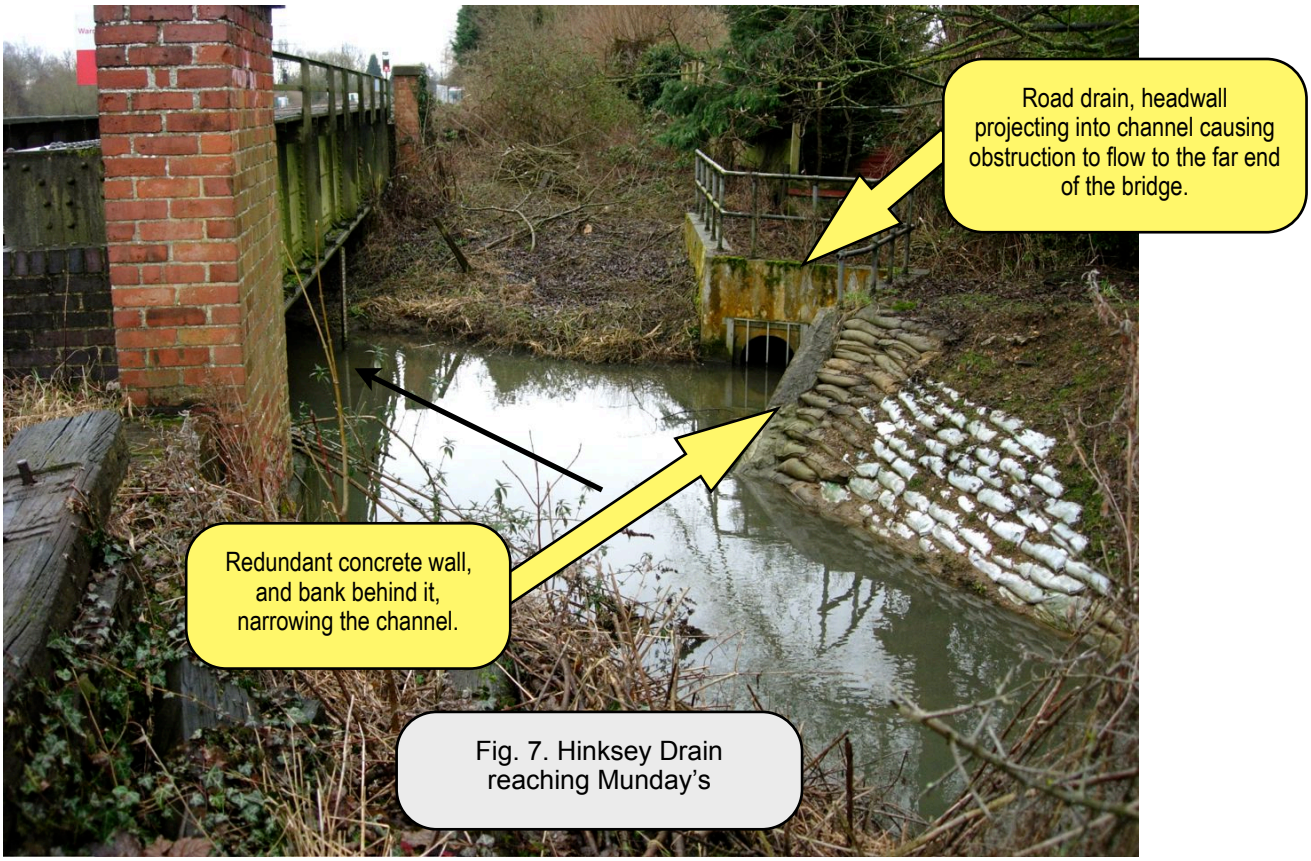

Fig. 7. Hinksey Drain reaching Munday's

Fig. 8. Wasted bridge

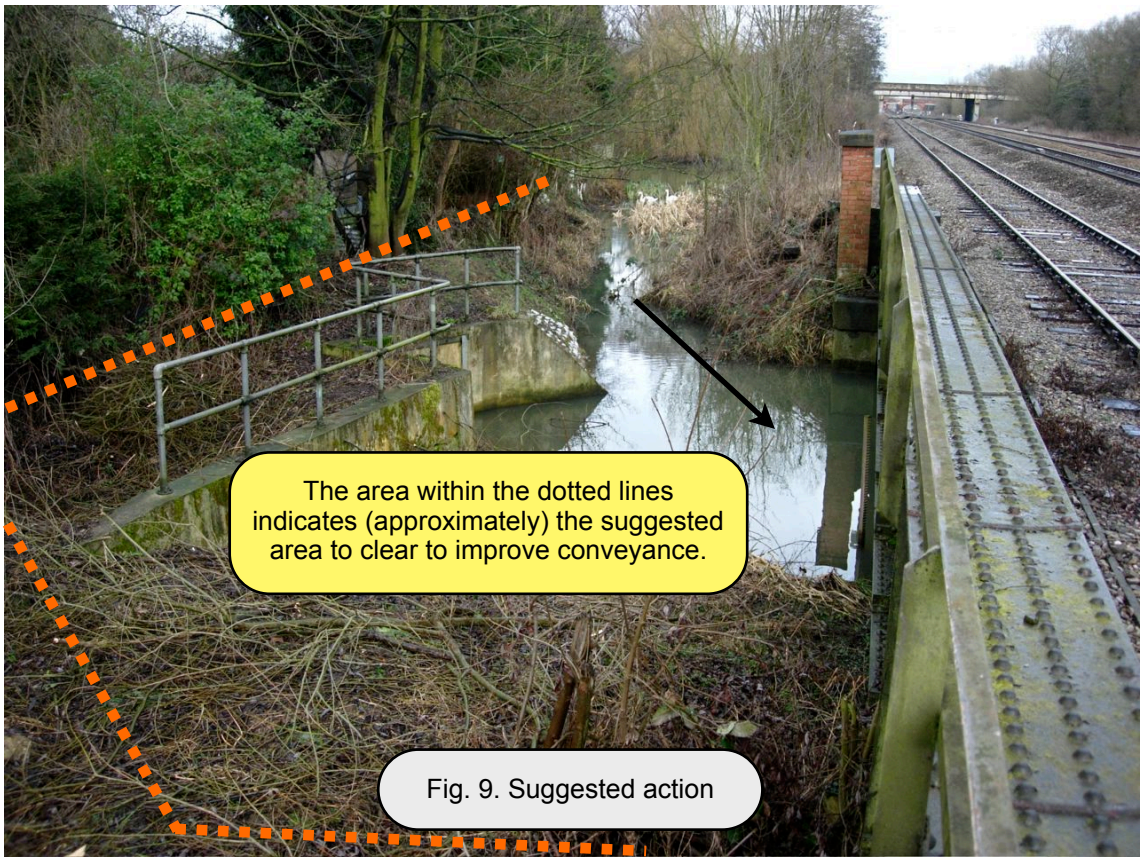

Fig. 9. Suggested action

Stroud's Bridge and the channel beyond to Hinksey Stream

Stroud's Bridge is a 6.5 m wide bridge under the main line railway, conveying water from west to east and thence into the Thames. It lies about 80 m below the redbrick old Abingdon Road bridge over the railway. Network Rail plan to raise the redbrick bridge in the near future. They plan to raise it by 60 cm - 30 cm of which is to raise the line below it to reduce the risk of it flooding and 30 cm to allow larger containers to pass under the bridge.

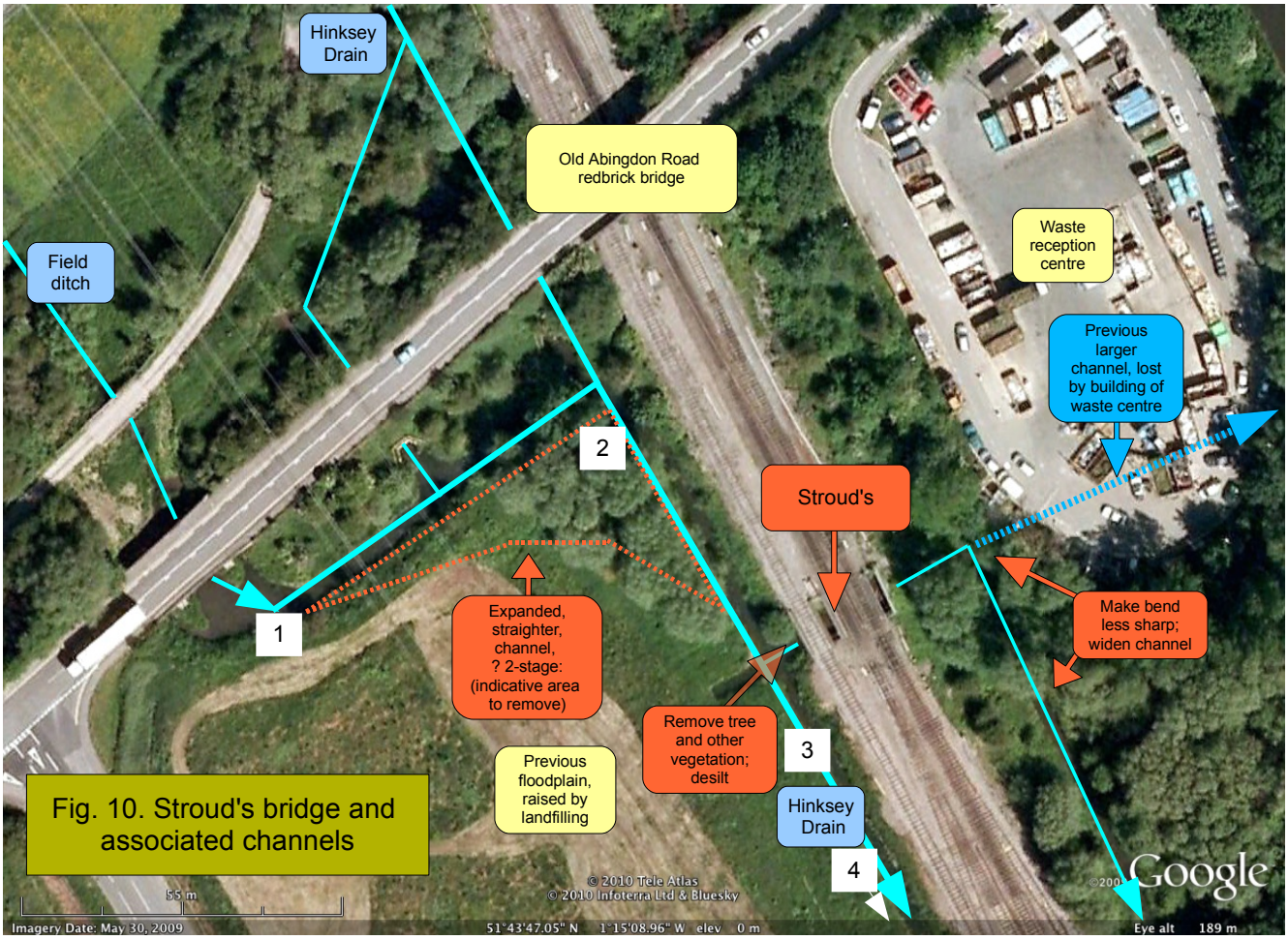

Fig. 10. Stroud's bridge and associated channels

Importance: as Munday's underbridge.

Ownership: Network Rail.

A willow partially blocks the entry to the bridge (Fig. 11) with resultant silting beyond.

The channel leading to the bridge turns very sharply through 90 degrees to go under it.

We are unable to get to the other side to inspect the channel beyond. But we know that it turns a right angle shortly after passing under the railway line: this is a result of the interposition of the County's waste reception centre. The channel used to lead straight on to Hinksey Stream but it was replaced a new, narrower channel, turning sharply south through 90 degrees, when the centre was built.

Fig. 11. Stroud's bridge

Suggestions

To make the most of what already exists:

- Clear vegetation and desilt.
- See Fig. 10: remodel the approach channel so it no longer has to turn so sharply to go under the bridge; remodel the outlet channel so it turns more gradually through 90 degrees as it heads south. Widen and clear the channel beyond as necessary, until it reaches Hinksey Stream.

Beyond that:

Increasing the width of this bridge would increase the all-important conveyance of floodwater under the railway. Ideally we suggest that the conveyance, by Munday's and Stroud's bridges together, should be of a similar order to that envisaged as necessary for the full OFRMS plan with its new channel. As this is at the narrow base of the floodplain, were this achieved, future progress could be made further upstream over time, safe in the knowledge that conveyance under the railway here would be adequate.

We know that this would be a large undertaking. It might require closure of the line - expensive and difficult to achieve. But if the line is to be closed anyway (we do not know whether this is the case, nor, if so, for how long), as part of the Network Rail operations on the track and bridge, then this could be a once in a lifetime opportunity to extend the width of the bridge without having to negotiate and pay for a second line closure.

We urge that this is given serious and urgent consideration - urgent because Network Rail need to get on with their work as soon as they can. We ask the Environment Agency to compare the

combined conveyance of an optimised Munday's underbridge and optimised (existing) Stroud's bridge, with the conveyance specified for the full OFRMS scheme. And then, if the comparison shows that more conveyance would be required to get up to 'full OFRMS' standard, to see what can be done in cooperation with Network Rail.

There would be benefit to Network Rail from a further reduction in the risk of track flooding and all parties could benefit if the costs of closure of the line, should this be needed anyway for Network Rail's own work, could be shared.

Hinksey Drain from the bridge on the old Abingdon Road to Stroud's and Munday's bridges

Importance: as Munday's.

Ownership: ? Oxford City; ? Network Rail. EA have responsibilities as it is a Main River.

This channel, a part of Hinksey Drain (a designated Main River), serves these two bridges. Water coming through the principal arch of the main red brick bridge turns left through 90 degrees soon after [Photo 1 below]. 100 metres or so further on it then turns 90 degrees to the right [Photo 2]. It would seem sensible to smooth out these bends as far as possible. This could be done by cutting land away as shown by the orange dotted line in Fig 10.

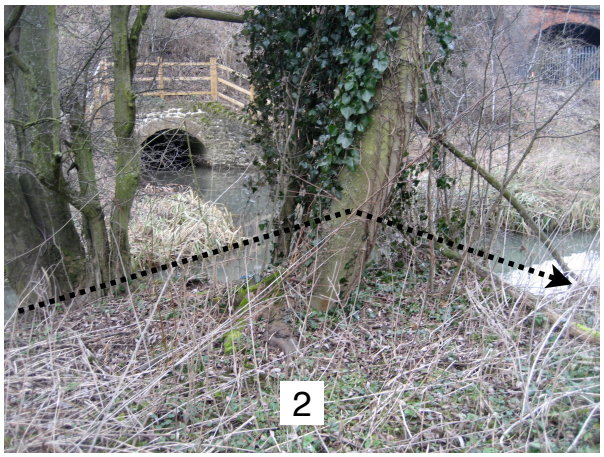

Fig. 12. The numbers refer to those in Fig. 10

It can be made wider throughout its length. Some parts already have a poorly delineated two-stage profile [Photos 3 and 4]. This could be extended by excavating an inclined berm on the non-railway side, where one does not already exist and where there is space. A two-stage channel has ecological benefits for both riparian and riverine habitat.

In places where there is not enough space for a two-stage channel, the channel could simply be widened. This applies as Hinksey Drain gets close to Munday's underbridge. Here the channel immediately up from Munday's should be widened and steel-piled on both banks - along the length of the ends of the two private gardens and on the railway side. We understand the owners of both gardens are prepared to lose some land off the end of their gardens so this can be done. See Figs. 6 to 9, of the channel near Munday's bridge. The widening should continue upstream until the point where there is space for a two-stage channel.

Redbridge bridge

As described above (Stroud's, first paragraph; Fig. 10) this bridge is to be raised. We have been told that Network Rail have consulted with the Environment Agency on this, offering to position the bridge piles so that a (future) large flood channel could be accommodated. This is very welcome.

Railway access road

This road, on a raised causeway, is used by Network Rail to get to the railway line and sidings at Redbridge. It acts as a dam to the flow of floodwater, with water soon rising to 1 m high.

Ownership/responsibility: Network Rail; EA (as Hinksey Drain is a Main River).

Hinksey Drain meets the railway access road at its eastern end. The river tapers quite rapidly from 13 m across to a weir 1.7 m across (Fig. 13), and thence to two pipes under the road, each about 0.9 m diameter (Fig. 14). During times of high water these pipes are inadequate (Figs. 15 and 16) and water spills out of the river into the adjacent field. Although new flood culverts installed by the Environment Agency in 2009 have greatly improved things, further works to reduce the damming effect of the road would provide further benefit.

Suggestions

- Create a wider weir (which could be U-shaped or diagonal to achieve this) with the crest set lower than the present one (to the extent that this could be done without compromising the lake habitat upstream).
- Provide larger culverts under the road.
- Remove (or raise out of the way) the two structures (one is a pipe or conduit for something, the other a metal 'frame' whose purpose is unclear, perhaps to protect the pipe?) crossing over the drain just above the pipes (Figs. 15 and 16).

Fig. 13. Hinksey Drain and weir, above the railway access road, looking upstream

Fig. 14. Looking downstream from about the same point, to where Hinksey Drain goes under the railway access road via two pipes

Fig. 15. Looking upstream from where the Drain passes under the access road

Fig. 16. It does not take much to overwhelm the pipes - flood debris deposited on the structures crossing the Drain (Feb 08, no property flooding)

Hinksey Park/ Lake Street

The Environment Agency has already made a proposal.

Hinksey Lake has twice overflowed recently, flooding houses in Vicarage Lane and Vicarage Road. Experience is that the lake level rises very fast when the Eastwyke Stream to the north overflows into it, but in July 2007 Eastwyke Stream did not overflow, and the lake still rose as fast. Discolouration of the Bowling Green pond to the south suggests the water came in from this direction.

Suggestion

- We endorse the Environment Agency's proposal for a sluice at the Bowling Green end, and suggest this be a 'non-return' sluice if this is feasible.

Botley Road area

The importance of the Botley Road

A 'dam' occurs at the Botley Road, which runs east-west on a causeway across the floodplain. There is not enough capacity to carry water under it, or immediately to the south of it, so it acts as a dam. This leads to local flooding along the Botley Road and upstream.

Earl Street, Duke Street and Lamarsh Road: a proposed alternative route for floodwater

Earl and Duke Streets and Lamarsh Road are side roads off the south side of the Botley Road (Fig. 17).

Authorities: Oxfordshire County Council; Oxford City Council; EA; Thames Water; Kingerlee Ltd.

In recent floods, floodwater overtopping the Botley Road at its low point near Bullstake Close turned east and flowed down Earl Street to the meadows beyond. The adjacent Earl and Duke Streets flooded in 2000 (c. 20 houses), 2003 (c. 30) and 2007 (all, 60). While groundwater contributes to this recurrent flooding, having a river flowing down Earl Street is a disaster which makes severe flooding inevitable. A video of this river at http://www.youtube.com/watch?v=DjkL0p09yQE&feature=related shows, much better than words can, the magnitude of the problem. OFA has worked with several authorities, via the Botley Road Working Party, on a plan to remedy the situation by routing water down Lamarsh Road instead.

Measures to reduce groundwater and water from overloaded drains in Earl and Duke Streets have already been carried out by the City and Thames Water. If the opportunity is not seized to solve the 'fluvial' component of the flooding too these efforts may be to a great degree wasted.

Suggestion

- The idea is to install a pavement/road hump at the north end of Earl Street and alter the gradients in Lamarsh Road (Fig. 17). Water would then turn west along the Botley Road and run down Lamarsh Road. If the far end of Lamarsh Road (which at present runs 'uphill') were lowered then water would then continue to flow through the site at the end, owned by Kingerlee and scheduled for development.

We understand that Kingerlee have been receptive to the suggestion that an overland flood route (or culvert(s)) be put in place through their site during development, for which we are very grateful.

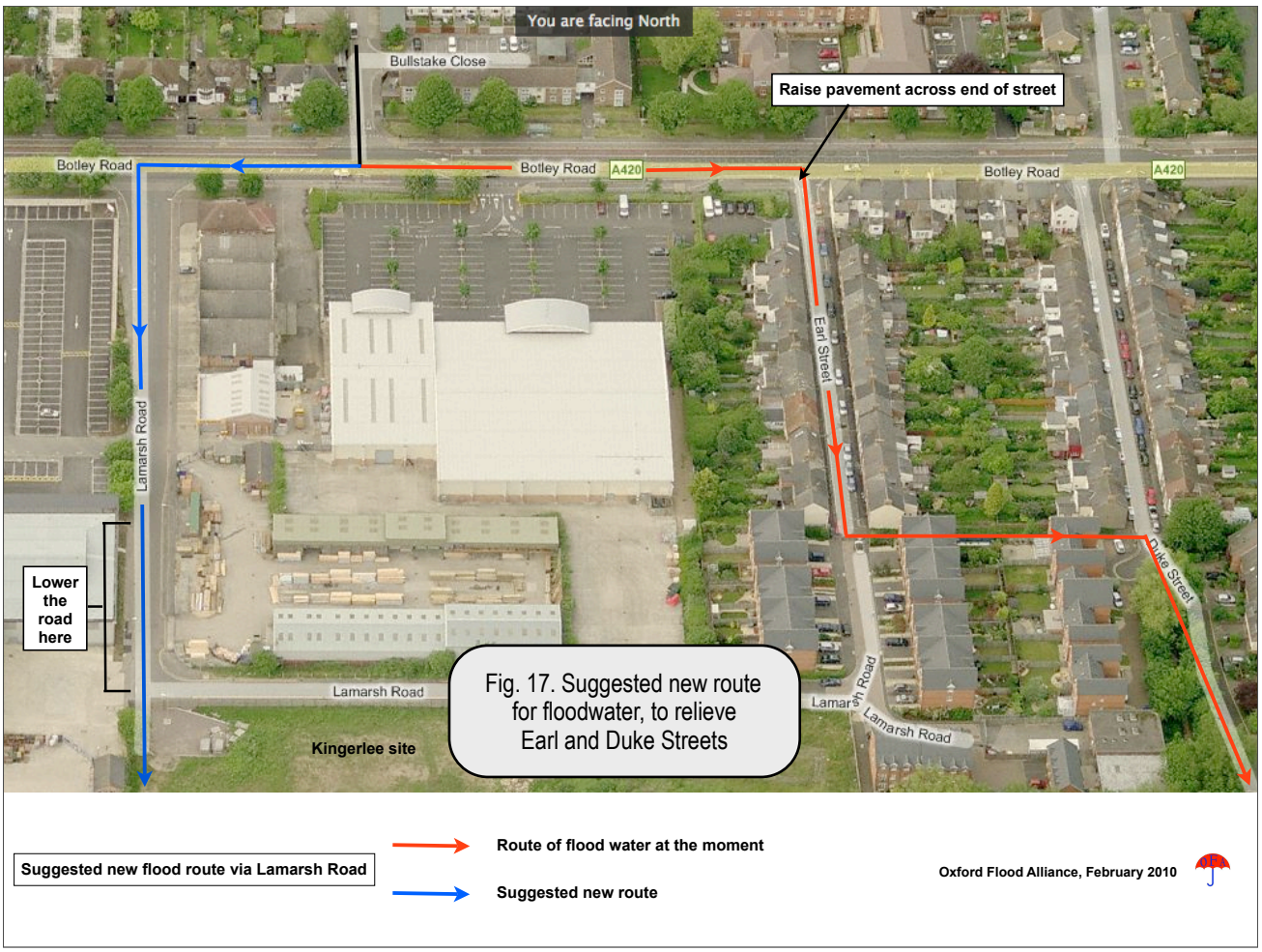

Fig. 17. Suggested new route for floodwater, to relieve Earl and Duke Streets

Lamarsh Road does not contain residential property, but there are shops. These are set back and/ or raised above the road level, but may require additional protection, perhaps with a demountable barrier.

What is required to do the job?

It is not yet agreed what the best technical choice for achieving a flood route with the 'necessary' conveyance is - whether overground, or via underground culvert(s), in either case starting from about the low point of Lamarsh Road and leading south to the flood meadow beyond the southern boundary of Kingerlee's site.

OFA believes that overground conveyance has every advantage. This would require lowering of the far end of Lamarsh Road and for Kingerlee to start their entrance road at that new level. There would then be a downhill slope through Kingerlee's site.

Oxfordshire County Council, as Highways Authority, have proposed a single 0.4 m diameter culvert (pipe). Having seen the 'river' that pours down Earl Street it seems to us extremely unlikely that one 0.4 m pipe will be anything like sufficient. The size of the pipe and that it is set below the surface are relevant factors. Preliminary calculations support our view. Following a recent site multi-agency meeting called by OFA, the Environment Agency has agreed to provide data to Oxford City engineers, who will use it to calculate with more confidence the approximate flows across the Botley Road in floods such as those in recent years. While such calculations will still inevitably be approximate they should be adequate to allow a rational decision as to what would work best, and its cost compared to alternatives. We feel strongly that whatever is decided on, it must be adequate to stop the Earl Street river, in the sort of floods we have seen in recent years.

In summary, we suggest that the optimal technical solution be determined by hydrological calculations from available data. Such calculations will be approximate but will give useful guidance. A price could then be arrived out for what is needed to do the job properly.

Funding

The cost of lowering the road surface at the far end of Lamarsh Road (for an overground solution) has been said by the County Council to be about £200,000. We do not know what that is based on; for example whether the length of road which would need to be lowered has been decided on with reference to levels AOD, and how much that lowering would need to be. So we are unsure how reliable the figure of £200,000 is. (As an approximation it is likely that about 50 m would need to be lowered, with a maximum depth to be removed at the Kingerlee site boundary of ~ 200 mm. Round the corner where Lamarsh Road turns east at the entrance to Kingerlee's site a further ~10 m would have to be tapered in to match.)

Oxfordshire County Council has applied for a grant from DEFRA for £100,000 to put in the single 0.4 m diameter pipe mentioned above.

Kingerlee are being very helpful and as part of the planning agreement are already providing funding under a Section 106 agreement: we presume that this money will be allocated to this project.

Oxfordshire County Council has applied for a (separate) DEFRA grant for £25,000 to raise the pavement at the northern end of Earl Street. The work is expected to start in April or May this year, so presumably independent of whether the grant application is successful or not, suggesting that an alternative source of £25,000 is available if needs be.

There does then already seem to be money which could be called on and grants which may be approved. We hope that the Environment Agency, Thames Water and Oxford City Council will be able to help if there is a shortfall. If that means reallocating money which was to have been spent elsewhere as part of the next round of Short-Term Measures, so be it.

Discussion

A conservative estimate puts the total immediate financial cost of flooding of Earl and Duke Streets in 2000, 2003 and 2007 at £3 million (using the mid-point of the national average cost of £25-30,000 per house per flood, ie £27,500, X 110 house-floods). The cost of the suggested works at a likely maximum of £200,000 is therefore remarkably good value. If the work is not done, or only partly done, before Kingerlee begin their development, then to do it in future could only be very much more expensive. And in the meantime Earl and Duke Streets would remain, totally unnecessarily, at high risk of flooding. This is a one-off opportunity to solve a very serious problem. ***We believe it should be the highest priority for any money that is available for flood relief in Oxford.***

To quote Robert Runcie, Director of Flood and Coastal Risk Management, Environment Agency, again:

> "We all know that tackling flood and coastal erosion is no easy task. And it requires many organisations to work closely together in partnership..."
>
> (Autumn 2009 edition of the Environment Agency's *Floodnews).*

Here's a chance, par excellence, to do so. Leaving it undone, or not done effectively, would condemn the two streets concerned to flood again and again. Whichever way you look at that it makes no sense at all.

OFA, on behalf of people who have been flooded three times since 2000, and remain, today, at high risk of flooding again, does not mind where the money comes from - what is important to the affected residents is that the necessary work is done. There is only one chance to get this right and it is ***urgent***. Kingerlee are likely to begin work this summer. It is also ***vital*** for a community and housing which has been very badly hit already - please, let's not miss this golden opportunity.

Osney Island

Osney Island is, unsurprisingly, surrounded by waterways - the Thames, Osney Ditch and Osney Stream (all designated Main Rivers).

The island is densely populated, with about 290 houses.
Flooding here is due to one or more of the following: overtopping the banks, surface water overwhelming the drains and ground water rising. We address only surface water here.

Ownership: Thames Water; County Council as the highways authority; EA as landowner.

Surface water

Water overwhelming the road drainage system is a problem for parts of Osney Island. The drain along South Street acts as a sump for the road drains for the whole of Osney Island and in times of flood will be overwhelmed. This is because the road drains that run south down East, Bridge and

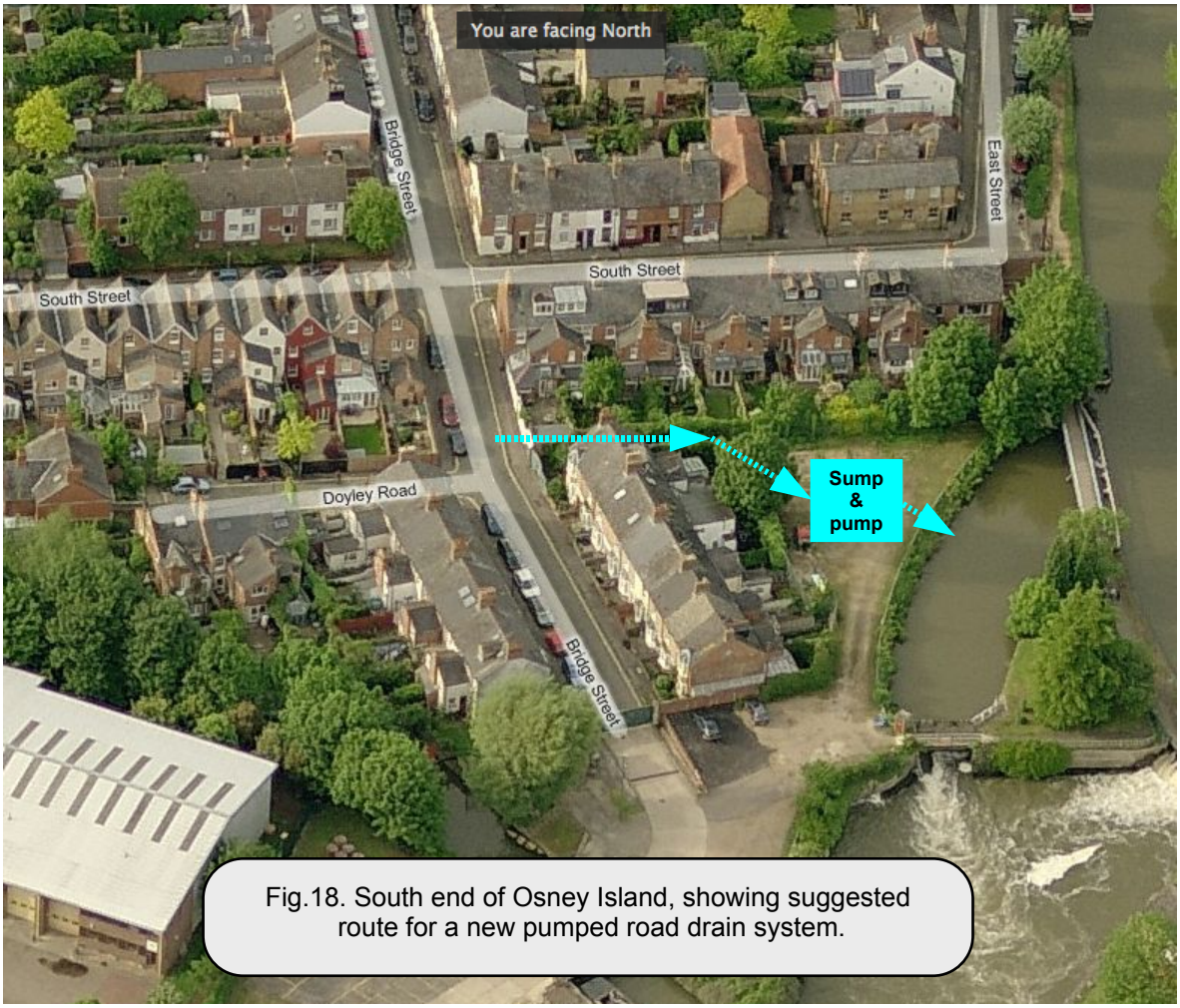

Fig.18. South end of Osney Island, showing suggested route for a new pumped road drain system.

West Streets, collect in South Street. In addition, the Bridge Street extension road drain runs north to connect with the South Street run.

The South Street road drain discharges into Osney Stream via a 300 mm non-return valve by the junction of South and West Streets. When water levels in Osney Stream rise, discharge from the road drain is facilitated by a pump, with a back-up, at the junction of South and West Streets. The water is pumped into Osney Stream; the design of the outfall is not optimal, as the water is not pumped out in the direction of the flow of the stream.

Thames Water has a plan to replace this pump with one of the same capacity; they will add telemetry to advise their control room if the pump ceases to work. Replacement of the pump (and installation of a pump of greater capacity) is limited by the restricted access on site.
When water is discharged into Osney Stream, it is recycled past the rear gardens of houses in Doyley Road and the west side of the Bridge Street extension. This may contribute to flooding. During a flood, temporary pumps are brought into Bridge Street extension to pump water into the Thames via a passageway onto land belonging to the Environment Agency.

Suggestions

- That the present pumping station by the junction of South and West Streets is upgraded by the installation of a pump of greater capacity; this will mean that a sump of greater volume will need to be dug. The outfall should be redesigned so that the water is discharged *with* the flow of water in Osney Stream.

- That a short spur is taken from the Bridge Street extension road drain via the passageway into the the Environment Agency's land, where a new sump be created. From the sump, excess water could be pumped into the weir pool (Fig. 18). Modelling would need to be undertaken to establish whether pumping would be required at times when flooding was not occurring. The Environment Agency is believed to be the owner of this land; an easement would need to be granted to Thames Water to allow access for maintenance and pumping.

The west bank of the Thames just above Tumbling Bay

When the Thames rises water pours over the bank here. It does so well before it does so elsewhere on the Thames west bank between Tumbling Bay and Godstow. The bank has been eroded, initially probably by cattle and wash from boats; but the process is now supplemented and accelerated by a vicious circle of ever more frequent and extensive overtopping water flow, causing further erosion. The area can be seen as acting like a weir - and one with a steadily increasing length and decreasing crest height. We believe this matters because the water coming out of the river inundates the area immediately to the north of the Botley Road adding considerably to the total load there.

Ownership: the Gee family, farmers.

Suggestion

- The river bank is repaired to stop water flowing over it so early.

OFA has already raised this with the Environment Agency and the Gees. It is included again here because of its importance and the continued worsening of the bank. This means that the work involved in putting it right may exceed that being mooted at the moment.

Binsey

The measures needed upstream of the Botley Road that conform to the low-cost approach, are more about earthworks than the construction of hard structures. These earthworks might be described by some as maintenance. But maintenance is something that is done regularly, as a matter of routine; yet we are describing works that have received scant attention, indeed almost none, for three decades.
But before considering them, it is worth considering how water flows under Botley Road. Black and Veatch figures, quoted in the Rickard report of January 2008 (Report on flood risk in the west Oxford floodplain), show that at peak (100-year) flood, the flows under the road are distributed so that approximately 20% of the water goes through each of 1) Hinksey/Seacourt Stream, 2) Botley/ Bullstake Stream, and 3) Osney Stream. The Thames major channel bears 30% of the water, and the Castle Mill Stream the remaining 8%. It is important to ensure that each of these five channels

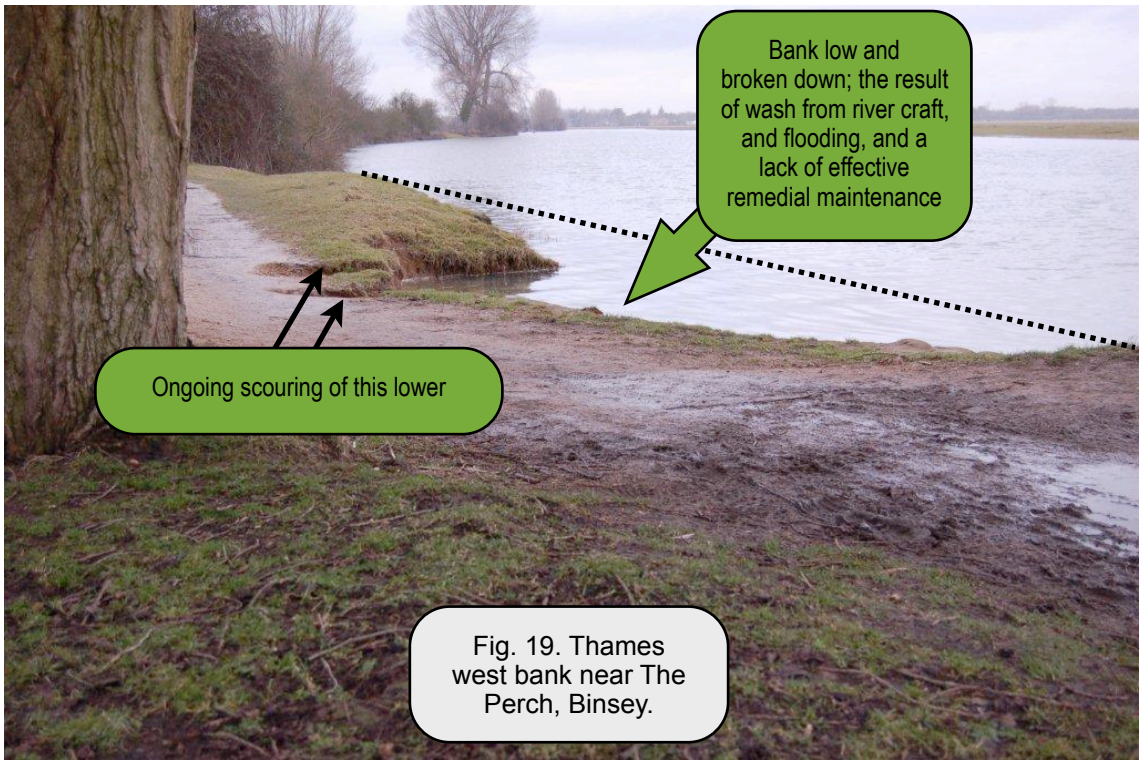

Fig. 19. Thames west bank near The Perch, Binsey.

has its capacity maintained, to carry its share of these flows. In future, increasing the capacity, notably of the Seacourt/Hinksey channels, would be an essential component of reducing the damming effect of the Botley Road.

Suggestions

- Increase the conveyance capacity of the Seacourt Stream between Botley Road and the intake from the Thames at the north end of the University Farm at Wytham. This would consist of clearing the numerous fallen trees and vegetation from the river and dredging it in many places. At present, water flows unobstructed across adjacent fields, because it cannot flow through the stream because of the obstructions. Maintenance used to be done by Thames Conservancy but has not been done for many years now.

- Repair the embankment on the west bank of the Thames, in the four or five short stretches between Medley and Godstow, where it is overtopped in times of high flood (increasing

flooding in the Binsey area): see Fig. 19. This repair need be no more complex than raising the bank in the low, eroded stretches, generally by no more than 15 to 25 cm. We believe Oxford City Council has responsibility for the bank here. The Thames being, of course, a Main River the Environment Agency may also have a role.

- Repair the fast-eroding bank just downstream of Godstow Lock, and the adjacent, non-functional culverts/and sluice structure at the intake of the Swift Ditch. We believe Oxford University is the riparian owner.

Looking ahead

If the works we suggest were carried out (perhaps getting Redbridge up to a '1 in 75 year' standard or thereabouts) it would then be possible to improve conveyance further. For example, Hinksey Stream could be widened, working up from Redbridge, by making it into a two-stage channel with a berm. As mentioned before, this has ecological benefits. Nor would it be likely to attract the opposition that digging a second channel might. The question of where the water to fill a single bigger, or a second, channel might come from - especially, but not only, in times of drought - would not arise. This could done over time, depending on how much money was available.

Funding

We do not know how much all this would cost. But we can reasonably guess that it will be a small fraction of the cost of the grand scheme, probably less than a tenth (£100-150 million was suggested for the grand scheme). This could be spread over say three years, as the projects are carried out.

We believe our suggestions would stand up well on a cost-benefit analysis.

They are compatible with any larger scheme which might come along.

They lay the foundations for future improvements should climate change make flooding worse.

In the *urgent* cases of Lamarsh Road and Stroud's Bridge, if the work is done now it will be both possible and more affordable. If the chances are missed it may be neither in future. Both these suggestions offer a real opportunity to improve things quickly and substantially.

Conclusion

Thank you for considering our suggestions. We ask those more expert than ourselves to consider and evaluate them. It may be that some are already under consideration. We believe they would make a substantial and good value contribution to flood risk reduction. We hope the authorities will work together - it should be a successful programme for all concerned - and contribute according to their means, to enable the whole.
We hope our political representatives, both local and national, will give support in achieving this. The public expect to be protected from the worst effects of flooding when the remedies are known and affordable. Flooding is disruptive and costly. We believe the measures we are suggesting will do a lot to keep people dry in their homes, to protect businesses and to reduce the massive costs of flooding for the local community, the county and beyond.

Oxford Flood Alliance was established by volunteers from the local community in November 2007. We represent the flooded communities of Oxford (Botley Road, Osney Island and Hinksey Park), Binsey, Wolvercote, South Hinksey, Kennington and Wytham. Further information is available at www.oxfordfloodalliance.org.uk