



Hampstead Heath Consultative Committee

Date: TUESDAY, 12 NOVEMBER 2013
Time: 7.00pm
Venue: EDUCATION CENTRE, PARLIAMENT HILL FIELDS, HAMPSTEAD HEATH, NW5 1QR

Members: Jeremy Simons (Chairman)
Virginia Rounding (Deputy Chairman)
Xohan Duran
Colin Gregory
Michael Hammerson
Ian Harrison
John Hunt
Nigel Ley
Alix Mullineaux
Susan Nettleton
Akin Olukiran
Helen Payne
Mary Port
Harunur Rashid
Susan Rose
Steve Ripley
Ellin Stein
Richard Sumray
Simon Taylor
David Walton
John Weston
Jeremy Wright

Enquiries: Alistair MacLellan
alistair.maclellan@cityoflondon.gov.uk

Dinner will be served in Parliament Hill Café at the conclusion of the Committee

John Barradell
Town Clerk and Chief Executive

AGENDA

Public Agenda

1. **APOLOGIES**
2. **DECLARATIONS UNDER THE CODE OF CONDUCT IN RESPECT OF ITEMS ON THE AGENDA**
3. **MINUTES**
To agree the public minutes and summary of the meeting held on 8 July 2013 (copy attached).

For Decision
(Pages 1 - 10)
- a) Draft Minutes of the Hampstead Heath Sports Advisory Forum Meeting dated 23 September 2013 - **For Information** (Pages 11 - 16)
4. **REPORTS OF THE SUPERINTENDENT OF HAMPSTEAD HEATH (COPIES ATTACHED):-**
 - a) Progress Report on Construction of a Stumpery in the woodland walk way - Golders Hill Park (Pages 17 - 30)
 - b) Report on maintenance works and future proposals at the Hill Garden & Pergola (Pages 31 - 42)
 - c) Hampstead Heath's Hedges and Their Management (Pages 43 - 68)
 - d) Hampstead Heath Ponds Project - Preferred Options Report and Non-Statutory Consultation (Pages 69 - 304)
5. **SUPERINTENDENT'S UPDATE**
The Superintendent of Hampstead Heath to be heard.
6. **QUESTIONS**
7. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT**
8. **DATE OF THE NEXT MEETING**

Agenda Item 3

HAMPSTEAD HEATH CONSULTATIVE COMMITTEE Monday, 8 July 2013

Minutes of the meeting of the Hampstead Heath Consultative Committee held at Education Centre, the Lido, off Gordon House Road, Hampstead Heath, NW5 on Monday, 8 July 2013 at 7.00 pm

Present

Members:

Jeremy Simons (Chairman)
Virginia Rounding (Deputy Chairman)
Xohan Duran
Colin Gregory
Michael Hammerson
John Hunt
Susan Nettleton
Helen Payne
Mary Port
Susan Rose
Steve Ripley
Ellin Stein
Richard Sumray
Simon Taylor
Jeremy Wright

Officers:

Simon Lee	- Superintendent of Hampstead Heath
Jonathan Meares	- Conservation and Trees Manager
Declan Gallagher	- Operational Services Manager
Paul Maskell	- Leisure and Events Manager
Alistair MacLellan	- Town Clerk's Department

1. APOLOGIES

There were no apologies.

2. DECLARATIONS BY MEMBERS OF ANY PERSONAL AND PREJUDICIAL INTERESTS IN RESPECT OF ITEMS ON THIS AGENDA

There were no declarations.

3. MINUTES

3.1 Minutes of the Meeting held on Monday 11 March 2013

The minutes of the meeting held on Monday 11 March 2013 were agreed as a correct record, subject to John Beyer being listed as representing Jeremy Wright.

Matters Arising

Minute Circulation

The Chairman noted that there was now a target to circulate draft Consultative Committee minutes within a fortnight of the Committee meeting. At the request of Colin Gregory it was agreed to include where possible the names of persons making comments before the Committee.

National Grid Fencing

In response to a question from Jeremy Wright the Superintendent replied that fencing instituted by the National Grid during repair work was due to be replaced shortly. It is planned that the new fencing will be of the stockproof specification used elsewhere on the Heath, protection was needed to allow germination of vegetation.

Gas Leaks

The Superintendent reported that the National Grid had been present on 8 July to carry out gas main repairs outside of the Education Centre. In response to a comment from Susan Rose on the poor state of the path next to the Men's Pond following gas leak repair works, the Superintendent replied that he was conscious that this needed to be dealt with.

Dog Walking

The Chairman informed the Committee that, further to concerns over the use of the Heath by commercial dog walkers, a paper would be presented to the Committee at its next meeting in October.

Affordable Art Fair – Second Event Proposal

The Superintendent briefed the Committee over the Affordable Art Fair's proposal to hold an event entitled 'Grow London', a contemporary garden show. He noted that it would need to be dealt with outside of the Committee cycle and that a report would be circulated for the Committee's views that would then be submitted to the September meeting of the Hampstead Heath, Highgate Wood and Queen's Park Management Committee.

In response to a proposal by Richard Sumray to focus on the theme of sustainability, the Chairman noted that this would complement one of the Lord Mayor-elect's chosen themes for her year in office. The Leisure and Events Manager added that the theme of sustainability lay at the heart of Grow London's ethos.

In response to a question from Michael Hammerson, the Superintendent confirmed that local groups would be involved in the second event.

Planning Decisions around the Heath

The Superintendent reported that a public inquiry had now been initiated into the London Borough of Camden's decision on the Garden House planning application. He added that the City of London Corporation had appointed a planning consultant to draft a submission on its behalf, to be submitted to the inquiry.

3.2 Minutes of the Meeting held on Monday 8 April 2013

The minutes of the meeting held on Monday 8 April 2013 were approved as a correct record subject to:

- Ryland's being corrected to Rylands on page 13

4. REPORTS OF THE SUPERINTENDENT OF HAMPSTEAD HEATH (COPIES ATTACHED):-

4.1 Update on the Hampstead Ponds Project

The Superintendent introduced the update on the Hampstead Ponds Project, noting the Communication and Engagement Strategy had been revised and that he would welcome the comments of the Committee. He stressed that the key issue was the revised timetable for the project: that it had become clear in mid-April that the initial timetable did not allow for an appropriate level of consultation and therefore the City of London Corporation had worked with Atkins to develop a fresh approach.

He continued by noting that as part of this approach Atkins was currently finalising a Constrained Options Report that would be issued to the Committee later that week. It is intended that Atkins will incorporate in the report comments from the Ponds Project Stakeholder Group to date to enable further discussion at the next workshop of the Stakeholder Group on 13 July, at which the proposed height of the dams will be discussed.

In relation to the height of the dams, the Superintendent noted that the key factor was the ability of the dams to cope with a worst-case scenario storm event. He stated that earthen dams will prevent the need for more heavily engineered structures and that there was an inherent trade-off between the aesthetics of the dams and heavier engineering elsewhere on the Heath: for example, a slightly larger earthen dam in one location would avoid the need for heavily engineered structures elsewhere.

The Superintendent informed the Committee that the ecological and environmental impact of the project would be discussed at the Stakeholder Group workshop on 13 July. He went on to say that preferred options will have been identified by September 2013 and that these would go out for consultation by November 2013. This entire process of the expanded consultation was costing the City of London Corporation a significant amount more money but nonetheless it was felt that this reflected the importance the Corporation placed on ensuring all relevant persons had the opportunity to engage with the project.

He informed the Committee that in terms of procurement, the process had been restarted and that the current six contractors would be narrowed down to a short list of four. This shortlist would then be shared with stakeholders and representatives of that Group would be given the opportunity to be involved in the appointment of the preferred candidate.

The Superintendent concluded by saying he was aware of the potential for a Judicial Review. He noted that the London Borough of Camden had recently issued a letter of information to residents downstream of the ponds to inform them of the risks associated with the collapse of the dams.

The Committee then discussed the report. In response to a request from Jeremy Wright the Superintendent agreed to circulate a copy of the London Borough of Camden letter.

In response to a request by Susan Rose, the Superintendent said that the baseline risk management report gathered by Atkins would hopefully be available for the Stakeholder workshop.

John Hunt noted that he was concerned over the lack of emphasis to date on the ecological and environmental issues associated with the Ponds Project and that he hoped this was indeed addressed at the Stakeholder workshop on 13 July. He hoped that measures were put in place to mitigate any damage done to the Heath by implementing compensatory works elsewhere. The Superintendent noted that he had discussed the principles of the project with Atkins extensively and that they were aware of the principles of mitigation and compensation.

Referring to the potential for a Judicial Review, Colin Gregory said that he hoped that all parties engaged in dialogue to attempt to achieve a common understanding and avoid a Judicial Review if at all possible.

Jeremy Wright intervened by saying neither party wanted a Judicial Review. He stated that the objective of the Heath and Hampstead Society was to ensure the legal minimum of work was undertaken on the Heath. Given that the management of the Heath was enshrined in law, he stated that the law must be the starting-point when planning the management of the Heath. He continued by expressing regret over the fact the City of London Corporation had not shared its advice from Counsel with the Heath and Hampstead Society. As a result of this he noted that the Society had recently taken its own specialist legal advice and it had subsequently shared a four page summary of this advice with the City of London Corporation. He repeated the Society's regret that, following this sharing of their legal advice, the Corporation continued to refuse to share its own. He concluded by expressing the hope that the Corporation would meet with the Society to discuss the situation, and that this could be done without prejudice. He finished by saying that the Society would have to consider its position if the Corporation continued to refuse to share its legal advice or meet to discuss the situation.

Richard Sumray added that the Corporation's communications plan for the Ponds Project included a commitment to openness and transparency, yet this principle did not seem to be in evidence in this particular case. He stated that even if the Corporation did not agree with the Heath and Hampstead Society's specialist counsel, there was a need to enter into dialogue in order to reach an agreement to avoid Corporation officers' time being absorbed in matters that detracted from the successful and timely implementation of the Ponds Project.

He finished by suggesting that a desire to keep aspects of the project confidential would be potentially damaging to the Corporation in terms of its reputation and perceived ethos.

The Chairman replied by stating that the Corporation and other interested parties shared the same goal and a common objective for the project and its impact, and that to this end the Corporation had employed an independent landscape architect to ensure the project had the minimum impact on the Heath. He noted that the invitation for a formal meeting with the Heath and Hampstead Society had not yet been received but that nevertheless following similar concerns expressed to him at the Committee Walk on Saturday 6 July he would be seeking advice from the City Solicitor, suggesting that a meeting with the Chairman of the Heath and Hampstead Society take place. He noted that the City Solicitor was currently on leave; he would be responding to the Society during the week commencing 15 July. He concluded by saying that all parties no doubt wanted a common position but the position of the Corporation must be recognised: the Corporation was responsible for any loss of life in the event of catastrophic event causing damage to the dams. Therefore the City was doing all it could to proceed with deliberate speed to mitigate this risk.

Jeremy Wright assured the Chairman that the Heath and Hampstead regarded itself as a 'critical friend' that hoped for the minimum amount of work necessary to ensure the Ponds Project was completed successfully.

In response to a comment by Susan Nettleton both the Chairman and the Superintendent assured her that environmental objectives would be given due consideration at the Stakeholder workshop on 13 July. Furthermore, the Superintendent committed to meeting with Susan Nettleton regarding the role of Heath Hands in communicating the rationale for the Ponds Project.

Susan Rose noted that other local bodies aside from the Heath and Hampstead Society shared its concerns over the impact of the Ponds Project, but they did not have its level of expertise or resources in communicating this concern. She asked that dialogue take place between the City of London Corporation and local bodies, rather than one body in particular.

Richard Sumray agreed but stated that nevertheless given its role to date they were happy for the Heath and Hampstead Society to take the lead in dialogue over legal issues.

Xohan Duran commented on the need to keep attendees to a minimum to ensure a useful dialogue took place.

4.2 Management Work Plan for Sandy Heath Ride

The Conservation and Trees Manager introduced the Management Work Plan for the Sandy Heath Ride, noting that it followed on from two similar work plans from 2012. He concluded by highlighting the objective of a tiered effect either side of the pathway once the project had been completed.

The Committee proceeded to discuss the work plan:

In response to an observation from Jeremy Wright, the Conservation and Trees Manager agreed to examine whether there should be different management on opposing sides of the path due to varying sunlight.

In response to a question from Michael Hammerson the Conservation and Trees Manager agreed to examine the potential impact on habitat that the cutting of the fringe vegetation would have.

In response to a question from Colin Gregory the Conservation and Trees Manager said that the Corporation had tried to introduce heather in the past but these efforts had been subject to arson. Michael Hammerson observed that some heather was present on Sandy Heath.

Susan Nettleton remarked that she supported the aims of the work programme.

The Chairman requested that the thanks of the Committee be referred back to the report author.

4.3 Progress Report on Enhancement of Landscaping Works to Bull Path and Surrounding Area at Parliament Hill Fields

The Operational Services Manager introduced the progress report on the enhancement works to the Bull Path and surrounding areas, noting that work had commenced in February 2013.

Mary Port expressed her support for the works and her congratulations for the achievements to date. She raised some concerns over the hedge along the Highgate Road and hoped that the entrance sketch on page 75 would become a reality.

The Superintendent added that further consideration would be given to the Swains Lane entrance, and that mowing would be relaxed behind the tennis courts to promote the overall aims of the enhancement works.

Jeremy Wright added his congratulations and noted he used the Bull Path around four times per day, meaning that the enhancement works were, for him, a marked improvement. He expressed the hope that seating would be soon be made available.

Colin Gregory noted that there was currently an initiative to plant wild flower meadows to mark the 60th Anniversary of The Queen's Coronation and that this may be something to consider for the Heath.

In response to a remark by Ellin Stein, the Superintendent noted that the shrubbery by the tennis courts had been taken out in 2012 with a view to promoting a meadow. Jeremy Wright noted that until a few years ago three tupes of buttercup had been present on the grass alongside the Bull Path, and that a return to such wildflower diversity would be welcome.

In response to concerns raised by Jeremy Wright and Mary Port, the Superintendent said that he would discuss the issue of new cycle stands with them outside of the meeting, noting in the meantime that it was important for the stands to be visible in order for them to provide security for the cycles.

4.4 Review of Sustainable Planting

The Operational Services Manager introduced the Review of Sustainable Planting, noting that he had received favourable comments from members of the public to date and that he hoped the Committee would similarly agree that the project had been a success.

In response to a question from Colin Gregory, who stated his support for the project, the Superintendent replied that the evergreen oaks would be trimmed during the winter, but that the geometric pattern envisaged in the project would likely not become apparent for at least five years.

Richard Sumray similarly welcomed the project, noting in particular the addition of the Stumpery.

In response to comments from Helen Payne and Colin Gregory the Superintendent agreed that the sustainable planting represented ongoing educational value and that there was potential for a weekend tour in 2014 and tuition during Autumn 2013. Furthermore, after a suggestion by Susan Nettleton, he agreed that a leaflet could be made available.

In response to a question from Michael Hammerson the Superintendent agreed that the Stumpery would be a unique deadwood habitat that would be worth monitoring to gauge the species that it attracted. He noted that the idea for a Stumpery had arisen after a Staff Visit to Highgrove and that the former Head Gardener there had agreed to come and help install the Golders Hill Park Stumpery.

4.5 Sports Update

The Leisure and Events Manager introduced the Sports Update to the Committee, highlighting some of the major events that had taken place on the Heath. These included the recent 10,000m athletics event, the City Dip, and the second Hampstead Heath Tug of War. He concluded by welcoming the new Hampstead Rugby Club representative Simon Taylor and noting that Richard Sumray had taken over as Chairman of the Sports Forum

Richard Sumray updated the Committee on current sports issues, suggesting that the contract with British Military Fitness be continued. He noted that the last Sports Forum had had a verbal presentation from the London Orienteering Klub and that a presentation on the future use of the Lido was forthcoming.

The Superintendent briefed the Committee on the proposal to use portable battery powered floodlights on the Heath for sports. He noted that it was

proposed to use them two nights a week to allow teams such as Hampstead RFC to train on more than one pitch, to prevent pitches from being damaged through over-use.

In response to a question from Michael Hammerson, the Operational Services Manager noted that staff dealt with imprints in the soil arising from sports by power harrowing. Richard Sumray added that despite widespread concern over damage to turf in Greenwich Park prior to the Olympics, the ground there had recovered very quickly.

The Leisure and Events Manager noted that large events such as the London Youth Games and the South East Cross Country Championships had a long affiliation with the Heath and it was hoped that this would continue. Nevertheless, recognising the potential of these events to damage the Heath in the event of poor weather he suggested that the practice of inviting Committee members on pre-event walks be revived.

In response to a question from Michael Hammerson the Superintendent explained that the term 'reorienting the lido' referred to the fact that the café was not sustainable in its present location and therefore The possibility of providing service to outside of the lido compound was being considered.

5. **QUESTIONS**

In response to a question from Colin Gregory it was agreed that the Town Clerk's Department would circulate 2014 and 2015 meeting dates to the Committee.

6. **ANY OTHER BUSINESS THAT THE CHAIRMAN CONSIDERS URGENT**
Annual Dinner

The Chairman noted that the Annual Dinner of the Management Committee would take place on Tuesday 22 October in Saddlers' Hall. Members of the Consultative Committee would be invited and it was expected that invitations would be issued at the beginning of September.

7. **DATE OF NEXT MEETING**

The Chairman noted that the next Hampstead Heath Consultative Committee meeting would take place on Monday 28 October at 7:00pm in the Education Centre, the Lido, off Gordon House Road, Hampstead Heath, NW5.

He added that the next Hampstead Heath Consultative Committee Walk would therefore take place on Saturday 26 October.

These dates replace the walk and meeting originally scheduled for Saturday 2 November and Monday 4 November respectively.

The meeting ended at 8.25 pm

Chairman

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HAMPSTEAD HEATH SPORTS ADVISORY FORUM

MONDAY 23 SEPTEMBER 2013

MINUTES OF THE HAMPSTEAD HEATH SPORTS ADVISORY FORUM HELD AT THE STAFF YARD, PARLIAMENT HILL FIELDS, LONDON NW5 ON MONDAY, 23 SEPTEMBER 2013 AT 6:30PM.

Present

Members:

Richard Sumray (Chairman)	-	Hampstead Heath Consultative Committee (London Council for Sports and Recreation)
Marc Hutchinson	-	HH Winter Swimming Club/ Heath & Hampstead Society
Rudolph Benjamin	-	HH tennis coach
John Carrier	-	Camden CCG
Richard Priestley	-	Highgate Harriers
Simon Taylor	-	Hampstead Rugby Club
David Walton	-	Hampstead Heath Consultative Committee (Sports Users Representative)

In attendance

Jeremy Simons (Hampstead Heath Management Committee Chairman)
Rob Marshall (British Military Fitness)

Officers

Natasha Cendrowicz	-	Note taker (also Highgate Harriers)
Simon Lee	-	Superintendent, Hampstead Heath
Declan Gallagher	-	Manager, Parliament Hill
Paul Maskell	-	Leisure & Events Manager, Hampstead Heath

1. Apologies

Apologies were received from Dave Bedford, Virginia Rounding and Nigel Robinson.

2. Minutes of the last meeting

The minutes of the last meeting held on 20 May 2013 were agreed as a correct record.

3. **Matters Arising**

Update on Places, People and Play (item 4) Simon Lee referred to the ongoing funding deficit, which meant that any project seeking funding from the Places, People and Play scheme would need to be wholly funded from grant aid. Of the options being considered, he felt that the London Marathon Trust would be more comfortable contributing towards refurbishing the athletics track, rather than upgrading the cricket pavilion. The Chairman agreed that while the LMT would be happy to receive bids for both projects, the athletics track had a greater chance of success. The lack of staff time to progress the cricket pavilion bid at this point, however, means that the PP&P December deadline could not be met.

Gas Works at the Heath Extensions (item 8) Simon Taylor inquired as to whether there would be scope for a third rugby pitch at the Heath extensions, now that the gas works had finished. A brief discussion followed regarding whether and where a third rugby pitch could be installed. As the need was not immediate, Simon Lee agreed to discuss further with Simon Taylor the options for a third rugby pitch to cater for growing demand for rugby at Hampstead Heath.

4. **Fatality at Kenwood Ladies' Pond**

Simon Lee provided an account of the events surrounding the fatality at the Kenwood Ladies' Pond, that had happened early in August. An inquest had been opened and adjourned. Whilst the verdict was awaited, a full review of all the swimming facilities had been conducted by an independent assessor as well as an internal accident investigation. Some recommendations were now being considered and would be presented to the Swimmers' Forum in the first instance. He would report back to this group once the Swimmers' Forum had had the chance to consider the recommendations. He noted that this was the first fatality in living memory at any of the bathing ponds.

RECEIVED.

5. **Verbal Presentation by British Military Fitness**

Rob Marshall, the North London Regional Manager of British Military Fitness gave a presentation on the activities of the organisation. Rob Marshall explained that all the BMF instructors were ex-military and BMF had been operating on the Heath since 2007.

During the course of discussion, the following points were made:

- Some Heath users found the shouting by instructors off-putting.
- BMF had not sought to target hard to reach groups.
- HH operations had been shifted from East Heath car park to the Lido side of the Heath, where the bulk of leisure activities were based.
- All clients undertook a basic medical assessment (by a qualified BMF instructor) before they were allowed to join.

- BMF had a good Health & Safety record.
- The training sessions did not cater for children, clients needed to be over 16 to join.
- BMF operated with £10million insurance cover.
- BMF had engaged in some HH events, offering free classes as the recent 'Give it a Go' event.
- More could be done to alert instructors and clients about shared space etiquette.
- The annual fee paid by BMF to use the Heath represented a sizeable contribution towards the HH budget.
- There might be scope for BMF to host team building type events for other sport groups.

Rob Marshall was thanked for his presentation and he agreed to ensure the concerns raised would be followed through.

RECEIVED.

6. Charging Policy – Athletics and Cricket

A report (prepared by Declan Galagher) setting out the charging policy and rates for athletics and cricket, was considered.

During discussion of athletics charges the following comments were made:

- the athletics season ran from April til September.
- There was no attempt to attract big corporate event to cross subsidise other track usage.
- More could be done to encourage take up of the annual season ticket for using the track.
- There were no sports development officers available to help diversify usage of the track.
- Corporate events were not without their drawbacks, due to expectations of what would be permissible at these events.
- Currently the track received a significant subsidy towards its upkeep.
- There might be scope for outsourcing management of corporate events under tight guidelines.
- Introducing an electronic card reader would improve payment rates.

During discussion of cricket charges the following comments were made:

- There was an untapped capacity for more cricket at the Heath Extension.
- Comparative information about cricket usage in Camden and Barnet would be helpful.
- The Parliament Hill Fields cricket square was too small for league matches.
- As Camden was promoting cricket as a key focus sport, there was scope for working with outside organisations to promote cricket.

It was accepted that the papers as presented couldn't provide by themselves the basis on which recommendations for charging could be made. The chairman said that before the next meeting he would meet with the officers to discuss the structure of future reports.

RECEIVED.

7. **Update on Athletics Track/Property Maintenance**

Simon Lee reported that the boiler at the athletics track was proving to be temperamental and had been out of action for fifty days out of the last twelve months. Various repair options were being considered, some of which could be very expensive. Temporary facilities to ensure hot showers could be provided, were being considered. Paul Maskell responded to Richard Priestley's suggestion of opening up the old football changing rooms, by explaining that these were currently being used by the RSPB. Simon Lee apologised for the delay in resolving this problem and Declan Gallagher added that it could take a further eight weeks to resolve.

In addition to problems with the boiler, Simon Lee also reported on leakage from the steeple chase water jump as well as floodlight problems.

RESOLVED: That the general problems with maintenance be followed up.

8. **Bowls and Croquet – New Lease**

Simon Lee referred to the need for a facilitated meeting between the bowls and croquet clubs and requested that the Chairman intervene. Rudolph Benjamin added that he had noticed increased usage of the croquet lawn as well as an agreement that had been reached for shared usage of their storage facility for a nominal fee.

RESOLVED: That it be agreed that the Chairman attend any meeting that was set up.

9. **Draft Cancellation Policy Large Events – Adverse Weather Conditions**

A report (prepared by Simon Lee) updating the earlier version of the draft cancellation policy report was considered. Marc Hutchinson offered to provide legal comments outside the meeting as he had some concerns about omissions. Natasha Cendrowicz referred to the omission from the report of an early offer of an alternative date where possible as well as making use of social media to inform users.

RESOLVED: That with the inclusion of any comments arising from the above interventions, the report be supported.

10. **Update on Summer Activities**

Paul Maskell reported on summer activities, notably:

- the night of the 10,000m race on 6 June, hosted by Highgate Harriers, which will be repeated in 2014.
- City Dip on 8 & 9 June raising £1,500 for the Lord Mayor's charity.
- 4,800 taking part in the Race for Life on 28 June.
- 40 children trained during the water awareness week at the end of July.
- over 200 participants taking part in the Heath duathlon on 1 September.
- 'Give it a Go', hosted jointly with Camden Council on 8 September.
- Highgate Harriers Open Meeting on 11 September had good take up despite poor weather.

In addition, the English National Cross Country Championships would once again take place on Hampstead Heath in 2015.

RECEIVED.

11. **Any other business**

Lido income In response to a question by Natasha Cendrowicz, Simon Lee confirmed that the income from the Lido had been above expectations due to sustained warm weather. Income from the ponds had also been reasonable.

Floodlights Simon Taylor thanked the Committee and Declan Gallagher for the successful introduction of portable floodlights, which had proved a revelation for winter rugby training.

12. **Date of Next Meeting**

RESOLVED: That the next meeting be held on 27 January 2014 starting at 6:30pm.

The meeting closed at 8:06pm.

CHAIRMAN

Contact: Natasha Cendrowicz
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Committee(s):	Date(s):
Hampstead Heath Consultative Committee	12 November 2013
Subject: Progress Report on Construction of a Stumpery in the woodland walk way - Golders Hill Park	Public
Report of: Superintendent of Hampstead Heath	For Information

Summary

This report informs members on the construction of stumpery in the woodland walk way in Garden in Golders Hill Park.

Recommendation

Consultative Committee notes :

- the successful construction of the stumpery as an important new feature in Golders Hill Park.
- acknowledges the close working relationships developed between Open Spaces Department staff and inspirations and knowledge gained from a visit to Highgrove House, Gloucestershire.

Main Report

Background

1. Over the past five years Golders Hill Park has become a hub for environmental education with the construction of RSPB classroom and pond dipping platform, conversion of a disused glasshouse into a butterfly house, installation of demonstration beds for vegetable & fruit growing and the creation of an insect hotel and adjacent wild flower meadow.
2. Two members of staff from Golders Hill Park wanted to add to the environmental learning experience and they initially proposed the concept of building a stumpery. The idea was supported by the Superintendent and agreed by your Committee as part of the 2013 annual works programme.
3. The area identified was an underused parcel of land in the fenced-off woodland walk leading from the hump bridge at the Lily Pond down into the main north / south pathway. The area was thick scrub with non - flowering rhododendrons and self-seeded tree saplings – map 1 and appendix three (photographs 1 and 2).

Map 1: Golders Hill Park



A Stumpery

4. Stumperies were a popular feature of a nineteenth century garden and can be described as structure similar to a rockery but instead of using rocks and alpine plants dead tree stumps and woodland plants are utilised, particularly ferns. Ferns were fashionable and hundreds of new species were introduced into Britain from around the world during this time. Stumperies have been described by commentators as a:

“grotesque form of Victorian folly”, a product of the Romantic imagination and it's obsession with the unadorned beauty of nature, and in particular ferns”.

5. The first stumpery was built in 1856 at Biddulph Grange which is now a National Trust property in Staffordshire. The largest and perhaps the most famous modern stumpery is that at Highgrove House, Gloucestershire and the home of His Royal Highness The Prince of Wales.
6. A Stumpery generally work on three congruent levels as an aesthetic structure, a wildlife haven and horticultural landscape e.g. photograph 1.



An aesthetic structure

7. Any tree species can be used to construction a Stumpery however, the most attractive and durable woods are *Quercus robur* (Common Oak), *Castanea sativa* (Sweet Chestnut) and *Taxus baccata* (Common Yew). The root plates of these three tree species rot down to a hard skeletal core, which retain the outlines of the main root systems which makes them ideal in terms of visual impact, durability and longevity.
8. The success to building a stumpery is in the attempt to strike a precarious balance between maximising the aesthetic appeal of the wood structure and creating the illusion that it could of conceivably have occurred naturally or in a natural setting.

A wildlife haven

9. Regardless of the level of desiccation, tree stumps provide an ideal environment for mosses, lichens, fungi and woodland plants to establish and flourish. Partially buried stumps enrich the surrounding soil and provide an excellent habitat for a wide variety of invertebrates, including wood boring beetles, hoverflies, bees and woodlice. Invertebrates in turn attract a variety of birds, particularly ground feeders such as dunnocks, wrens and song thrushes. Small mammals also like to burrow down into the dark and fertile soil around the stumps.

A horticultural landscape

10. The twisted bowls and hollows in the stumps make ideal planting pockets for ferns and other woodland plants such as *Hepatica nobilis* (Common hepatica) and *Convallaria majalis* (Conval lily) and *Trillium flexipes* (Nodding wakerobin). The grain and colour of the wood beautifully highlight the differing shapes, shades and shadows of plants.

Current Position

Highgrove House

11. In September 2012 two members of staff visited Highgrove House and were given a private tour of the Stumpery by the Senior Gardener who was in charge of the Stumpery at Highgrove House - appendix one. A friendship was formed and the

Senior Gardener kindly offered his services free of charge in the construction stage of the stumpery at Golders Hill Park.

12. The Senior Gardener with ten years knowledge and experience of constructing and working within the stumpery has proven an invaluable expertise resource which has given confidence and motivation and knowledge transfer to Golders Hill Park staff.

Epping Forest

13. The majority of stumps were gathered from buffer land adjoining Epping Forest. The stumps had been laying in-situ for decades and the environmental impact of removing them was negligible particularly as all had lost most of their soft wood and pulp which is a vital food source and habitat for insects. The Head of Conservation at Epping Forest was briefed and supported the project.
14. Approximately twenty stumps were removed from Epping Forest and given the current national concerns on tree heath the Tree Management Officer at Hampstead Heath gave bio-security clearance before the stumps were transported to Golders Hill Park.

Clearing the site & Construction

15. Work on clearing the site began in December 2012. Works included removal of the thick non - flowering rhododendrons, self-seeded tree saplings and clearing the stream. Judicious pruning works were undertaken to existing trees to enhance light levels in order to allow for a wider variety of plants to establish both in and around the stumps.
16. In July 2013 for one week, the Senior Gardener from Highgrove House working alongside key staff members from Golders Hill Park constructed the Stumpery. In order to re-landscape and create mounds which the stumps were built into, twenty tonnes of re-cycled soil was introduced into the area. A telescopic front loader with pallet fork attached and other heavy plant was used to transport and embed the stumps - appendix three, photographs 3 and 4.
17. Interpretation boards were installed at both ends of the woodland walk-way which were approved by the communications office at Highgrove House - appendix two. During the construction phase the woodland walk-way was closed off for one week.
18. Forty meters of poor condition chestnut pale fencing was replaced by a dead hedge at the back of the Stumpery which will provide an additional habitat for wildlife including invertebrates, amphibians and small mammals, as well as a perching spot for small birds. It was cheap and allowed the re-use of natural material and it created an effective and impenetrable barrier to ensure protection of the stumpery.
19. The finished stumpery resembles a structure which is pre-historical and fossil like in appearance - appendix three, photographs 5 and 6. Verbal feedback to staff has been very positive and welcoming. An article on the construction was published in 1st August Ham & High 2013.

Future Planned Works

20. Once the stumps have settled into the surrounding ground, the bowls and hollows will be packed with soil to provide planting spaces for a variety of native ferns and woodland plants *Hepatica nobilis* (Common hepatica), *Convallaria majalis* (Convall lily), *Trillium flexipes* (Nodding wakerobin) etc. A few interlopers such as *Acer species* (Acer) and *Dicksonia antarctica* (Tree Fern) will be planted to add form and drama.
21. Bog and marginal plants such as *Calla palustris* (Bog Arum), *Iris pseudacorus* (Yellow Iris) and *Lysichiton americanus* (Skunk Cabbage) will be planted to line the damp

sides of the gully which runs through the Stumpery area. This will provide a variety of foliage and form which will fully compliment the structure of the Stumpery. Bee friendly plants such as *Digitalis purpurea* (Common Foxglove) and *Pulmonaria officinalis* (Common lungwort) will be planted along the dead hedge line at the back of the Stumpery.

22. Creating the remaining twenty meters of dead hedge and removal of chestnut fencing at the back of the Stumpery during winter 2013.
23. A wood chip walk-way will be incorporated into the design to allow schools groups and supervised tours to gain closer observation and a submersible pump will be installed to create a slow moving stream through the stumpery.
24. An experiment with the use of Tufa Rock, an extremely porous volcanic rock which is ideal for growing small plants and mosses will be looked at. The use of this material was very popular in the late Victorian era and would add a differing and complementary structure to the Stumpery and intensify the mysterious and arresting ambience of the Woodland Walk area.
25. Shade and moisture levels in the immediate environ will be managed to encourage the stumpery to become a haven for fungi, lichens and mosses to establish and spread. An overall review of the design and acquire new stumps and extend north.

Corporate & Strategic Implications

26. The stumpery supports several of the City Together Strategy - The heart of World Class City 2008-2014 themes, including: *... supports our communities ... protects, promotes and enhances our environment ... is vibrant and culturally rich.*
27. The project shares the Open Spaces Department Business Plan 2013-2016 aims & objectives for environment and people: - *"Deliver sustainable working practice to promote the variety of life and protect the Open Spaces for future generations"* and *"Manage, develop and empower a capable and motivated work force to achieve high standards of safety and performance"*.
28. The stumpery also supports the Essential Action in the Hampstead Heath Management Plan Part 1 – Towards a Plan for the Heath 2007-2017, NL9: - *"Retain dead and dying wood wherever possible to encourage invertebrates, fungi and birds."* NL10: *"Use interpretation boards to explain and make available the Heath's landscape and wildlife resources to a wide and diverse audience"*.

Implications

29. The costs associated with the construction of the stumpery have been met from the Superintendents local risk budget. The costs have been kept to a minimum as the material was sourced from our other open spaces and in-house staff were able to undertake the creation of the main feature.
30. There are no legal, property implications or human resource implications

Conclusion

31. The stumpery will serve as an arresting visual feature in its own right, as well as being a haven for insects, amphibians, small mammals and bird species and provide planting spaces for shade woodland plants.

32. The stumpery can be used as a convenient interactive resource in which school groups can explore issues and acquire knowledge and skills in ecology, conservation and wildlife in a novel and innovative manner.
33. The project has given a unique opportunity to encourage close working relationships and knowledge transfer from teams across Hampstead Heath and Epping Forest, including sports & recreation keepers, gardeners and trees & conservation. It has also enabled Golders Hill Park to develop a relationship with the Gardens department at Highgrove House.
34. It is acknowledged that Golders Hill Park is a popular community facility, used by local residents and the construction of a stumpery will be a welcome additional attraction.

Appendices

Appendix 1 - Highgrove letter

Appendix 2 - Interpretation board

Appendix 3 - Photographs

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Appendix 3 – Photographs

Photograph 1: Stumpery site before works – rhododendrons scrub



Photograph 2: Stumpery site before works – the stream



Photograph 3: Construction - Prepare ground to place a stump



Photograph 4: Construction - creating a soil mound



Photograph 5: Completed stumpery infrastructure showing stream



Photograph 6: Completed stumpery infrastructure showing dead hedge and outline of chip barked path



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HIGHGROVE HOUSE
DOUGHTON
TETBURY
GLOUCESTERSHIRE GL8 8TN

From: The Head Gardener to TRH The Prince of Wales
and The Duchess of Cornwall.

CORPORATION OF LONDON		
HAMPSTEAD HEATH DIVISION		
DATE	11 JUN 2012	REC'D
ACK'D		

8th June 2012

Dear [REDACTED]

Thank you for your letter dated 9th May regarding your proposal to install a stumpery on Hampstead Heath. If this comes to fruition, I know that HRH would be delighted to have Highgrove and the initial designers of the Stumpery, [REDACTED], noted as conceptual inspiration for your design.

I would be most happy to host [REDACTED] and [REDACTED] for a mutually convenient visit to see the stumpery at Highgrove and I would be grateful if you could contact my secretary [REDACTED], or [REDACTED] to organise this.

Once again, thank you for your letter and may I wish you every success in your plan.

With kind regards,



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The Golders Hill Park Stumpery

A Stumpery is being created as a habitat for wildlife and as an interesting aesthetic feature in Golders Hill Park.



It will be planted with native ferns and woodland plants and will provide nesting and feeding sites for insects and birds. Conditions should be just right for mosses, lichens and fungi to grow and to create hiding places for small mammals such as hedgehogs.

Stumperies were first made popular in Victorian gardens and have once again become fashionable. Our initial plan for a stumpery was further inspired by a staff visit to Highgrove, where HRH the Prince of Wales has created his own stumpery.

We are collecting contorted root bowls from dead oaks, sweet chestnuts and yews, generally choosing those that cannot stay in situ and would otherwise go to waste.

The dead hedge at the back of the area and other enhancements will provide complementary habitat that will make this corner of Golders Hill Park a haven for wildlife.

We hope that the Stumpery will be completed by May 2014.

Contact Details – Golders Hill Park

Tel: 020 7332 35111

www.cityoflondon.gov.uk/goldershillpark

Stumpery at Royal Horticultural Society Garden Wisley (RHS)

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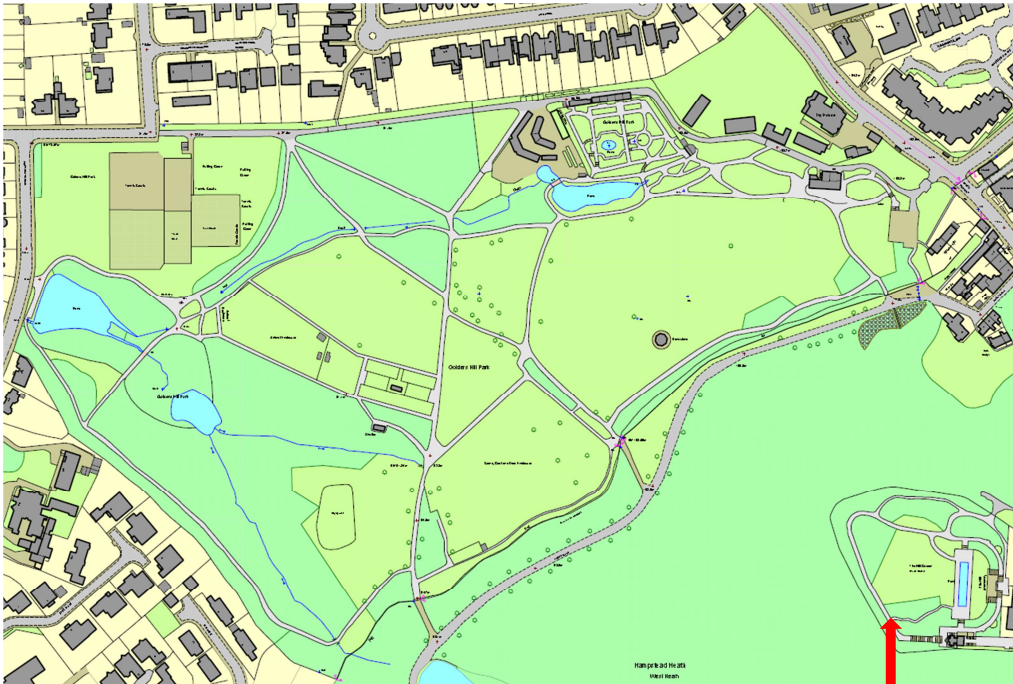
Committee(s):	Date(s):
Hampstead Heath Consultative Committee	12 November 2013
Subject: Report on maintenance works and future proposals at the Hill Garden & Pergola	Public
Report of: Superintendent of Hampstead Heath	For Discussion
<p style="text-align: center;"><u>Summary</u></p> <p>This report informs members of construction work undertaken during the last ten years, and proposal to seek a venue licence to hold marriage and civil partnership ceremonies.</p> <p>Recommendation</p> <p>That the Consultative Committee:</p> <ul style="list-style-type: none">• notes the on-going repair and maintenance works undertaken in the Pergola during the last ten years.• endorses the approach to the use of the Hill Garden Pergola for marriage and civil services, the details of which will form a separate report.	

Main Report

Background

1. In 1904 William H Lever, later Lord Leverhulme purchased The Hill, a substantial house facing North End Way. He enlisted Thomas Mawson, the first president of the Institute of Landscape Architects to redesign the garden and build the Pergola. Construction was carried out in three phases between 1905 and 1925.
2. The Pergola is situated on the eastern edge of the West Heath area, see Map 1 below. It is a Grade II* Listed structure consisting of a high level walkway, stretching almost 250 metres in length through a colonnade of stone columns. The walk ways are supported off a substructure at lower level that also has an internal walkway in place. Photograph 1 shows the Pergola today, one of the hidden gems of London.
3. After Lord Leverhulme's death in 1925 there were various owners of the Pergola. The City of London Corporation took over its management in 1989 and commenced a major restoration programme costing £1.4M. Works included foundation stabilisation, brickwork repair, and the replacement of stone pillars and oak timbers to match the originals. In 1995 the restored Pergola was reopened for public access.

Map 1: Golders Hill Park / West Heath / Hill Garden



Hill Garden & Pergola

Photograph 1: Pergola today



4. The Hill Garden is included in the English Heritage Register of Parks and Gardens of special historical interest. In early June each year the Hill Garden and Pergola is included in the Open Garden Squares weekend which is organised by the London Parks & Gardens Trust. This year an estimated 300 visitors attended the event.

5. In March 2013 the chairman wrote a comprehensive article for the Ham & High outlining the history of the Hill Garden Pergola –Appendix 1.
6. The Hill Garden and Pergola are popular locations for filming and photography shoots.

Current Position

7. Over the ten years the City Surveyors Department have overseen the completion of the following works in section 1 (green area) and section 2 (pink area) see Plan 1 below. Total costs of works to date for the Pergola and Hill Garden boundary wall total approximately £333,000.
8. When works are being undertaken notices are displayed in key access locations informing members of the public of impending closures to sections of the Pergola, Appendix 2. Also a letter was written to neighboring properties informing owners of planned works – Appendix 3.

Section 1

9. Key stone and re-pointing repairs were completed on the Pergola Bridge in March 2011 at a cost of £10,000.
10. Oak framework repairs were undertaken in February 2012, costing £46,000.00. Repairs included checking all timbers, tightening existing fixings, inserting new fixings and removing and replacing rotten timbers wherever necessary to the whole section, including 4 domed and 2 large tented structures.

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11. False windows were re-rendered and painted in April 2013 at a cost of £9,000 – Photographs 2 & 3. Cast iron pipes replaced at a cost of £1,000.
12. A structural survey of the ground level walkway has been carried out costing approximately £9,000.

Section 2

13. The Oak framework was strengthened; works were completed in March 2012 at a cost of £10,000. Works consisted of inserting additional timbers, putting beams back into position and replacing missing screws.
14. Re-laying of the entire paviour pathway was completed in May 2013 at a cost of £50,000. Previously this pathway was a health and safety concern as the path had sunk along the middle causing water to collect, this froze in winter making the path very slippery – Photographs 4 & 5a and b.
15. Coping stones on the wall along the colonnade were made safe at a cost of 3,000 in April 2013.

Hill Garden Boundary Wall

16. Eighty-three meters of boundary wall has been rebuilt at a total cost of £194,000 – Photographs 6 & 7. The works was carried out in three phases.
17. A fourth and final phase of rebuilding forty meters is due to commence in September 2013, at approximate cost of £125,000.

Future Works and Proposals

18. There are additional works that need to be undertaken in the future, subject:

Section 1

- Tanking to high level walkway over ground floor walkway
- Brickwork repairs and repointing
- Repairs to stone balustrades, columns
- Repainting railings
- Paving repairs/replacement
- Stairways – possibly open up and repairs

Section 2

19. Given the age and condition of the structure, as a precautionary measure when wind speeds exceed 50 miles per hour, this section of the Pergola structure is closed to the public.
 - Replace timber framework in section 2
 - Repair stone colonnades

- Brickworks repairs and repointing
- Repairs to stone balustrades and columns to staircases
- Repainting railings
- Paving repairs and replacement
- Stairways – possibly open up and repairs
- Repairs to store rooms underneath Belvedere Structure
- Repairs to Belvedere Structure.

20. These will form the basis of a future Committee report.

Future Use of the Hill Garden Pergola

21. In the Heath Management Plan – Towards A Plan for the Heath, in the Section that gave "A Glimpse of the Future", reference was made that there might be marriage or civil partnerships at the Hill Garden Pergola.
22. The Business Manager has been pro-actively approached by Camden Council who are very keen to pursue this location as a potential venue for marriage and civil partnerships. Having discussed this at both previous Management and Consultative Committee walks with positive feedback, a tentative application has been made for a venue licence.
23. This again could generate additional income to support the management of the Heath, it is however recognised that such an activity must be managed sensitively and not become intrusive to the overriding purpose of the site. The detail relating to this approach will form the basis of a future report.

Corporate & Strategic Implications

24. The Pergola supports several of the City Together Strategy - The heart of World Class City 2008-2014 themes, including: ... *"a support our communities ... protects, promotes and enhances our environment ... is vibrant and culturally rich"*.
25. The Pergola shares the Open Spaces Department Business Plan 2013-2016 aims and objectives for environment: - *"Ensure that measures to promote sustainability, biodiversity and heritage are embedded in the Department's work"*.
26. The Pergola also supports the essential actions and/or aspirational goals in the Hampstead Heath Management Plan Part 1 – Towards a Plan for the Heath 2007-2017, B1 *"Restore and refurbish the Hill Garden and Pergola, the Hill Garden Shelter and Pitt Arch"* and D1: - *"Conserve and enhance the historic and planned elements of the Heaths designed landscapes, while improving their appearance and public facilities"*.

Implications

27. The costs associated with these construction works has all been met from the City Surveyors Department Annual Works Programme ring-fenced maintenance budget.

28. There are no legal, property implications or human resource implications at this stage.

Conclusion

29. This report demonstrates the value of the Annual Works Programme, with ring-fenced maintenance budgets, enabling the City to invest £324,000 to protect, preserve and maintain the Hill Garden & Pergola Grade II* Listed structure in accordance with its statutory obligations for the next generation to enjoy.
30. Designation for use of the location for marriage and civil ceremonies on a limited basis, provides an additional value for this largely undiscovered architectural landscape feature.

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Photograph 2: Re-rendered false windows before works



Photograph 3: Re-rendered false windows after works



Photograph 4: Paviour pathway before replaying works



Photograph 5a and b: Paviour pathway after replaying works





Photograph 6: Boundary wall repairs



Photograph 7: Completed boundary wall repairs



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Committee(s):	Date(s):
Hampstead Heath Consultative Committee	23 September 2013
Subject: Hampstead Heath's Hedges and their Management	Public
Report of: Superintendent of Hampstead Heath	For Discussion
<p>Summary</p> <p>This report presents the results of a survey of Hampstead Heath's hedgerows which was undertaken in 2012. It covered linear woody features which might be managed by traditional hedgerow techniques. These were found to total seven kilometres in length.</p> <p>The data from the survey was used to produce a ten-year management programme, through which all hedges would receive appropriate management to protect and promote the biodiversity and landscape importance of the features.</p> <p>Recommendation(s)</p> <p>Members are asked to provide their views on the overall management programme for hedgerows set out in the report and accompanying Management Plan.</p>	

Main Report

Background

1. Hampstead Heath possesses a fine resource of hedges, many of ancient origin. Although their management has been on-going over many years, it has been planned on a somewhat localised basis. An overall assessment of hedges and their condition and a long-term programme of management was lacking.

Current Position

2. A survey of hedges on Hampstead Heath was carried out in 2012.
3. A decision was required as to what to include in the survey. The term 'hedge' has been used on the Heath to include features which normally would not merit this appellation. It was decided to include all features which might be managed by traditional hedge management techniques, such as coppicing and laying. Examples are the so-called Hedges 2 and 3 on Parliament Hill, which today are more akin to linear woodland rather than hedges. Former hedges which are now no more than treelines were excluded, as were formal and amenity hedges.

4. The length of such features was found to total seven kilometres. However, only 1.9 kilometres could be called real hedges, arbitrarily taken as containing a relatively dense shrub layer less than 5m wide. Most of these were planted in the last 30 years or so. Elements of most of the many hedges present in the 19th century have survived, but often as lines of trees with little or no shrub layer beneath them.
5. Many of the hedges are very important for maintaining the biodiversity of the Heath. Birds are favoured by a dense shrub layer, as well as bordering habitat such as brambles, which provides additional habitat and valuable protection from dogs. Veteran trees are vital features for invertebrates, of which the Heath harbours some rare species. Most of the Heath's wild service trees grow in old hedgerows.
6. Hedgerows benefit from management. If they are not managed, they lose their character, expanding laterally and often growing into tall, leggy structures with a poor shrub layer. Once this has happened it is difficult to restore them to their original form, but they still require management to retain and enhance their wildlife and landscape values.
7. Such management often entails laying: part cutting shrubs and bending them over so that they re-sprout. This promotes low-growing dense woody growth. Ideally the whole width of the hedge is cut, but if it is very wide and tall, it may only be appropriate to cut part of the width. For example, Hedge 1 has recently been laid in its entirety, whereas Hedge 3 was considered too much of a major visual landmark to cut right through, and only the southern side was laid.
8. Laying should be repeated periodically. 'Gapping up' with new plants may be required if there are insufficient shrubs.
9. Some 320 metres of hedge have been managed in the past two years. About 50 metres of new hedges were planted.
10. Greater detail of the survey and its analysis of the data are presented in Appendix 1.

Proposals

11. A 10-year programme of hedge management is proposed, as detailed in Appendix 1, under which all hedges covered in the survey would have received management by 2022. Work planned for autumn/winter 2013/4 includes laying the western half of a hedge near the north-west corner of the Extension, the other half of which was cut in spring 2013; and laying and gapping up the northern third of the hedge between Preachers Hill and East Heath Road, the rest of which would be managed in subsequent years.

Corporate & Strategic Implications

12. The City has a legal duty under the Hampstead Heath Act 1871 to maintain the natural aspect of the Heath.
13. All hedgerow management proposed will be undertaken using the Heath local risk budgets. There is a reputational risk in not pro-actively managing the natural aspect of the Heath. Left unchecked the mosaic of diverse habitats for which the Heath is renowned would be lost to secondary woodland cover.

14. This project also supports the City Bridge Trust work relating to the survey and management of the Heath's hedges.
15. The proposals link to the theme in the Community Strategy to protect, promote and enhance our environment.
16. They also link to the Open Spaces Department Plan through the Strategic Aim to 'adopt sustainable working practices, promote the variety of life (biodiversity) and protect our Open Spaces for the enjoyment of future generations', and the Improvement Objective to 'ensure that measures to promote sustainability and biodiversity are embedded in the Department's work'.

Conclusion

17. A survey of the Heath's hedges was undertaken in 2012, and the data obtained were used to draw up an overall management schedule for them. Under this plan, all hedges would have received appropriate management by 2022. The work has already begun, with the next tranche of tasks scheduled for autumn 2013.

Appendices

- Appendix 1 – Hampstead Heath's Hedges and the Management

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Appendix 1

Hampstead Heath's Hedges and their Management

July 2013

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What has become of our old hedges?.....	3
Planting and new hedges	4
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Introduction

1. Hedges are wonderful visual features, attractive in their own right and dividing up the landscape. They and their associated habitats are of prime importance to the biodiversity of the Heath for both flora and fauna.
2. The former agricultural areas of the Heath – Parliament Hill Fields, Kenwood and the Extension – would once have been criss-crossed with stock-proof hedges. Many of those present in the mid-19th century remain today, but not in their original form. Only the hedgerow trees remain from some, while others have expanded laterally into wide bands of trees and shrubs. Of only a few can no trace now be found.
3. In recent years many hedges on the Heath have been managed by laying, coppicing, topping and gapping up. New hedges have also been planted, some where former hedges grew, others in entirely new places.
4. A survey was carried out in 2012 to investigate the current resource of the hedges on Hampstead Heath and to produce a plan for future management.

The survey

5. What can today be termed a hedge is a good question in the context of the Heath. What we call a hedge, such as Hedge 3 on Parliament Hill, is often more like a corridor of woodland than a classic hedge characterised by dense shrubs

and a few metres wide and high. Recently planted hedges are the exceptions, being easily recognised as such.

6. Linear barriers of shrubs or of trees with shrubs beneath were included in the survey if they were less than about 20m wide. Major hedges marked on 19th century maps which now lie adjacent to woodland were also covered if at least shrubby vestiges of the hedge could still be discerned. All these are termed hedges for the purpose of this report.
7. Lines of trees adjacent to ponds, such as those to the west of Stock and the Mixed Bathing ponds, were excluded, as were lines of trees without any hedge shrubs below them. Regularly-clipped amenity hedges, such as those around the tennis courts at Parliament Hill, were also omitted.
8. Information recorded included a brief description of each hedge, length, an estimate of average height, width and density of the shrub canopy when in full leaf, ground flora, shrub and tree species, bordering habitat, and evidence of planting and management. An assessment was made of each hedge's biodiversity, landscape and historical interest, as well as future management which might advantageously be undertaken. Photographs were taken.
9. The survey was too extensive to be carried out in entirety at the optimal time of year. Most field work was carried out between May and September 2012, although due to unforeseen circumstances a few areas could not be surveyed until winter.
10. A total of 7.0km of hedges were surveyed, as shown in figure 1.

What constitutes a true hedge?

11. What is a real, true hedge? The original main purpose of a hedge was usually to confine stock, and a true hedge could be defined as one which is, or could be made (e.g. by laying), into a dense, relatively narrow, largely continuous barrier not more than say two to three metres high, with or without an overstorey of trees. 'Relatively narrow' is a matter of judgement, but being generous is here taken as up to about five metres wide.
12. Hedge shrubs have to receive enough light to thrive; hedges where the shrubs are heavily shaded by trees do not do well, and gapping up with additional stock is rarely very successful unless more light is provided by felling or raising the crowns of trees, which is often undesirable for other reasons. Lines of many large, shading trees are therefore not here considered true hedges unless they have dense shrubs beneath the canopy.
13. Figure 2 shows the locations of hedges where most of the length currently fulfils these criteria for 'true hedges'. They total 1.9km in length. Those shown in blue are planted since the late 1940s, most of them in the last 30 years. Only those shown in yellow, totalling 502 metres, may contain some component from the 19th century or earlier, though all of these include much recently planted or naturally colonised material.
14. 1.7km of hedges were recorded as having a shrub layer more than an estimated five metres wide. Most of these emanate from the 19th century or earlier. Although no longer retaining a true hedge-like character, these belts of trees and

shrubs make fine visual features and are of great significance for biodiversity, especially if the understory is dense, providing for example excellent feeding, roosting and nesting places for birds.

15. Many other hedges contain so many trees that they could not be managed effectively as true hedges without cutting down some of these.

What has become of our old hedges?

16. Figure 3 displays the locations of probable field boundaries shown on maps of the 1860s. Most of these would, at that date, presumably have comprised hedgerows, although boundaries with Kenwood or other external properties or roads or tracks might have been fences or railings.
17. Many old trees in the boundaries of the 1860s are present to this day. Figure 4 is a map of the trees identified as veteran in the Veteran Tree Survey carried out by Heath Hands; most are along old hedge lines. There are fine examples of these on the Extension and within what is now woodland on South Meadow, for example.
18. Contrasting with trees, far fewer shrubs remaining from the old field boundaries have survived..
19. Some boundaries may not have been in a functional, stock-proof state in 1866. An example is shown below, depicting the state of a hedge, probably Hedge 2 or Hedge 3, in 1894.



*Photo of either
Hedge 2 or 3 in 1894*

20. Figure 5 shows those hedges containing significant remnants from the 1860s or before, in the form of old trees and/or shrubs. Two examples of hedges containing obviously old shrubs are the Saxon Boundary, where ancient hawthorns survive (see photo below), and the western end of Hedge 2, containing large old hazel and hawthorn stools.



Old hawthorns along the Saxon Boundary

Planting and new hedges

21. About 2.3km of hedgerow have been planted, replanted or significantly gapped up with native species over the past 25 years or so, as shown in figure 6. Of these, entirely new hedges total just over a kilometre long.

Hedges and biodiversity

22. Hedges and their associated habitats are of great value for fauna, notably for birds, invertebrates, mammals and bats for feeding, breeding and shelter and, in the case of bats, for route-finding across open country. For many groups of animals, including birds, the Heath's hedges and hedgerow trees are at least as rich, if not richer, than its woodlands. By contrast, although the Heath's hedges are important for tree and shrub species, the ground flora is disappointingly poor.
23. An ideal hedge for biodiversity should:

- Possess a dense shrub layer which starts at ground level. Quite a few of the Heath's hedges are bushy, for example many of those on the Extension, and management such as laying or coppicing aims to preserve and increase this further. As the Heath's woodlands tend to be poorly structured, with little beneath the trees, hedges contain a significant proportion of the Heath's shrubs apart from holly, which is abundant in woodland. Some hedges, notably on the Extension, are too heavily shaded to allow a thriving shrub layer to be created.
- Be formed from a variety of shrub species. Some species are particularly associated with hedges, such as hawthorn, hazel, buckthorn, spindle and, perhaps to a lesser degree, wych elm and Midland hawthorn. Our old hedges have lost many of their rarer shrub species, though Midland hawthorn and wych elm still survive from former times in some places. A wide range of shrubs has been included in many of our more recently planted hedgerows and for gapping up existing ones.
- Contain hedgerow trees of a range of species and ages, including veteran. Many of the Heath's hedges contain wonderful old trees, though in quite a few cases, notably on the Extension, these are so numerous that the hedge below has suffered. In addition, if there are too many mature trees this inhibits the younger trees which will in time replace them. As with shrubs, some tree species are particularly linked to hedgerows. On the Heath these are wild service, wych elm and crab apple, which are all relatively uncommon in England, and field maple, a more common species. Figure 7 displays a map of hedges containing wild service, wych elm or crab apple.
- Be bordered by adjoining habitat such as brambles, thistles and long grass, as well as ditches. Many of the Heath's hedges are bordered by good habitat, such as Hedges 1, 2 and 3 and some of the Extension hedges. Ditches also run within or adjacent to many of the latter, providing useful complementary habitat.
- Be relatively un-shaded. Hedges provide many of the berries which birds feed on in autumn and winter, and the shrubs fruit more prolifically if they receive plenty of light. Those with an un-shaded south or south-east facing aspect are particularly important, proving warm habitats for feeding, breeding and shelter. Notable here are several hedges on the Extension, and Hedges 1, 2 and 3 on Parliament Hill.
- Be undisturbed: an ideal hedge will not be bordered or crossed by footpaths or roads. Brambly and thistly edges are particularly important, especially in the context of the Heath, protecting hedges from disturbance by dogs and people (as well as providing valuable habitat in their own right).
- Be continuous.

24. There is such a diversity of hedges on the Heath that it is impossible to rate them all according to biodiversity interest. Information on a selection of nine hedges with important biodiversity features is given in table 1 and figure 8. The list is not exhaustive.

Hedge management

25. If hedges are not managed, they tend eventually to grow into tall, leggy and gappy structures, and may expand laterally. The original shrubs may die through competition and shade. Once this has happened it can be very difficult to restore the former character of a true hedge, though they still need to be managed to retain and enhance their landscape and wildlife values.
26. Laying is the traditional way hedges were managed (see photos below). This preserves the hedge and its shrubs, and leads to a dense structure. If repeated periodically, say every seven to ten years, it can preserve the hedge indefinitely. Once layed, the hedge can be allowed to regrow immediately or can be topped annually or biennially to maintain it. It has to be left to grow again for several years before re-laying is carried out.



A recently layed hedge near the Goodison Fountain (above), and the same hedge the following summer (below).



27. It is not practical to lay all the Heath's hedges. Some contain many fine veteran trees, heavily shading the shrubs beneath, which would not thrive with laying. Others have developed into tall, wide barriers of great landscape value; laying the full width would change the landscape and would not recover a hedge-like character without removing trees and shrubs to reduce the width. Examples are Hedges 2 and 3 on Parliament Hill Fields.
28. It may still be beneficial to manage a band of shrubs and trees along the edges of hedges which are now very wide, e.g. by coppicing or laying. This can produce a band of thick growth of much greater biodiversity value than drawn up shrubs and young trees, especially to birds and invertebrates. This had been successfully tried in a number of places, for example on Hedge 3.
29. Alternatively, the full width of wide hedges can be laid, leaving some saplings to grow on into trees if appropriate. This can substantially alter the landscape, creating a shrubby barrier rather than a band of young trees, but it does ensure continuity, preventing the closely-spaced trees from becoming ever more drawn up. The eastern end of Hedge 1 was cut right through in this way in March 2013.
30. 'Gapping up' by planting new shrubs may be required where gaps have developed.
31. Existing hedgerows have been managed on the Heath and new ones planted. In 2012, 105 metres of hedge were laid and about 50 metres of new hedge were planted. Some 219 metres of hedge were laid or coppiced in the early months of 2013.
32. A programme for continuing management is proposed in table 2 and figure 9. Under this schedule, all suitable hedges, totalling just over a kilometre, should have been brought into appropriate management by 2022. This total excludes hedges which are topped or clipped annually, such as some near East Heath Bothy, and newly planted hedgerows (such as in Springett's Wood) which may or may not require management by then.
33. When hedges are gapped up or newly planted, stock is obtained from commercial nurseries. The provenance of this stock is normally required to be south-east England. However, it would be ideal if progeny from shrubs and trees actually growing on the Heath could be obtained, at least for the rarer species of tree and shrub. A priority would be Midland hawthorn, which can still be found in a few places on the Heath, and which might be grown from seed. Cuttings could also be taken from an old crab apple, now in a very poor state, found in a former hedge on the Extension. This appears to be the native species (although some botanists question whether the crab apple is truly native to Britain).
34. Another species worth propagating would be hazel. Because of the difficulty of obtaining nuts from wild trees, due to the ravages of grey squirrels, hazel plants obtained from nurseries are normally grown from nuts obtained from Kentish cobnut orchards. Kentish Cob is a domestic variety of hazel close to but not identical to the native species. Nurseries do not admit their stock is grown from Kentish Cob nuts, and may not realise the implications. Genes of our native stock are therefore being diluted throughout the country. It might be possible to obtain rooted cuttings cut from very old stools growing on the Heath, or to layer suckers

so that they root. Such stools can be found in a number of hedgerows, for example the western arm of Hedge 2.

35. Wild service, which is associated with hedges, has recently been grown from berries collected from trees on the Heath and a programme of planting these out has already begun. It is planned to restore a line of oaks marking an old boundary across Tumulus Field, and natural seedlings growing on the Heath will be used.

Conclusion

36. Hampstead Heath possesses a great number of hedgerows. A large proportion of those present today date back to the 1860s or before, but their character has changed very considerably since that time: although many ancient trees are still present, most of the original shrubs have disappeared in all but a few cases, and many of the old hedgerows now resemble narrow belts of trees rather than classic hedgerows. However, relict hazel and hawthorn stools are present in some.
37. New hedges have been planted, especially over the past quarter century.
38. The value of the hedges historically and for the landscape is immense. The hedges are also of very great value for nature conservation, supporting a wide range of fauna and to a lesser extent flora. They are of particular importance for birds and for bird watchers.
39. Management will prolong the life of the hedges and ensure that they continue to be of optimal value to nature conservation, its enjoyment, and the Heath's landscape.

Figures

Hampstead Heath Hedgerow Survey

Hedges surveyed in 2012

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Figure 1



Cities Revealed photography copyright The GeoInformation Group, 2010



Hampstead Heath Hedgerow Survey

Boundaries and individual trees shown on the OS maps of the 1860s

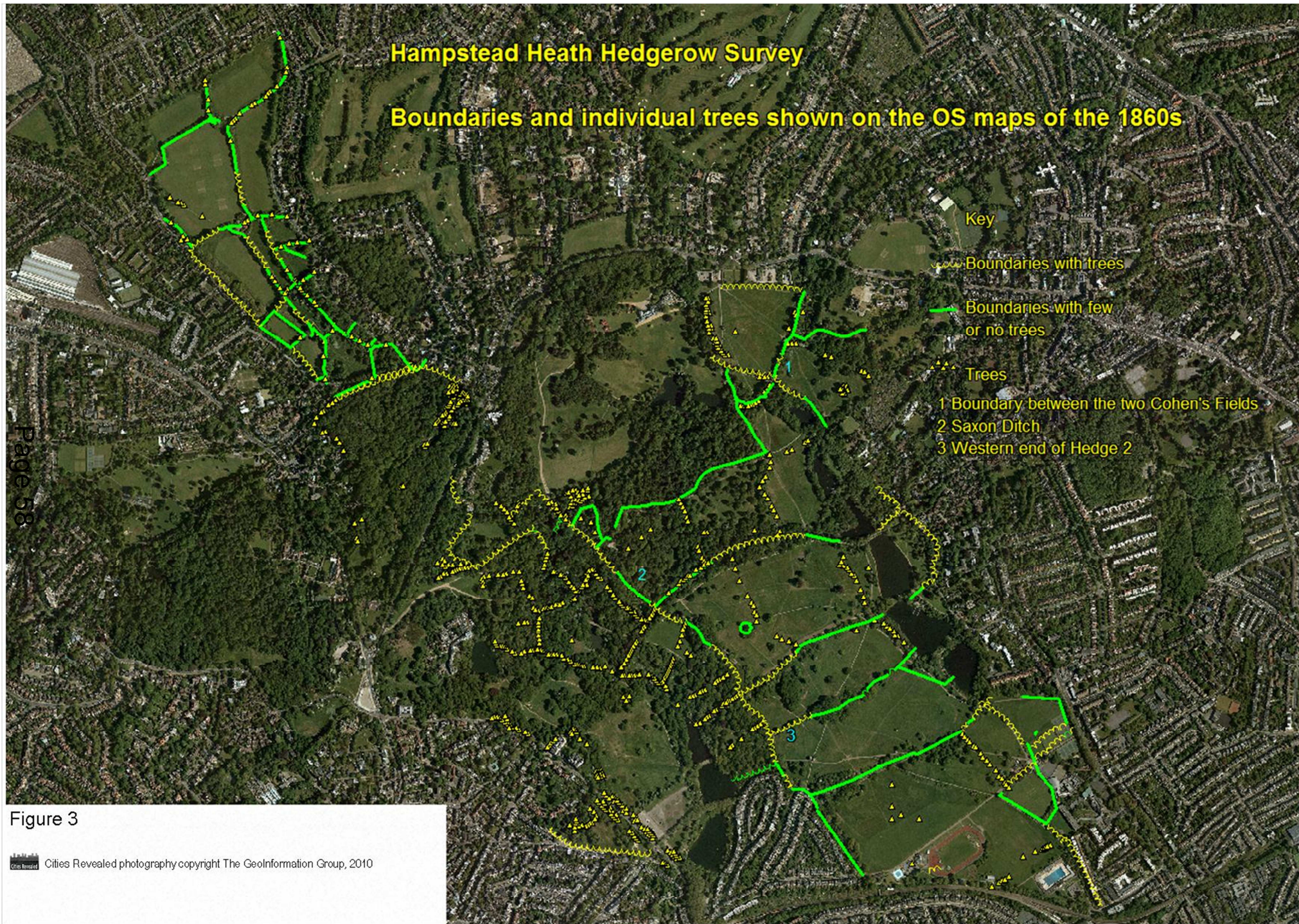


Figure 3



Figure 4

Hampstead Heath Hedgerow Survey

'Hedges' present today which probably contain significant remnants (trees or shrubs) of features present in the 1860s

Blue: boundary with trees in 1860s

Yellow: boundary without trees in 1860s

Figure 5

Hampstead Heath Hedgerow Survey

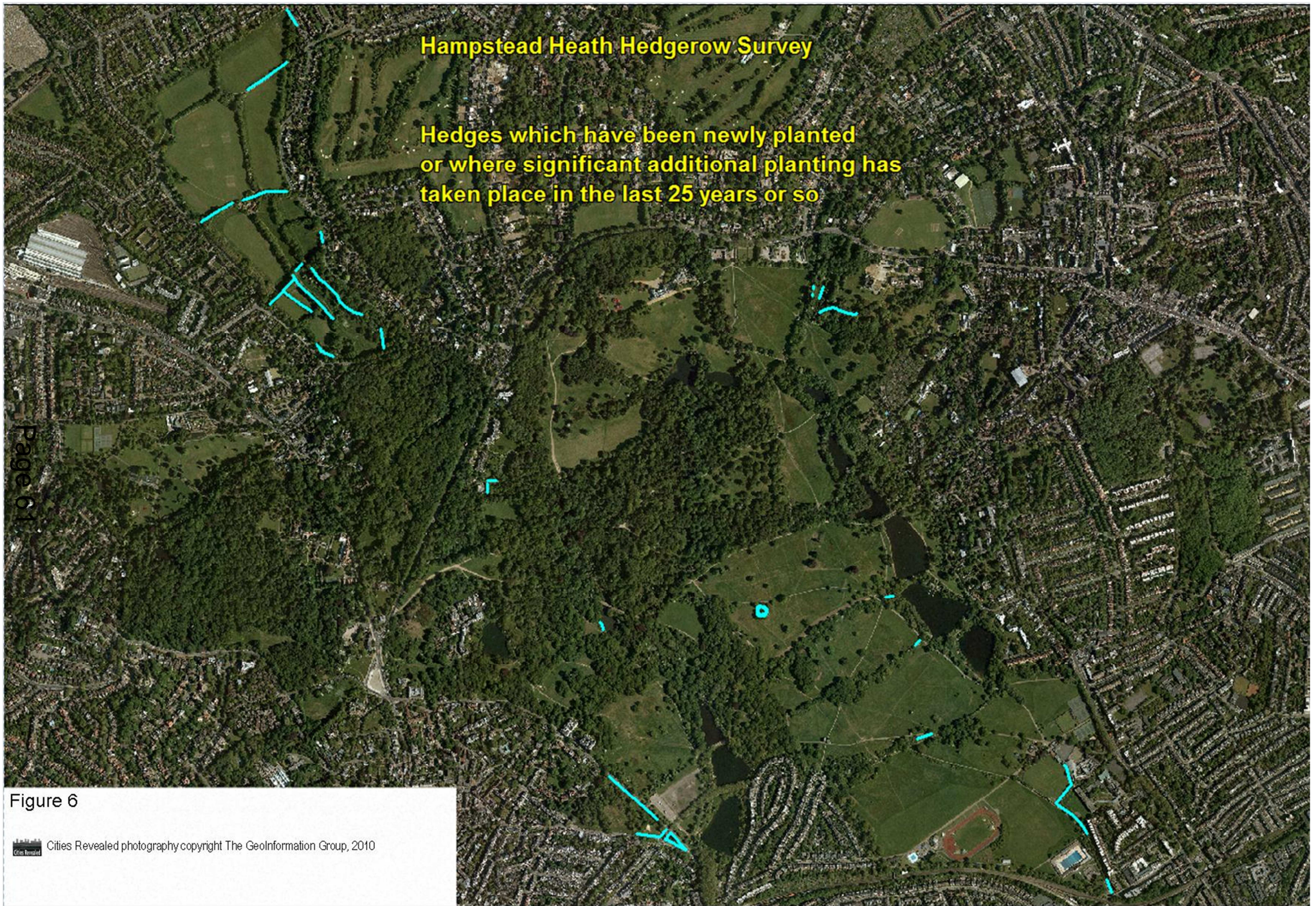
Hedges which have been newly planted
or where significant additional planting has
taken place in the last 25 years or so

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Figure 6



Cities Revealed photography copyright The GeoInformation Group, 2010



Hampstead Heath Hedgerow Survey Hedges with unusual species of trees

- Wild service
- Wych elm
- Crab apple

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Figure 7



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Tables

Table 1 Nine examples of hedges with special biodiversity features

Map ref	Name/location	Special characteristics
1	Parliament Hill, Hedge 2, eastern section	South-east facing; thick; undisturbed on both sides; adjacent to conservation grassland and scrub; good for birds and enjoyed by birdwatchers
2	Parliament Hill, Hedge 2, western end	South-east facing; thick; undisturbed on both sides & protected by dense bramble; adjacent to conservation habitat; probably good for birds; very old hawthorn and hazel stools
3	Parliament Hill, Hedge 3	South-east facing; thick; south side undisturbed and protected by bramble, especially at western end; adjacent to conservation grassland and scrub; good for birds, including whitethroat, and enjoyed by birdwatchers
4	Kenwood, Stock Pond path hedge	Wonderful old wild service tree
5	Extension, south-west of ???	Large number of wych elms, shrubs and trees; several nice hazel and hawthorn stools; relatively undisturbed; good band of bramble and thistle on NE side
6	Extension, west of central path	Very high number of veteran trees; wild service
7	Extension, short section of hedge east of main path	Very old crab apple; possibility of taking cuttings
8	Extension, between two small meadows	South facing; relatively undisturbed (no footpath on south side); conservation grassland on each side
9	Extension, north of cricket pitches	South facing; ditch on south-facing side

Table 2 Management 2012-2022

Hampstead Heath hedgerow management 2012-2022										
Hedgerow	Map ref	Year	Planned or done?	Description of work & objective	Laying	Thickening	Coppicing	Topping	Other	Totals laying, thickening & coppicing
2012										
Extension north of horse ride, NW of Bothy	1	2012	Completed	Topping				42		
Extension north of horse ride, north of Bothy	2	2012	Completed	Topping				29		
Extension nr SW corner	3	2012	Completed	Topping				36		
Extension from Pond 1 SW alongside ditch	4	2012	Completed	Laying	35					
Hedge 1 adjacent to copse	5	2012	Completed	Laying	70					
Totals 2012					105			107		105.00
2013										
Hedge 1, end by pond	6	2013	Completed	Laying, to retain hedge character and thicken up	39					
Extension, old hedge by pond 2	7	2013	Completed	Laying, to preserve remining old hedgerow shrubs	49					
Extension, hedge in wood from Pond 1 to path	8	2013	Planned (autumn)	Laying, to preserve remaining hedgerow shrubs	15					
Extension, south of horse ride western end	9	2013	Completed	Laying, to retain hedgerow character	53					
Extension, north of horse ride north-west of Bothy	2	2013	Planned (autumn)	Topping, to retain hedgerow character and keep hedge thick				32		
Extension, hedge by cricket nets	10	2013	Completed	Coppicing west side, provide light to stream, preserve any remining shrubs, and cut back from cricket nets			33			
Extension, north end, hedge by stream, west half	14	2013	Completed	Laying south side, to preserve hedgerow shrubs and provide light to stream	78					
Extension, north end, hedge by stream, east half	17	2013	Planned (autumn)	Laying south side, to preserve hedgerow shrubs and provide light to stream	78					
Topping as per 2012		2013	Planned (autumn)	Topping, to retain hedgerow character and keep hedge thick				107		
Note - proposed Stock Pond path deferred till after 2014										
Totals 2013 excluding Stock Pond Path					312	0	33	139		345.00

2014										
Preachers Hill, west edge, north section	14	2014	Planned	Laying and gapping up, to preserve hedgerow character and thicken up	56					
Extension, hedge east of cricket nets - south section	15	2014	Planned	Laying west side, to retain hedgerow character and preserve any remaining hedgerow shrubs	107					
Extension, near NE corner	16	2014	Planned	Laying and gapping up, to preserve hedgerow character and thicken up	57					
Pryor's Field, boundary with Mixed Pond, south end	13	2014	Planned	Laying and coppicing, to thicken up and preserve remaining hedgerow shrubs	12					
Topping as per 2013		2014	Planned	Topping to retain hedgerow character and keep hedge thick				139		
Total 2014					232			139		
Totals 2012-2014					532	0	33	385		565.00
2015/7, excluding topping										
Stock Pond Path hedge	18	2015/7	Planned	To be discussed; to thicken hedgerow and reduce cut-throughs		142				
Extension hedge east of cricket squares, north section	20	2015/7	Planned	Laying west side, to retain hedgerow character and preserve any remaining hedgerow shrubs	77					
Extension, hedge east of horse ride latitude of Children's Playground	21	2015/7	Planned	Laying, to preserve old shrubs and retain hedgerow character	89					
Extension, south-west of Children's Playground	22	2015/7	Planned	Laying, to preserve hedgerow character	54					
Extension, intermittent tree line west of horse ride latitude of Children's playground	23	2015/7	Planned	Planting and laying. To create new hedge in place of desultory tree line	84					
Pryor's Field, next section of boundary with Mixed Pond	24	2015/7	Planned	Laying and coppicing, to preserve remaining shrubs and thicken up						
Preachers Hill, west edge, middle section	25	2015/7	Planned	Laying and gapping up, to preserve hedgerow character and thicken up	77					
Preacher's Hill, west edge, southern section	26	2015/7	Planned	Possible laying, to preserve hedgerow character. Will cause temporary major change in appearance	57					
Total 2015/7					438					as required

Wish list 2018-2022, excluding topping										
Extension, near NW corner	31	from 2018	Planned	Laying to maintain hedge density	85					
Extension, north of bothy	32	from 2018	Planned	Laying to maintain hedge shrubs and density	89					
Extension, between 2 small fields	29	from 2018	Planned	Lay north edge to preserve hedgerow shrubs; fell several small trees to provide light	84					
Extension, near Children's Playground	30	from 2018	Planned	Re-lay to preserve hedge density	34					
Extension, horse ride NW corner	27	from 2018	Planned	Re-lay to increase hedgerow density	55					
Extension, SW corner	28	from 2018	Planned	Re-lay to preserve hedgerow shrubs (having left for several years to re-grow)	19					
West of Harry's compartment	33	from 2018	Planned	Lay and gap up	7					
North edge of west Cohen's Field	34	from 2018	Planned	Coppice willow at west end and blackthorn at east end			20			
East edge of east Cohen's Field	35	from 2018	Planned	Coppice streamside to provide light to stream			144			
Tumulus, outer hedge	36	from 2018	Planned	Remove sycamore saplings & trees and bramble growing into gorse					92	
Tumulus, inner hedge	37	from 2018	Planned	Lay, do not gap up due to archaeological interest	73					
Hege 2, west end section	38	from 2018	Planned	Consider major coppicing and laying from north side, to preserve ancient hedgerow shrubs, which are heavily shaded, and thicken up centre	121					
Millfield Lane, opposite Men's Pond	39	from 2018	Planned	Gap up					38	
Hedge 3, eastern half	40	from 2018	Planned	Lay or coppice several sections on north side to take back from cycle track, thicken up and provide grassy adjacent habitat	50					
Hedge 1, central section	41	from 2018	Planned	Lay south side to thicken up and provide better edge habitat. Reduce expansion into grassland on north side	122				15	
Hedge by Lido, north section	32	from 2018	Planned	Lay/coppice and gap up to thicken hedge at bottom and prevent access within hedge	136					
Total, wish list 2018-2022					875		164		145	as required

Committee(s):	Date(s):
Hampstead Heath Consultative Committee	12 November 2013
Subject: Hampstead Heath Ponds Project – Preferred Options Report and Non-Statutory Consultation	Public
Report of: Superintendent of Hampstead Heath	For Discussion
<p>Summary</p> <p>Following consultation with the Ponds Project Stakeholder Group, two “preferred options” have been produced for each chain of ponds. These options are detailed in the appended Preferred Options Report.</p> <p>Both sets of options meet the project objectives to improve dam safety in accordance with standard industry guidelines whilst as far as possible preserving the Heath as a natural open space. A by-product of being able to safely pass the Probable Maximum Flood in all preferred options is that the standard of flood protection afforded to communities downstream where there is no dam failure is also improved.</p> <p>This report also sets out the engagement work that has taken place over the past fifteen months leading up to the development of the Preferred Options. It includes a summary of the engagement with the Hampstead Heath Ponds Project Stakeholder Group as well as with staff and the general public on the development of preferred options for meeting the City’s duties as a responsible owner of reservoirs whilst as far as possible mitigating the impact of the works in accordance with the Heath’s foundation legislation. Overall the strategic input, particularly from the Ponds Project Stakeholder Group has been integral to the development of options that seek to minimise the impact on the Heath’s landscape. At this time however it seems unlikely that a consensus will be reached on the Preferred Options by all groups represented.</p> <p>The report also sets out the proposed consultation methodology to be implemented by specialist consultants in undertaking the non-statutory public consultation over the coming winter period.</p> <p>Recommendation(s)</p> <p>Members are asked to receive:</p> <ul style="list-style-type: none"> • the views of the Hampstead Heath Ponds Project Stakeholder Group as set out in the various appendices to this report (principally 1 and 4); • the Report of the Strategic Landscape Architect on Stakeholder Engagement to date; <p>Members are asked to provide their views on the:</p> <ul style="list-style-type: none"> • Hampstead Heath Ponds Project Preferred Options Report; • consultation methodology for the non-statutory consultation period (November 2013 to February 2014) to receive the views of the wider public on the Preferred Options for the Hampstead Heath Ponds Project. 	

Main Report

Introduction

1. Approval was given by the Court of Common Council on 14th July 2011 to proceed with the project to upgrade the pond dams on the Hampstead and Highgate chains. The aims of the project are to reduce the current risk of pond overtopping, embankment erosion, failure and potential loss of life downstream; ensure compliance with the existing requirements of the Reservoirs Act 1975 together with the additional expected requirements under the Flood and Water Management Act 2010 while meeting the obligations of the Hampstead Heath Act 1871; and improving water quality. At the same time it seeks to achieve other environmental gains through, for example, habitat creation.
2. Industry guidance and best practice to support the legal framework is set out in the Institution of Civil Engineers (ICE) "Floods and Reservoirs Safety" and requires that the Heath dams must be able to pass a Probable Maximum Flood (PMF) – these are regionally derived statistical figures for the maximum amount of water that can be released from the sky. The ICE consider that if a dam can safely accommodate the PMF event, then it is reasonable to state that the probability of dam failure has been "virtually eliminated".
3. It is the dams' function to store or pass water safely without risk of failure. The outflow from the Highgate chain of ponds in a PMF event in the current situation is equivalent to 38 tonnes of water per second passing over or around the dam.

Current Position

4. To help support your Committee in understanding the complex issues associated with the Hampstead Heath Ponds Project (referred to at that time as the Flood and Water Management Project), Management Committee approved the involvement of stakeholder representatives in July 2012:
"to provide views and advice to the Hampstead Heath Consultative Committee in relation to the Flood and Water Management Project within the context of the Hampstead Heath Act 1871 and relevant reservoirs legislation."
5. In order to ensure that landscape and environmental considerations were championed within the project and to support stakeholders in this, the City appointed a Strategic Landscape Architect (SLA), with the support of the Stakeholder Group. The SLA's principle role has been to champion the landscape of the Heath, ensuring that the design is environmentally led to mitigate its impact.
6. The SLA acts as a critical friend during the design process and as such he has provided commentary on the impact of the design proposals. As an independent appointment, separate from the Design Team, the SLA is able to

influence the development of the design options without being prejudiced by partnership contract arrangements.

7. In December 2012 the Management Committee having received the views of your Committee approved a Design Review Method Statement prepared by Atkins as lead designers for implementing the first phase of the Hampstead Heath Ponds Project. This work covered the:
 - fundamental design review of the hydrology of the site, including Haycock's design and input data, to establish the size of flood that has to be designed for;
 - an environmental baseline review undertaken in parallel to the fundamental design review identifying constraints that have helped to inform the option selection and identification process;
 - proposed outline approach to consultation to respond adequately to the interest and concern among stakeholders and the wider public generally about the project;
 - planning application strategy, including the planning programme that will list the main permissions required;
 - options development and evaluation to arrive at a preferred solution.
8. The April 2013 Management Committee was delayed until early May 2013 to enable representatives of the Stakeholder Group and members of your Committee to provide views and receive clarification of issues associated with the Design Flood Assessment. The City of London agreed that before any work commenced on preparing options and detailed design solutions the Design Team would undertake a Fundamental Review of the basis for the whole project. This work was deemed necessary by the City Corporation following recommendations by Aecom who undertook an independent peer review of the original feasibility study and was also requested by the members of the Hampstead Heath Ponds Project Stakeholder Group.
9. The review utilised industry standards and software, ensuring that the work would be in line with current industry best practice to determine the Probable Maximum Flood (PMF) and its impact on the earth dams across the Hampstead and Highgate chains of ponds.
10. The conclusion of this report was that:

"Floods estimated by Atkins were generally 30% to 50% lower than those estimated by Haycock. Even with reduced flood volumes water would still flow over the dam crests in events ranging from the 1 in 5 year to the PMF events. For example Stock Pond will overtop during the 1 in 5 year event while Hampstead No 1 pond will start to overtop between the 1 in 1000 year flood and the 1 in 10,000 year flood. The speeds of the flows on the outer slope in conjunction with the uneven nature of the slopes with coarse vegetation are such that the embankments are likely to suffer erosion damage which in some cases could lead to a breach. To reduce the risk of breaching, improvements need to be made to some of the dams to enable them to cope with these floods, although the extent of the work needed should be less than that proposed by Haycock".

11. The Management Committee approved this Design Flood Assessment as the basis for the continuation of the Hampstead Heath Ponds Project and development of the preferred design options at a special meeting of the Committee held on the 9th May 2013.
12. Having approved the basis upon which the options for the development of the project would need to be designed and following significant representation from the Stakeholder Group and representatives of your Committee, and whilst acknowledging the need to progress proposals 'with all deliberate speed', the City Corporation agreed to extend the timetable for development of the options by six months. This extension of time was welcomed by the Stakeholder Group thereby enabling greater engagement in the iterative process of refining the best options to meet the scheme objectives. In the Preferred Options Report at Appendix 1 the overview of the options development process is shown.
13. This commenced with development of a Constrained Options Report. The process of developing these options began with an unconstrained options list in the form of a matrix of generic options. This was used to collate feedback from stakeholders, Heath staff and the wider public to identify constraints.
14. The preliminary list of constrained options was reviewed in a workshop involving members of the Ponds Project Stakeholder Group, the City of London including Heath staff, and Atkins on the 18th May 2013. At this workshop there was a broad agreement between all present that the strategic concept of providing extra flood storage capacity by focusing major works at the middle of each pond chain, at less sensitive locations, was generally a sound principal to adopt. Feedback and views were provided to the Design Team and a final Constrained Options Report was issued on Friday 7th June 2013.
15. The Constrained Options Report also established the preferred approach to solving dam safety; that treating the two chains of ponds as systems, rather than focussing all works on the current three designated statutory reservoirs provides a more holistic method of spreading the works, preserving the Heath's natural aspect and future proofing against further works if anticipated legislative changes that have already been enacted are fully implemented. In addition the design principles and philosophy were clearly set out.
16. A further Stakeholder Group workshop on 13th July focused on landscape mitigation, pond restoration, water quality improvements and ecological management. Engineering options were also discussed at length using flowcharts showing trade-offs and consequences of the various options considered, alongside photomontage visualisations together with detailed options descriptions and comparisons.
17. It was apparent from this workshop that there remained strong views both for and against a proposed 3m additional dam raising at the Boating Pond, whilst on the Hampstead chain of ponds the loss of 2 plane trees was not well received. This workshop formed the basis for the issue of the second iteration of the shortlist options. Following feedback the final Shortlist Options report was issued on Friday 6th September 2013.

18. The feedback from the Shortlist Options report is set out in Appendix 2 of this report, together with responses to all who responded.
19. The final Stakeholder Group workshop in the development of the preferred outline options took place on Saturday 14th September 2013. At this meeting the Design Team set out the basis for its two preferred options. It was apparent at that meeting that there were still major concerns about the provision of an additional 3m dam at the Boating Pond. A new “Option P” on the Hampstead chain of ponds was proposed that would result in the loss of only one Plane tree at the Hampstead No. 2 causeway.
20. Further refinement of the modelling of the Probable Maximum Flood on the Highgate chain of ponds enabled Atkins to discount the 3m dam option at the Boating Pond, this information was presented to the Stakeholder Group at its meeting on the 30th September 2013.
21. A log of all questions that have been raised relating to the project, together with responses from Atkins or the City Corporation have been captured and these are included at Appendix 3 of this report.

Preferred Options

22. Atkins Preferred Options Report which is appended to this report (Appendix 1) meets the following key objectives of the project as they:
 - ensure City of London compliance with current and expected reservoir legislation;
 - improve dam safety on all the dams in the chains;
 - preserve as far as possible the Heath’s natural aspect;
 - focus major works at the middle of each chain of ponds (see earlier paragraph 14);
 - introduce a passive system (no reliance on mechanical or human intervention);
 - maintain (or increase) the standard of protection downstream in other flooding scenarios (where there is no dam failure);
 - do not increase the rate of flow discharged from the last dam in any flood event, compared to the flows expected in the existing scenario.
23. In addition to the works set out below all ponds require works to install new spillways. The provisional size of these spillways is indicated on page 10 and page 34 of the Preferred Options Report.

Highgate Chain

	Option 4	Option 6
Stock Pond	Crest Restoration by 0.5m maximum	Crest Restoration by 0.5m maximum
Kenwood Ladies Pond	Crest restoration by 0.2m maximum	Crest restoration by 0.2m maximum
Bird Sanctuary Pond	Crest restoration by 0.1m maximum	Crest restoration by 0.1m maximum
Model Boating Pond	2m	2.5m
Highgate Men's Bathing Pond	1.5m (wall)	1m (wall)
Highgate No. 1 Pond	1.25m (wall)	1.25m (wall)
Standard of Protection	1 in 1000 year	1 in 1000 year

Hampstead Chain

	Option M	Option P
Vale of Health Pond	Crest restoration 0.6m maximum	Crest restoration 0.6m maximum
Viaduct Pond	Crest restoration 0.2m maximum	Crest restoration 0.2m maximum
New Catchpit dam	5.6m high new earth embankment	5.6m high new earth embankment
Mixed Bathing Pond	1m	2m (embankment or wall combination)
Hampstead No. 2	3x3m box culverts	0.5m wall, 1x4.5m box culvert
Hampstead No. 1	1x4.5m box culvert	1x4.5m box culvert
Standard of Protection	1 in 1000 year	1 in 10,000 year
Plane tree loss on Hampstead No. 2	2	1

24. Although not a design objective, as a consequence of the dams being designed to pass the PMF safely, there is an improved standard of flood protection for people living downstream of the ponds where there is no dam failure. In other words, more floodwater from higher return period events would be temporarily stored below the spillway level. Less water would therefore be flowing overland towards Brookfield Mansions from the last pond, and more water would be slowly passed through the overflow pipes into the sewer system after the storm has passed.
25. The Preferred Options Report demonstrates through the suggestions that have now been incorporated in the design options how vital the Ponds Project Stakeholder Group has been in influencing the options that have been developed. It also sets out which suggestions have been discounted.

Feedback on the Preferred Options Report

26. Following the issue of the Preferred Option Report on the 4th October members of the Stakeholder Group were asked to provide their formal views in writing by Sunday 20th October 2013. These responses are all appended to the Preferred Options Report (see Appendix 1). At the Ponds Project Stakeholder Group meeting on the 21st October 2013 each Group was asked to provide its view on the Preferred Options Report. The Note of this meeting is also appended to this report.

27. There were a number of specific issues that were raised at the meeting:

Legal Position – following a meeting between the Heath & Hampstead Society and the City of London, including their respective counsel, it was hoped that a joint statement could be issued setting out the differences of opinion. At the time of drafting this report the release of the joint statement is imminent.

Spillways – serious concerns were expressed that whilst the size and depth of proposed spillways had been set out, their location and impact on the Heath landscape was not at all clear.

Raising of the Mixed Pond - one member was particularly concerned that with the installation of the proposed Catchpit dam no works to Mixed Pond should be required. It was confirmed that the downstream catchment still delivered significant amounts of water into the Mixed Pond. The two metre raising was a trade-off for the reduction in tree loss at Hampstead No. 2 pond.

Early Warning – the view was expressed that with Early Warning systems communities downstream could be given adequate warning of potential flooding risks. The City has previously invested in an “early-warning system” which monitors weather conditions locally and water levels in some ponds.

The Meteorological Office cannot however guarantee to provide the City Corporation with sufficiently robust forecasts to be able to predict a convection storm and thus the City cannot warrant that in a flood event such an early-warning system will mitigate potential loss of life. Post-completion of the works the City will still need an Emergency Plan to deal with potential flooding events.

The City Corporation also has to meet its obligations to satisfy the Panel Engineer that the PMF event can be passed safely without risk of failure of a dam.

Disproportionate Nature of the Works - There are concerns among the stakeholders that the proposals are disproportionate to the scale of the problem; however the City Corporation is following standard industry guidelines to achieve a design solution that can pass the PMF event without risk of dam failure and therefore avoid the need for the supervising engineer to call for a formal statutory inspection.

Volume of PMF versus Introduction of New Pipes – a view was expressed that insufficient consideration had been given to the use of pipes to pass water through the chain of ponds. As an example on the Highgate chain of ponds the volume of water in the PMF event passing over or around the dam

in the current situation is 38 tonnes of water per second. The size of pipes to accommodate this volume of water would need to be enormous.

In January 2012 the Stakeholder Group received a presentation from Thames Water who advised that the flood alleviation scheme installed under the Heath in the 1990's was only designed to accommodate a 1:70 year storm, this is significantly less than the design standards required to "virtually eliminate" the risk of dam failure. If the PMF event were to occur in this part of London then the sewer system would already be operating at capacity with sewers surcharging water.

Treatment of Margins of Ponds – concerns were expressed that the changes proposed at the Boating Pond would deprive users and particularly fishermen of access to the water's edge. It was explained that access around the pond would still be possible. Concern was also raised that the treatment of ponds appeared to be fairly generic and not specific to the respective ponds and that this could ultimately lead to ponds losing their intrinsic characteristics. An example was the introduction of floating islands that many considered inappropriate for the Heath environment.

Need for a Passive System - the use of valves was raised by several stakeholders as a means of potentially lowering water levels, however, placing City Corporation staff into a situation where they may be at risk in terms of operating valves is unacceptable.

Maintaining Access for Users - West Hill Court have identified that maintaining access around ponds, particularly for people with disabilities will be essential. There is also the need to ensure that opportunities for angling on the Heath are retained, particularly at the Model Boating Pond.

Strategic Landscape Architect - the SLA advised that he had prepared a Review of the process undertaken to date, this is also appended to this report (see Appendix 5).

28. Given the disparity of views expressed at the Stakeholder meeting, it seems increasingly unlikely that there will be a consensus reached from the various groups represented on the Stakeholder Group.

Non-Statutory Public Consultation

29. The City Corporation has appointed Resources for Change, a specialist engagement organisation to offer expert and independent advice on the non-statutory consultation process. Resources for Change have previously worked with the City Corporation; they managed the extensive consultation on the Heath's management plan in 2006/7, where over 1000 detailed responses were received on this strategic document.
30. The primary purpose of the public process is to inform the public about what is being done and why and also to give them the opportunity to inform the City of London's choice from the preferred options for the Hampstead and Highgate pond chains. The information giving aspect will need to address:

- Who are the City of London Corporation, what is their remit as a responsible body (managing some 12,000 acres of public open space), with responsibility as landowners for the dams on Hampstead Heath.
 - The legal context about why the project is required, in terms of current and anticipated reservoir legislation and the City Corporation's potential liability in the event of dam failure, and how this relates to the Heath's foundation legislation.
 - The hydrology and design standards that underpin dam safety and the societal risks associated with dam failure.
 - The work the City Corporation has undertaken engaging with the Ponds Project Stakeholder Group over the past 18 months and how this has influenced the design principles and philosophy. It will need to address why a "passive" solution rather than one that involves human or mechanical intervention as a design solution is essential.
 - Early contractor involvement and the need to engage collaboratively with the building contractor to help inform the options development and to seek to minimise impact of traffic movements both within the Heath and for the surrounding residential/business community.
31. Given that all options achieve the underlying design objectives, principles and philosophy, this consultation will be seeking to understand what preference consultees have on the Preferred Options, rather than a full options consultation to influence the design of the scheme, since its detailed aspects are only at an early illustrative stage.
32. There has been significant involvement already with key stakeholders. The purpose of this process, both its information giving and consultation, is therefore to 'reach out' to others who may be affected, with a focus on those with a defined interest in the issues raised by the Ponds Project work. These people are identified as:
- Users of the ponds and immediate surrounds
 - Those living within the vicinity of pond chain areas
 - Users of the Heath
 - Those having a specialist interest in the Heath e.g. birdwatchers
 - Schools and youth groups
 - Heath volunteers
 - Local businesses
 - Off site - those potentially impacted in the situation of a dam breach
 - Those who may potentially (or have reason to think they will) be impacted by the Ponds Project works
 - Wider public (considered beyond scope apart from information sharing)
33. A more detailed summary of the consultation process is appended to this report.

Next Steps

34. At its meeting on the 21 October 2013 the Stakeholders requested more detail on the next steps:
- During the consultation process the design team and Stakeholders will receive information on the views being expressed by people as part of the non-statutory consultation.
 - The appointment of the main contractor will enable further essential site investigations to be undertaken to consider issues such as where “borrow pits” might be located. This will help to inform the options development that will continue to be pursued during the consultation process, given the advice that the City Corporation needs to move towards a design solution and implementation of works “with all deliberate speed”.
 - At the end of the non-statutory consultation there will need to be an evaluation and analysis of the results, together with the information from the building contractor that will inform a decision on the “Preferred Design Solution”.
 - This information will then need to be presented to the Ponds Project Stakeholder Group, your Committee and ultimately the Management Committee during April 2014, who will then need to determine whether these solutions form the basis of a detailed planning application.
 - The City Corporation is looking to submit a detailed Planning Application during early June 2014.
 - There will then be a period of “Statutory Consultation” and another opportunity for the public to express their views on the proposed scheme.

Resources

35. At this stage the estimated overall project costs remain unchanged at £15.12m (+/- 20% at Q4 2010 prices). As part of the production of the options report the Design Team have undertaken a preliminary “overall order of costs of works”. At this stage of the project process the figures are commensurate with the estimated costs previously reported (despite the inclusion of the additional fees incurred resulting from the wider consultation process and the building of an additional dam on the Hampstead chain of ponds). The preliminary overall order of cost figures still, however, require significant refinement and will be influenced by the ground investigation surveys.

Corporate & Strategic Implications

36. The works support the strategic aim 'To provide valued services to London and the nation'. The scheme will improve community facilities, conserve/enhance landscape and biodiversity and contribute to a reduction in water pollution whilst meeting the City Corporation's legal obligations. The risk of any dam breach leading to serious downstream flooding of communities (and consequent exposure to potential claims and reputational damage) is mitigated.

Conclusion

37. Through its engagement with the Ponds Project Stakeholder Group championed by the independent Strategic Landscape Architect, the City Corporation has through an extensive iterative process arrived at the "Preferred Options" of its appointed designers, Atkins. All of these options meet the design objectives, principles and philosophy to pass the PMF event and as far as possible preserve the Heath's natural aspect.
38. The City Corporation is commencing a non-statutory consultation with the wider public to advise them on what is being done and why, and also giving users and other interested parties the opportunity to inform the City of London's decision on the "Preferred Design Solution". Members of the Consultative Committee are asked to provide their views on the consultation methodology.

Appendices

- Appendix 1 – Atkins Preferred Options Report and Feedback on the Preferred Options Report Received from the Ponds Project Stakeholder Group/West Hill Court
- Appendix 2 – Responses to Shortlist Option Report from Ponds Project Stakeholder Group/Others together with Responses.
- Appendix 3 – Log of all Questions and Responses relating to the Ponds Project to date.
- Appendix 4 - Notes of the Ponds Project Stakeholder Group meeting 21st October 2013
- Appendix 5 - Strategic Landscape Architect – Review of the Process to Date
- Appendix 6 – Consultation/Information Giving Methodology

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Hampstead Heath Ponds Project

PREFERRED OPTIONS REPORT
VOLUME 1
25th October 2013



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Volume 2: Comments, Queries and Answers on Shortlist Options Report



1. Summary

Purpose of report

- 1.1** This report details the outcome of the process of the 3rd stage of engagement and options development with stakeholders. The report focuses on the preferred options / combinations for each chain of ponds, and provides an indication of specific pond restoration and water quality works, including possible proposed mitigation and compensation measures for the impact of the engineering works.
- 1.2** The report describes the two preferred options in detail for each of the pond chains, which can be summarised as follows:

Highgate Chain of Ponds:

- **Option 4:** Crest restoration works at Stock Pond and Kenwood Ladies Bathing Pond, 2m raising of the dam at Model Boating Pond, 1.5m and 1.25m raising of dams at Men's Bathing Pond and Highgate No.1 Pond. Spillway works at all ponds.
- **Option 6:** Crest restoration works at Stock Pond and Kenwood Ladies Bathing Pond, 2.5m raising of the dam at Model Boating Pond, 1.0m and 1.25m raising of dams at Men's Bathing Pond and Highgate No.1 Pond. Spillway works at all ponds.

Hampstead Chain of Ponds:

- **Option M:** Crest restoration works at Vale of Health and Viaduct Ponds, build new 5.6m high flood storage dam (with a 300mm outlet pipe) at the Catchpit area, raise the dam at Mixed Bathing Pond 1.0m, install letterbox culvert spillways at Hampstead No.2 Pond and Hampstead No.1 Pond. Spillway works at all ponds.

- **Option P:** Crest restoration works at Vale of Health and Viaduct Ponds, build new 5.6m high flood storage dam (with a 300mm outlet pipe) at the Catchpit area, raise the dam at Mixed Bathing Pond 2.0m, raise the dam at Hampstead No.2 Pond with a 0.5m wall, install letterbox culvert spillways at Hampstead No.2 Pond and Hampstead No.1 Pond. Spillway works at all ponds.

- 1.3** The reader is referred to the following reports on the City of London's Ponds Project website for detail on the design process leading up to this report: Ponds Project home page: <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Pages/default.aspx>
- 1.4** Ponds Project Reports page (click on the bar "Reports from the Project team inc. Shortlist Options Report"): <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Pages/Reports.aspx>
- 1.5** The following page is dedicated to the Shortlist Options Report and provides links to the stakeholder comments: <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Pages/Comments-on-the-Shortlist-Options-Report.aspx>
- 1.6** Comments and queries from engagement with the Ponds Project Stakeholder Group (PPSG) and feedback from the wider public on the Shortlist Options Report have been collated with responses from the design team in Volume 2 of the Preferred Options Report. A Log of Questions and Answers since October 2012 is available on the Ponds Project home page <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Pages/default.aspx>



2. Overview of Decision Making Process and Options Development

2.1 The options development process is summarised in the updated flowchart on [Page 8](#) and shows progress to date including the issue of this report. The process started with the problem definition stage, and has then progressed through three iterations of option development with stakeholders and the wider public to arrive at the preferred options. The option development phase will culminate in a 12 week period of non-statutory public consultation over the winter months where the preferred options for each chain of ponds will be presented at exhibitions to the public.

Brief Summary of Problem Definition

2.2 Atkins is commissioned to develop options that significantly reduce the risk of dam failure while complying with the Hampstead Heath Act 1871 and the Reservoirs Act 1975, and taking into account the requirements of the Flood and Water Management Act 2010. To arrive at the best solution, while mitigating potential impacts, the options need to be carefully considered in the context of the whole chain as a system, as well as identifying the best solution for each chain.

2.3 Atkins completed a fundamental review to assess the largest flood that the dams are required to accommodate – known as the Probable Maximum Flood (PMF) - and to check if the dams are likely to withstand overtopping when passing the flows downstream. Less severe floods have also been used to assess the system response to ensure that the options for passing the PMF do not

exacerbate the flows downstream during lesser floods. The review was carried out using industry standard methods, based on established guidance from the Department for Environment, Food and Rural Affairs (Defra) and the Institution of Civil Engineers (ICE). The Design Flood Assessment Report can be accessed through the Ponds Project Reports webpage, following the link provided in [Section 1](#).

2.4 Atkins’ review shows that flood peaks are generally 30% to 50% lower than those estimated in earlier work by Haycock Associates Ltd, which means there will be less water to manage than originally envisaged. However even at these lower values the dams will overtop in the PMF and breaches are possible, with risk to life and property downstream. The City of London therefore needs to carry out works to make the dams safe and reduce the risk to life and property downstream.

2.5 Industry standard best practice guidelines state that the City of London should ensure the dams can pass the flows associated with the PMF safely; eg without collapse. Moreover, the modelling showed that most of the dams will also be overtopped in very much smaller return period floods, from as low as a 1:5 year return period events.

2.6 This is because the capacities of the existing overflow pipes at each pond are too small, and the storage capacities of each pond, between the overflow level and the dam crest level, are not sufficient to deal with the floods without floodwater flowing over the dam crests onto the downstream faces.

2.7 The condition and level of the dam crests, the uneven downstream faces and the size of trees on most of the downstream slopes of the dams, mean that the volumes and speeds of flow overtopping the dams present a significant risk that overflowing flood water will erode the dam fill material. This erosion would cut down into the dams until they fail and release the water stored behind them. The dams, therefore, need to be made more resilient to being overtopped in flood events to avoid dam failure, or additional spillway capacity needs to be provided, or a combination of these actions.

2.8 To read a short ‘plain English’ summary of the explanation for the need for the project go to: The Ponds Project Reports webpage, following the link provided in [Section 1](#) and look in the Reports sections for the: Design Flood Assessment Summary Rev 4. This report also provides a technical explanation of the need for the project.

Duties of the City of London

2.9 Having established a risk of dam breach the City must comply with the Reservoirs Act 1975 (where this applies to the three large statutory reservoirs on the Heath) and must also take into account the Flood and Water Management Act 2010, which may have an extended remit to include cascades of smaller reservoirs and will be coming into effect in the next few years.

2.10 In carrying out works to reduce the risk of dam failure, the City of London, as the custodian of Hampstead Heath, is obliged to comply with the Hampstead Heath Act 1871 which requires the City to “...at all times preserve, as far as may be, the natural aspect and state of the Heath...”

Key Objectives

2.11 Atkins has developed options that will that will make the dams safe from breach within Highgate and Hampstead chains of ponds, and reduce the risk to life and property downstream, to comply with the Reservoirs Act 1975, whilst also taking into account the emerging requirements of the Flood and Water Management Act 2010.

2.12 The preferred options meet the key objectives of the project:

- They improve dam safety on all the dams in the chains
- They maintain (or increase) the standard of protection downstream
- They do not increase the rate of flow discharged from the last dam in any flood event, compared to the flows expected in the existing scenario
- They preserve the Heath as a natural open space.

Design Principles and Design Philosophy - An Overview

2.13 The project design principles and design philosophy have informed the development of the preferred options. The design principles and design philosophy summarised in the previous options reports have been retained and developed to balance dam safety requirements, with feedback from engagement with stakeholders and the wider public, while having regard to the environmental considerations of each pond and the 'natural aspect and state of the Heath'. These considerations include: retaining existing water level and the distinctive character of the Heath and key views, and minimising the scale of intervention, and impact on visual amenity and the use of the Heath for all users - including swimmers, anglers, walkers and nature enthusiasts.

2.14 Environmental management is an integral part of the project. In addition to improving water quality the project must ensure that following construction work reinstatement the Heath's natural aspect takes place. The collaboration between technical specialists has already ensured that none of the options being considered preclude pond and terrestrial habitat reinstatement and restoration. The use of appropriate and natural materials and minimal intervention will be used to retain the natural aspect of the Heath.

Design Principles

2.15 Design principles that apply to all of the preferred options to enable integration of the dams with the Heath character include:

- Each chain of ponds is considered as a whole system, so that any significant increases in storage capacity are focused in the least sensitive locations, limiting tree loss around ponds and reducing the residual works required elsewhere.
- Each dam must be able to pass the design flood inflow safely, in accordance with Table 1 of 'Floods and Reservoir Safety' (ICE, 1996). Hampstead No.1 Pond, Boating Pond and Highgate Men's Pond must all pass the Probable Maximum Flood or PMF as they are all Category A dams where "a breach could endanger lives in a community downstream". A community is defined in 'Floods and Reservoir Safety' as 10 people or more. Under the Flood and Water Management Act 2010 this has been revised downwards to 1 person.
- Tree loss is to be minimised to retain the character and natural aspect, of the Heath.
- Each option is designed as a passive system to improve the resilience of the dams without reliance on any mechanical system (such as valves or pumps) or human intervention. The passive system of each option has been designed to pass excess flood water at each dam following these principles:

1. A spillway at most ponds that passes as much as possible of the PMF, in order to minimise the volume and speed of water flowing over the dam crest, where overtopping is tolerable (see Table 1 of 'Floods and Reservoir Safety', ICE, 1996.)
2. Where the overtopping of the dam crest is not tolerable, which applies to the majority of the dams in the pond chains (due to the number of trees on the crests and on the downstream slopes), some works to raise or restore the dam crests and creation of natural open spillways are proposed, to pass the PMF in order to minimise risk of dam failure. There is therefore a trade off at each pond between the amount of dam crest raising, and the width and depth of the spillway required to pass the PMF safely.
3. Where overtopping of the dam crest is tolerable (which only applies to the dams at Mixed Bathing and Bird Sanctuary Ponds), and excess flood water up to the PMF still needs to be passed over the dam crest or the downstream slope, reinforcement works to the downstream face may be required to allow flow over part or all of the width of the dam crest.

2.16 The project has to be capable of standing up to external scrutiny, and this is why the design is constrained by these principles, which have a basis in legal requirements and standard dam safety guidelines.

Design Philosophy

2.17 The design philosophy common to all options is influenced by the requirement to comply with the Hampstead Heath Act 1871, feedback from stakeholder engagement described in Chapter 3 and the City’s Vision for the Heath and Hampstead Heath Management Plan.

2.18 The design philosophy includes:

- More storage capacity that has been added in the middle of each chain of ponds for each option to reduce the rate of flow of floodwater to the downstream ponds. The amount of works required to increase the resilience of the dams to overtopping has therefore been reduced in scale. Armouring the whole dam crests (and removing all trees on the dams) would not be required in most cases. Similarly works would only be required to install spillways, therefore preserving the majority of the trees on the dams.
- The current water level has been retained in each pond to protect the visual amenity and character of the Heath. Any proposed new spillway has been set above the typical normal water level of the pond in question, so that it would be normally generally dry and allow so the spillway surface can to be covered in grass. The nature of the grass mix (either plain ‘amenity’ grass, or ‘native wildflower’ grass mix) will depend on the expected speeds of water flows down the spillway in each case.

- ‘Naturalised’ spillways have been proposed in the optimum locations around the ends of dams, where possible, to minimise tree loss and visual impact. In addition to grass seeding on spillways, other environmental mitigation measures have been identified to integrate the works, and retain the distinctive character of the Heath and key views, include planting on the upstream face of the dams and marginal planting eg reedbeds on the pond perimeter
- The option design development has been constrained and informed by the existing environmental considerations and an overriding aim identified for each pond to reflect the unique landscape character of the pond. These distinct characteristics will inform the landscape design strategy to include earthmodelling and planting to integrate and soften the appearance of the dams, a planting list and materials palette that considers the type and finish of materials eg the potential type, colour design etc of potential cladding.
- The ponds and pond margins provide diversity in aquatic and terrestrial habitat. These habitats need protection and monitoring to minimise the risk of habitat loss/damage and the risk of harm/disturbance to animals including the spread of invasive species. Where any potential detriment to these habitats is identified this requires mitigation and reestablishment to achieve a balanced ecology around the ponds. Environmental mitigation* and compensation** measures have been considered collectively across the chains

and are proposed as an integrated part of the options, including consideration of the engineering works (ie the permanent works) and the temporary construction impacts on the ponds. All pond restoration will be integrated with the existing form and function of each individual pond, and the approach to improve water quality.

Four approaches have been proposed to restore the ponds:

- Softening the edges and banks in their current locations
- Softening the edges and banks by creating new margin in the pond
- Softening the edges and bank by excavating new margin set back from the pond
- Restoring by adding new islands or internal margins.

*Environmental mitigation measures that provide the environmental restoration local to construction, for example, replacement of lost waterside margin.

**Environmental compensation measures that are remote of the works and may include sediment removal, creation of new islands or removing non-native species for example.

- In addition to the pond restoration measures, further feasible water quality improvements have been identified for each pond to help comply with the Water Framework and Bathing Water Directives. These include:
 - The removal or consolidation of sediment within an island or pond margin or possibly used to provide material for any dam works.

- The provision of reedbeds at the upstream end of each pond to trap sediment and stop it moving down the pond chain.
- Selective pruning back of overhanging trees to reduce seasonal leaf litter.
- Aeration of the ponds to improve dissolved oxygen content
- Precipitation of phosphorous from the water column (a standard water treatment process) or locking of phosphorous in the sediment
- Biological management – by removing the larger and bottom feeding fish (e.g. Carp), so preventing the stirring up of sediments (and hence phosphorus release) and the subsequent impact on water quality.
- Floating islands within non-statutory ponds to reduce nutrient levels through plant uptake, and provide new habitat, amenity value, fish refuge, and shading of the water column to address algal issues.

3. Engagement with stakeholders

3.1 The engagement process is shown in the following updated flowchart and is now into the 3rd Iteration Stage. The engagement with the Ponds Project Stakeholder Group (PPSG) has been a continual process throughout the spring and summer of this year, and so far has included these activities:

- Comments on the Design Review Method Statement and the Assessment of Design Flood Report,
- The Critical Review, where the Strategic Landscape Architect asked the stakeholders about their concerns and preferences, then captured these into a document given to the City of London and Atkins,
- Constrained Options workshop, 18th May 2013 – where the concepts (eg of adding extra storage capacity) and typical engineering solutions were discussed,
- Site walks, including one on 17th June 2013 that specifically looked at the possible scale of embankment works at the Catchpit area and Model Boating Pond,
- Shortlist Options workshop, 13th July 2013 – where the shortlist of engineering options was presented along with the environmental engineering options to provide mitigation and compensation by focusing on pond restoration and water quality,

- Regular attendance by City of London and Atkins engineers and technical specialists at PPSG evening meetings, to answer technical queries and address concerns raised,
- Preferred Options workshop, 14th September – focussing on three engineering options for each pond chain and the pond-specific options for pond restoration and water quality works,
- Individual meetings with specific groups eg Elaine Grove and Oak Village Residents' Association, Highgate Men's Pond Association, Brookfield Mansions Residents' Association and the Heath & Hampstead Society,
- Open technical meetings for PPSG members,
- Engagement with Heath staff, such as ecologists and tree specialists,
- Stakeholder involvement in the competitive dialogue process (where tendering constructors proposals were discussed), including involvement in the selection of the form of contract to be used.

3.2 After the first two workshops, an options report was issued to stakeholders, who provided comments. These were taken into account, where possible, at the next stage of developing and modelling the options. The comments and responses to queries on the Shortlist Options Report are collated in Volume 2 of the Preferred Option Report. All other queries received since October 2013 are collated in a Log

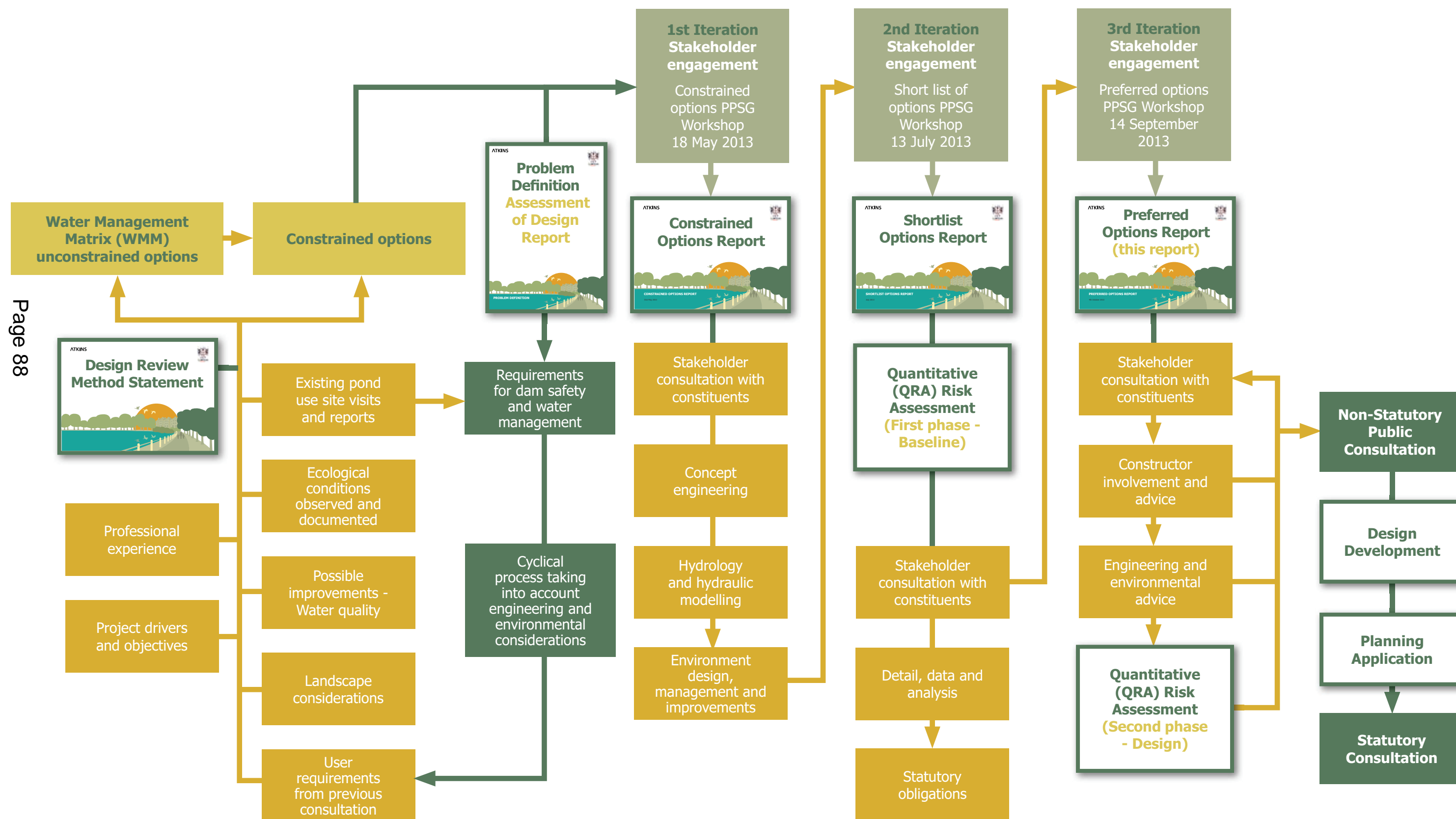
of Questions and Answers that is available on the Ponds Project home page <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Pages/default.aspx>

3.3 One of the aims of the Preferred Options workshop was to address stakeholders' concerns raised in the comments on the Shortlist Options report. This workshop proposed two new options, one of these is described in detail in this report.

3.4 As well as stakeholder comments and queries, some proposals and suggestions have been put forward by the PPSG. These have been considered carefully by the design team. While some proposals have been assessed as not feasible in terms of meeting the key objectives of the project, others have been taken on board. These proposals are discussed later in this report.



Overview of options development process



4. Incorporation of suggestions from stakeholders

4.1 A number of suggestions from stakeholders have been considered as feasible and have influenced the development of the preferred options. Suggestions have either been incorporated into the options development and modelled, or can be modelled in the forthcoming outline design stage.

4.2 Providing extra storage capacity by building a flood storage dam at the Catchpit area in order to minimise works at most sensitive pond

This has become a key element of the options for the Hampstead chain of ponds, and has been modelled extensively. The flood storage dam would create around 12,000m³ of additional flood storage capacity, which significantly reduces the extent, scale, and impact of works to downstream ponds.

4.3 Keeping the Kenwood Ladies Bathing Pond changing rooms in the centre of the dam

This has been incorporated into the options design due to queries about the impact of moving the building to the east bank in terms of lifeguard visibility.

4.4 Desilting ponds at the same time as the dam safety works

It was suggested that works to remove silt from the ponds could be carried out while there are construction plant on site to carry out the dam safety works. As well as achieving efficiencies and reducing the overall impact of two separate sets of works, this creates possibilities such as the potential for moving the silt into the borrowpits created to provide fill for raising

dams. Certain ponds are prioritised for these desilting works, such as Viaduct Pond, Stock Pond, and Bathing Ponds.

4.5 Retaining the group of trees on the west bank of Model Boating Pond and turning the area into a peninsula

This idea has been incorporated in the design (see visualisations in the preferred options section) and the assessment of the amount of fill that can be excavated from the west bank will take the peninsula into account.

4.6 Traffic management ideas

Suggestions such as avoiding movement between pond chains (in order to minimise the impact of construction traffic) have been incorporated into the constructor's brief

4.7 Modelling of options to reduce loss of plane trees at Hampstead No.2 Pond

At the constrained options workshop, there was a general consensus that the line of plane trees on and near the dam at Hampstead No.2 Pond was a key feature on the Hampstead chain of ponds. Consequently, the plane trees became a focal point for all options modelled on this chain, with the number of plane trees affected becoming a key criterion in options comparison.

4.8 Borrowpit locations

Heath staff and stakeholders have provided suggestions for the location of borrowpits for fill to raise embankments.

This has informed the planning of ground investigations, which are critical to the progress of the detailed design of preferred options. Subject to the results this will also significantly benefit the impact on traffic movements to and from the Heath in the neighbouring communities and within the Heath.

4.9 Adding an extra overflow pipe to Model Boating Pond, in order to reduce the spillway width

This is desirable since the existing overflow pipe is only 310mm in diameter. A new larger pipe, set just above normal water level, could be relatively efficient at discharging a portion of the floodwaters and could lead to a reduction in the spillway width, provided that it does not reduce the standard of protection at the downstream end of the ponds. This is a refinement that could be modelled during the outline design phase.

4.10 Widening the proposed reinforced spillway at Mixed Bathing Pond to reduce the dam raising

The causeway at Mixed Bathing Pond is one of the few dams where this kind of approach is feasible, since the downstream slope is a uniform grassy slope and is mostly clear of trees.

An increased spillway width, with a lower dam crest level, could be modelled to test whether there is a compromise between the 1m and 2m raising. For example, in the current options where the crest is raised by 2m, the proposed spillway is

1.7m above the existing crest level. A variation on this could have a spillway increased from 17m to 40m (almost the whole clear length between the tree canopies at either end), with the spillway crest at 1.5m up from the existing crest level, and with the crest raised to 1.8m at each end of dam.

4.11 Relocating the overflow pipe between Bird Sanctuary Pond and Model Boating

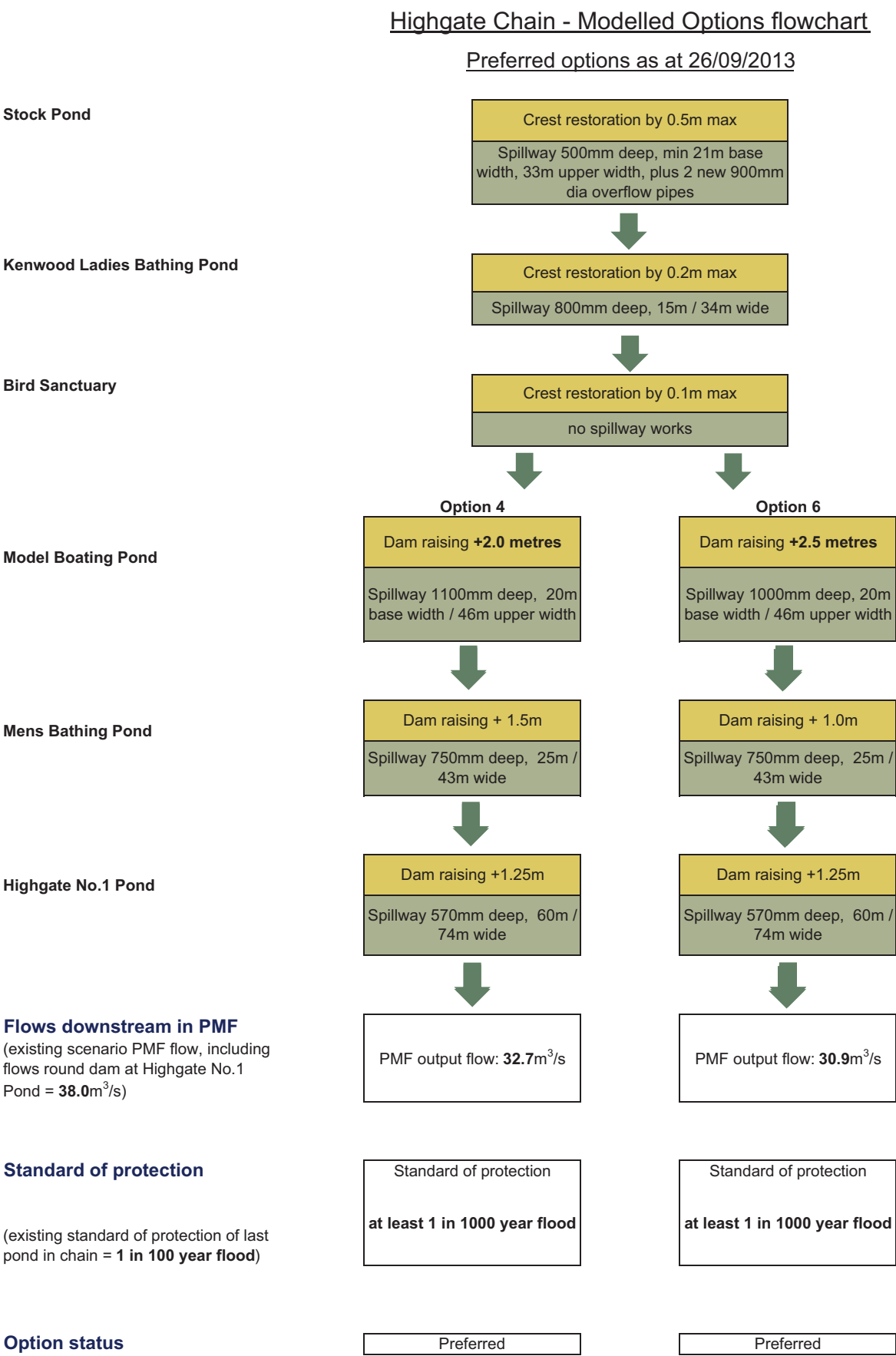
This would have aesthetic benefits because it would allow removal of the existing concrete slab where the overflow pipe discharges into Model Boating Pond. This pipe could be relocated to the west end of the Bird Sanctuary Pond dam, while retaining or refurbishing the other existing pipe at the east end. Details of works on these pipes could be included in the plans when these are developed during the outline design phase.

5. Preferred Options - Highgate Chain

Options selection process: Highgate chain

- 5.1** The two preferred options for this chain of ponds are currently as follows:
- Option 4:** Crest Restoration works at Stock Pond and Kenwood Ladies Bathing Pond, 2m raising of the dam at Model Boating Pond, 1.5m and 1.25m raising of dams at Men’s Bathing Pond and Highgate No.1 Pond. Spillway works at all ponds.
 - Option 6:** Crest restoration works at Stock Pond and Ladies Bathing Pond, 2.5m raising of the dam at Model Boating Pond, 1.0m and 1.25m raising of dams at Men’s Bathing Pond and Highgate No.1 Pond.

- 5.2** These two options are shown in a schematic form on the revised options flowchart. As requested by stakeholders, the provisional depths and widths of spillways are now included on the flowchart, along with information on the standard of protection provided. This information comes from running a range of different size floods through the hydraulic model to find out, which return period flood is the largest one to be contained below the proposed spillway level of the last pond (Highgate No.1 Pond).
- 5.3** Although not a design objective, as a consequence of the dams being designed to pass the PMF safely, there is an improved standard of protection for people living downstream of the ponds. In other words, more floodwater from higher return period events would be temporarily stored below the spillway level. Less water would therefore be flowing overland towards Brookfield Mansions from the last pond, and more water would be slowly passed through the overflow pipes into the sewer system. It should be noted that the figure for the flow being discharged from the last pond in the PMF event in the existing scenario now includes some flow that the model shows to be flowing round the low spot in the natural ground at the south west side of the dam at Highgate No.1 Pond. This element of flow has been included in the total flow downstream, to allow a fair comparison of the options with the existing scenario, since the output flow from the proposed options is all through the proposed spillways which replace the flow round the sides.



Details of Preferred Options - Highgate

5.4 The details of the two preferred options are summarised for each pond below, followed by visualisations, sections and plans showing the environmental mitigation and compensation measures proposed for pond restoration and water quality.

Option 4 works description

Stock Pond

5.5 Proposed works involve:

- Crest restoration of the eastern part of the dam by up to 500mm.
- An open channel spillway, 21m wide at its base, which is set above top water level (TWL) in order for the spillway.

To remain typically dry, so that the reinforcement to prevent the spillway eroding during rare high flows can be lined with topsoil and grass. The spillway would be located around the western end of the dam, where the tree coverage thins out towards the open field, in order to minimise tree loss. The spillway would be 500mm deep and would have side slopes at 1:12 to maintain access along the reinstated road for vehicles and wheelchair users.

- Two new 900mm diameter overflow pipes set at the TWL at the same level as the existing overflow pipe. These would follow the open channel spillway route closely and then discharge into the next pond.

Refer to [Page 12](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 12 – View to north east along dam from south west of Stock Pond - Existing



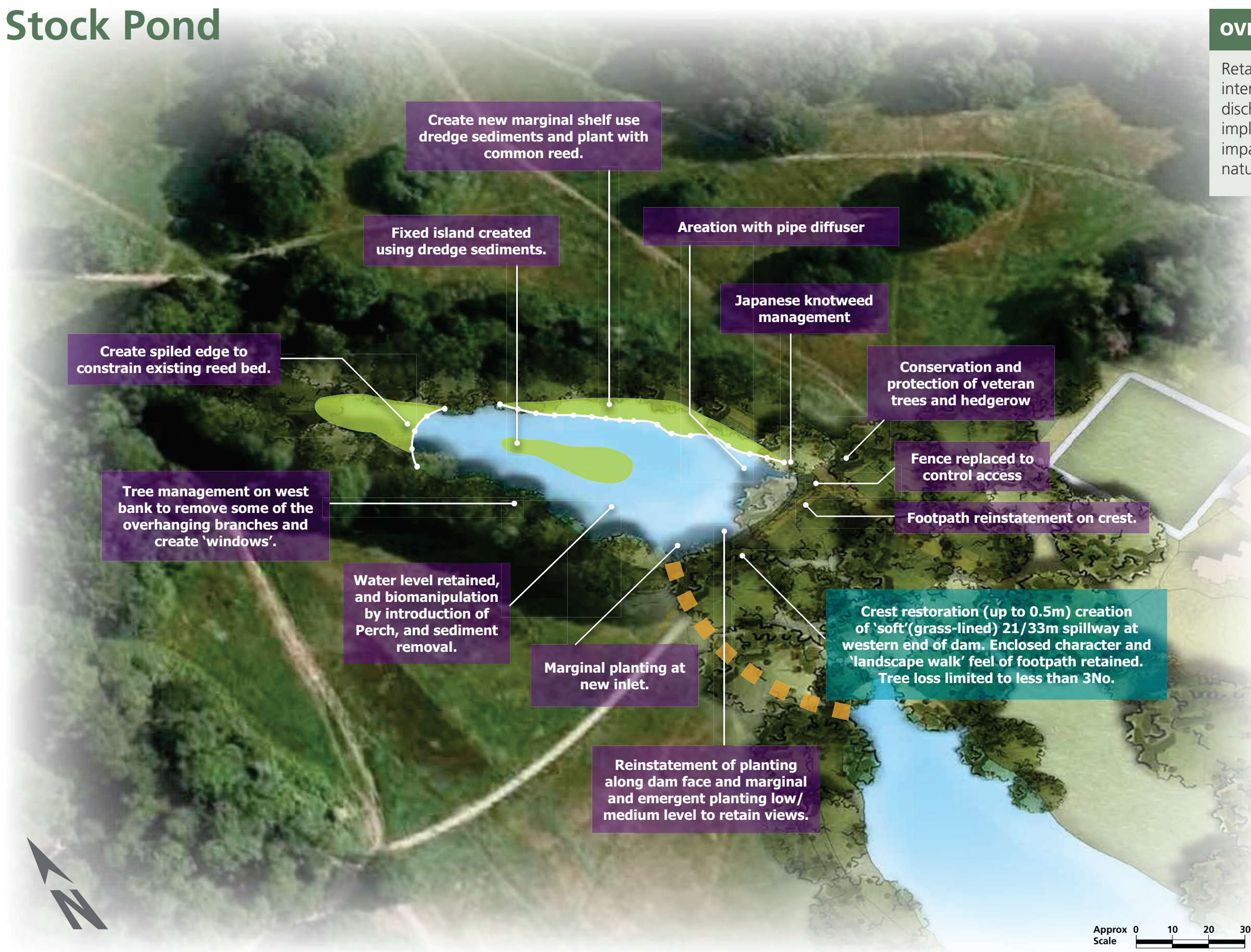
View Point 12 – View to north east of spillway along dam from south west of Stock Pond

Stock Pond

OVERRIDING AIM

Retain water level, limited intervention to improve discharge capacity with sensitive implementation to minimise visual impact and to retain the wild and natural character of the Heath.

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Kenwood Ladies Bathing Pond

5.6 Proposed works involve:

- Crest restoration works to bring up the eastern half of the dam by up to 230mm.
- An open channel spillway to be installed around the western end of the dam, subject to further surveys/ investigation and design development. This spillway would be 800mm deep and if required could have side slopes of 1: 12 to maintain disabled access from the south west side used by some swimmers. The exact location of the spillway would be decided on by assessing the potential for tree loss on the downstream slope of the dam. (This will be confirmed when the latest topographical survey is received as it can then be combined with the information from the tree survey.) After the spillway passes the bottom of the downstream slope of the dam, it would change into a shallow natural channel with topsoil-lined reinforcement matting as it runs down to Bird Sanctuary Pond. No tree clearance would be therefore needed beyond the dam slope.
- Replacing the changing room / building with a similar structure in a similar location, but with a raised floor slab so that the underside of the slab is 300mm above the new level of the crest. Architects will look at options for ensuring that the access to the building from the east side (the Millfield Lane side) complies with current regulations.
- Potential to reduce the width of the open channel spillway by replacing the existing overflow pipe with a larger pipe or pipes which could pass flows to one or more legs of Bird Sanctuary Pond.

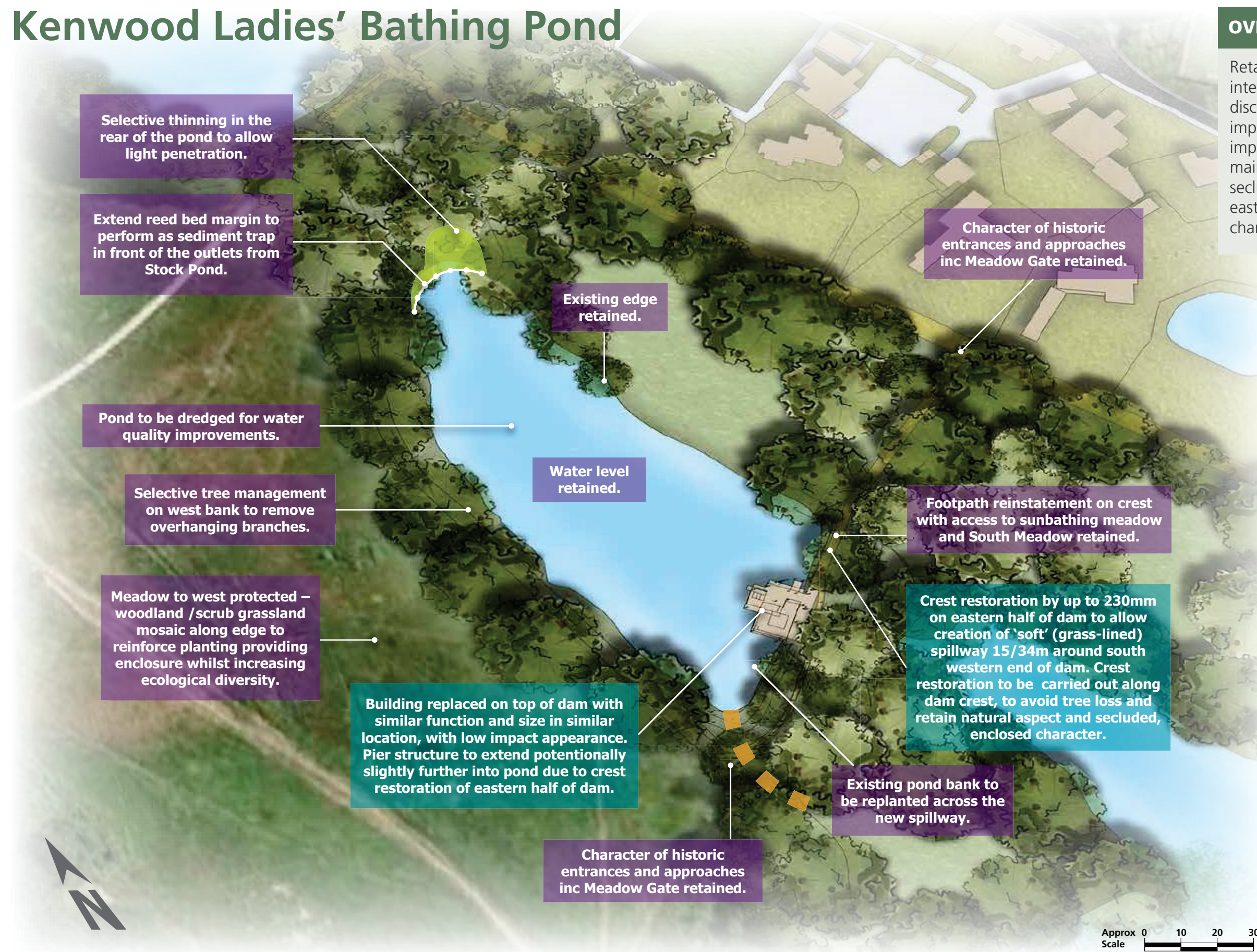
Refer to [Page 14](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Kenwood Ladies' Bathing Pond

OVERRIDING AIM

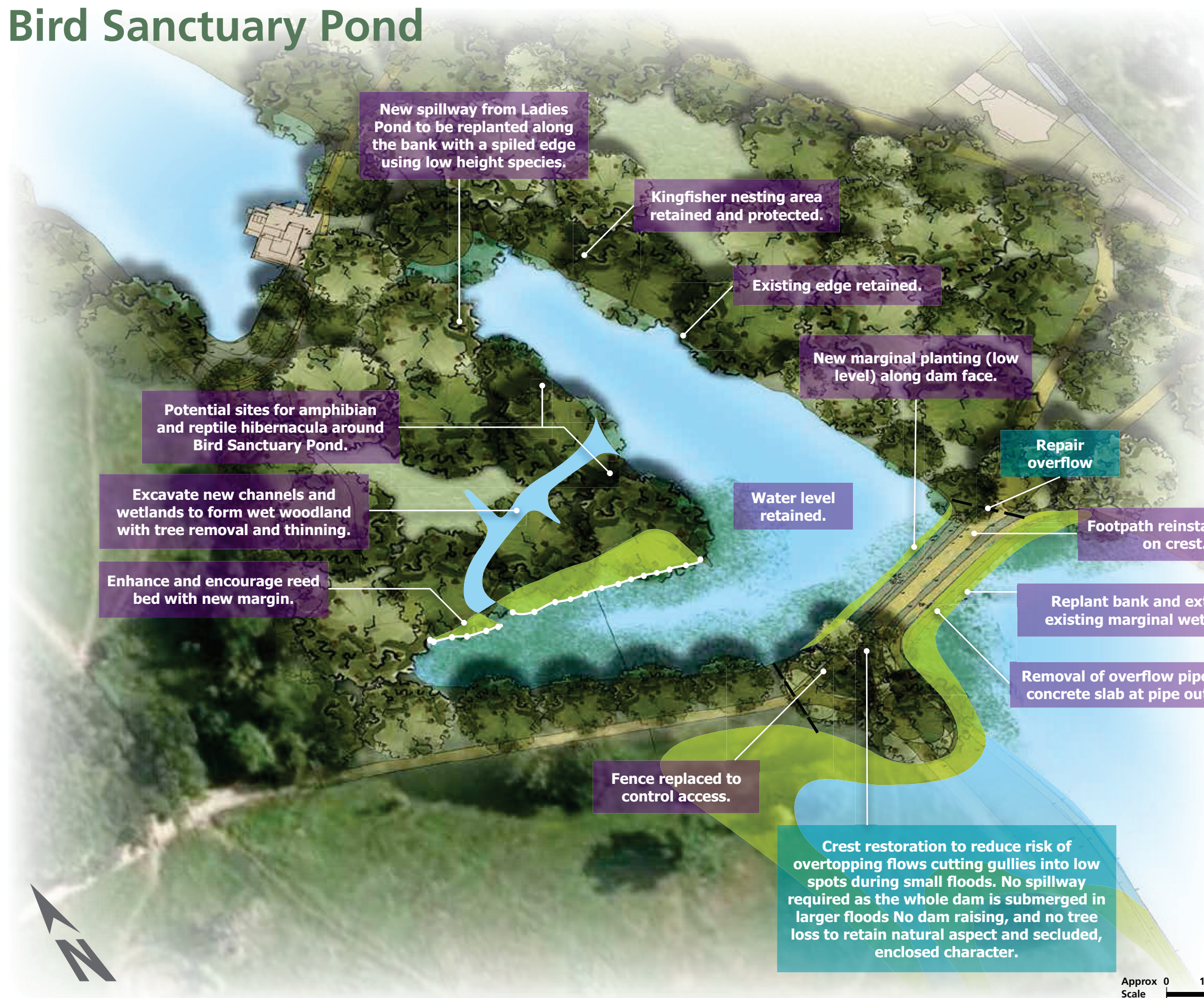
Retain water level, minimise intervention to improve discharge capacity with sensitive implementation to minimise visual impact and effects on users, and maintain the spirit of place and seclusion, key views to the south east, and retain the wild and natural character of the Heath.

Page 94



- Environmental engineering.
- Indicative environmental mitigation and compensation including: Pond edge restoration, water quality improvement and ecological management.
- Indicative centreline of possible spillway location.

Bird Sanctuary Pond



Bird Sanctuary Pond

5.7 Proposed works are limited to:

- Crest restoration of the low spots in the causeway road by filling with material around 80 - 100mm deep. (No retaining wall required).
- Potential for some minor works to replace the overflow pipe between Bird Sanctuary Pond and Model Boating Pond.

See left for environmental mitigation and compensation measures proposed for pond restoration and water quality

OVERRIDING AIM

Retain water level, minimise intervention to improve discharge capacity with sensitive implementation to minimise impact on wildlife habitats and visual amenity, and retain the wild and natural character of the Heath.

- Environmental engineering.
- Indicative environmental mitigation and compensation including: Pond edge restoration, water quality improvement and ecological management.
- Indicative possible location of replacement overflow pipes
- Spiling

Model Boating Pond

- 5.8 Proposed works vary at this point. In Option 4 the works involve:
- Raising of the existing dam by 2m by constructing an earth embankment on the upstream face of the existing dam against the sheet piles.
 - A spillway on the raised section of bank that would be 20m wide at the base, and 1.1m deep (i.e. below the raised upper crest level). After the downstream toe of the new bank, the spillway would change to become

- shallower and widen out towards the west abutment. A low training bund running down the downstream slope of the existing dam would guide the flow towards the natural ground to the west, in order to minimise lining works.
- Excavating the natural ground slope above the west side of the pond, widening the surface area of the water and removing the sheet piles on that side to create a softened edge. This excavation is intended to provide material for the dam and so can be shaped in such as way as to avoid

trees, e.g. by leaving an island around the group of lime trees half way along the west bank. The upper slope of the west bank would be cut from the existing slope of around 1:10 to 1:8.

Refer to [Page 21](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 13 – View south west / west across Model Boating Pond from sunbathing bank in east
Existing



View Point 13 – View south west / west across Model Boating Pond from sunbathing bank in east of enlarged pond area and wetland - 2m Raising (option 4)



View Point 6 – Across Model Boating Pond looking South
Existing



View Point 6 – Across Model Boating Pond looking South
2m raising without landscaping of dam (option 4)



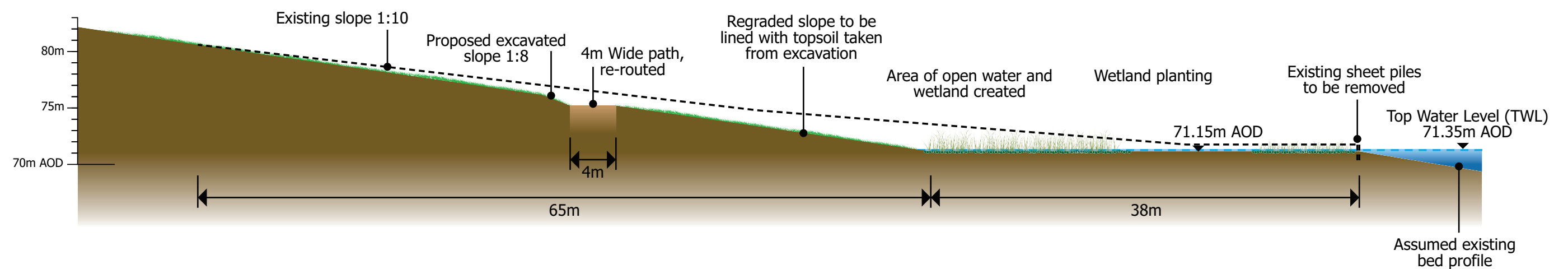
View Point 8 - View across Model Boating Pond looking East
Existing



View Point 8 - View across Model Boating Pond looking East
2m bund and wetland showing indicative landscaping (option 4)

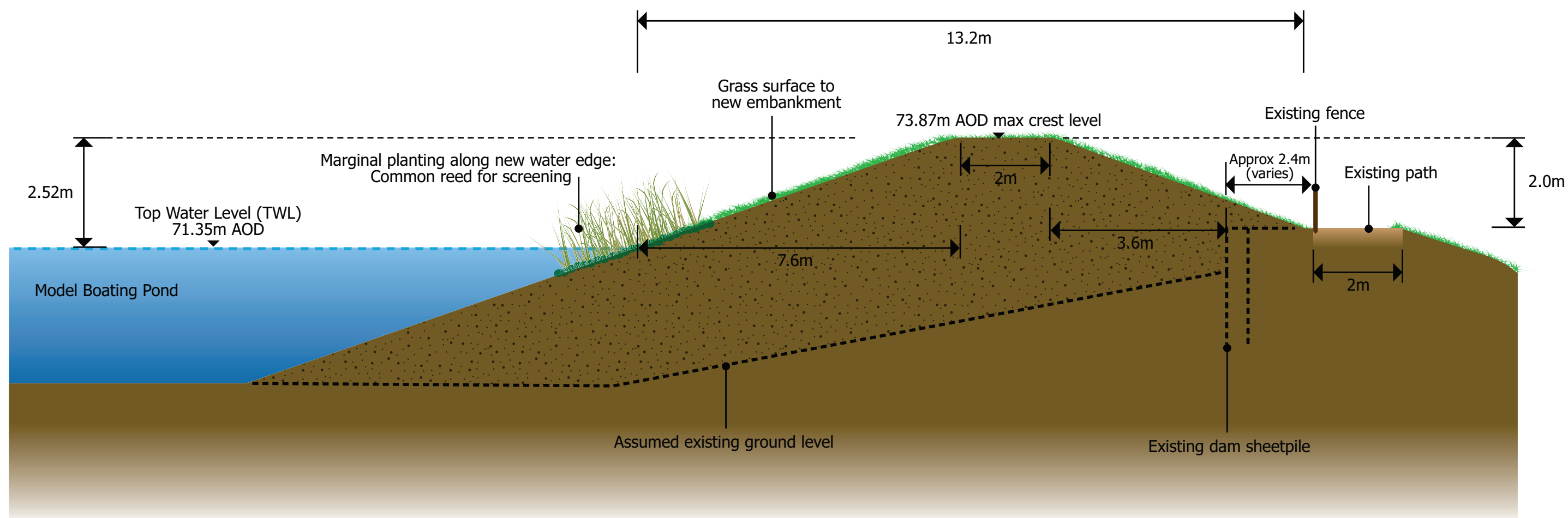
Cross section of widening / excavation at west bank of Model Boating Pond

Page 99



Model Boating Pond Option 4 - 2.0m raising

Page 100

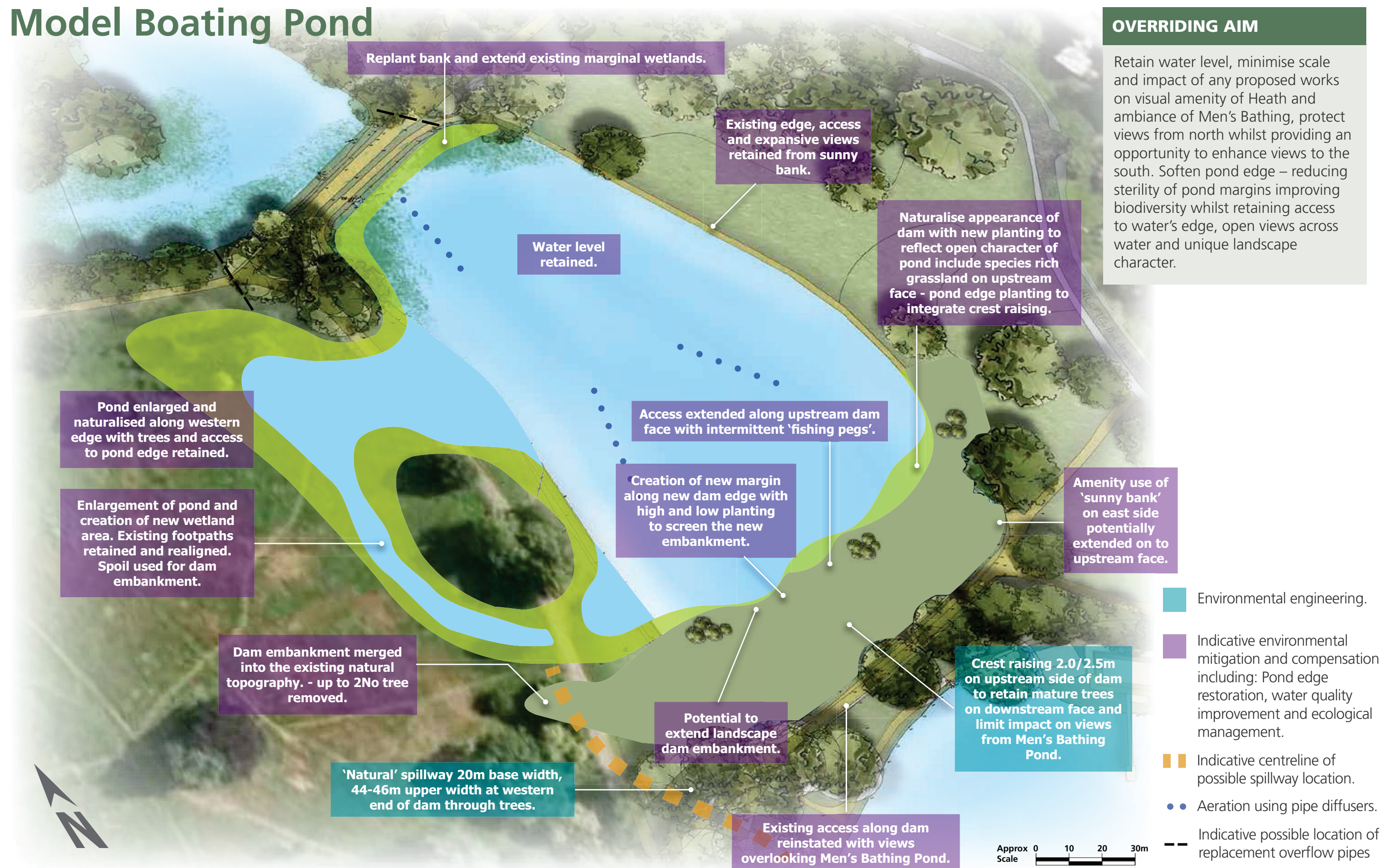


Model Boating Pond

OVERRIDING AIM

Retain water level, minimise scale and impact of any proposed works on visual amenity of Heath and ambiance of Men's Bathing, protect views from north whilst providing an opportunity to enhance views to the south. Soften pond edge – reducing sterility of pond margins improving biodiversity whilst retaining access to water's edge, open views across water and unique landscape character.

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Mens Bathing Pond

5.9 In Option 4 the works here involve:

- Remedial works to prevent leakage through the dam and settlement of the dam material. The nature of these works will be confirmed following ground investigation which will enable analysis of the stability of the dam during flood events.
- Raising of the dam crest level with a wall 1.5m high on the dam crest, along the line of the existing fence. This wall would have a reinforced concrete core with cladding such as timber, colour and material to be agreed. The upstream sheet piles would not be affected but could be screened with planting.

- A reinforced grass spillway, with a base 750mm below the top of the new wall. The location of the spillway would be subject to further surveys / investigations and design development. The spillway could either be on the gap between bushes on the downstream slope, or round the west end of the dam, which would require cutting and filling around the natural ground in that area and some tree loss (exact numbers to be confirmed once the latest topographical survey results are combined with the tree survey information).

Refer to [Page 24](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality



View Point 9 - View across Mens Bathing Pond looking South
Existing



View Point 9 - View across Mens Bathing Pond looking South , showing one possible location of spillway
1.5m wall (Option 4)

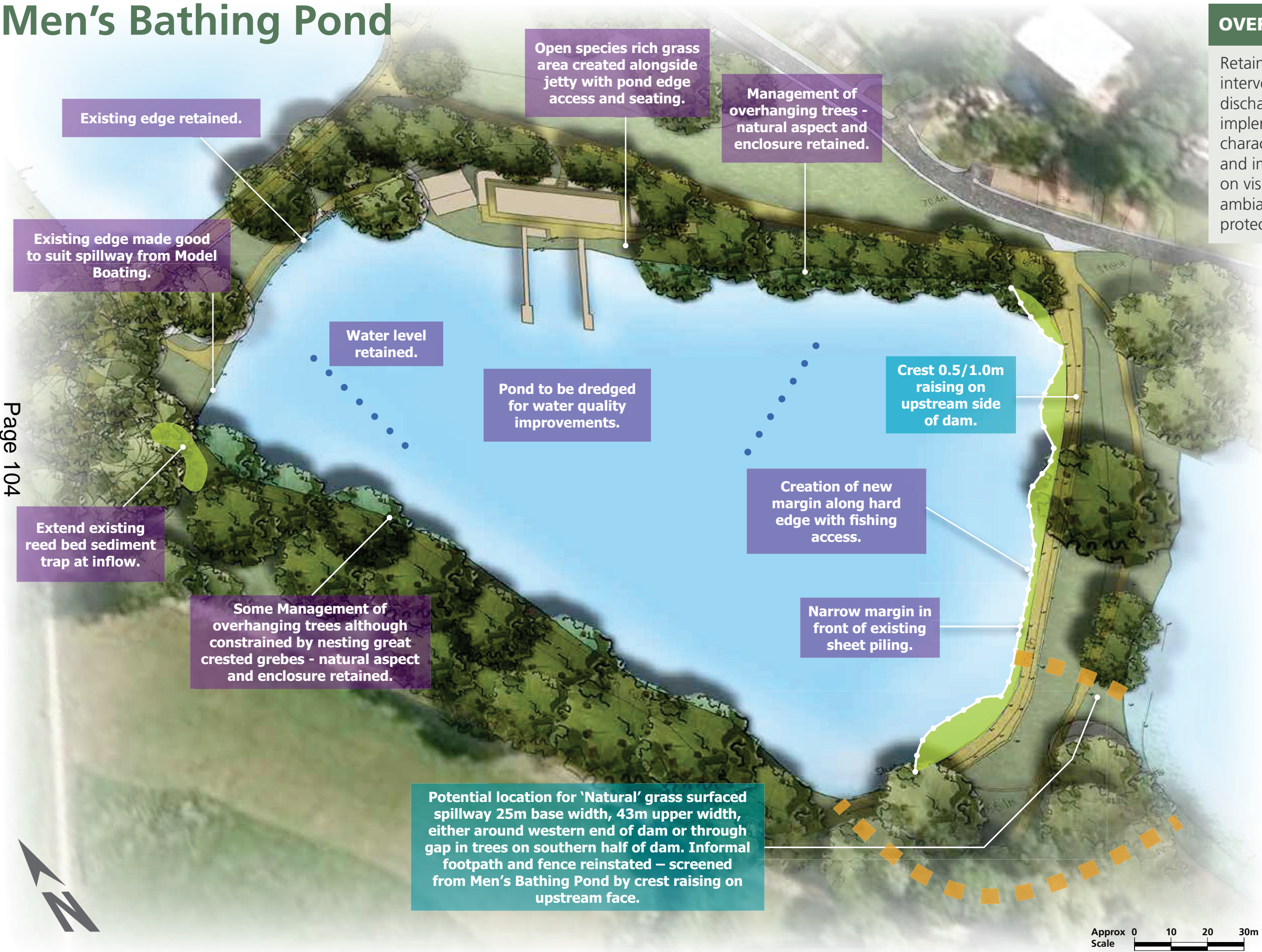


View Point 14 – Across Highgate No. 1 Pond looking North
Existing



View Point 14 – Across Highgate No. 1 Pond looking North, showing one possible location of spillway
1.5m wall (Option 4)

Men's Bathing Pond



OVERRIDING AIM

Retain water level, minimum intervention to improve discharge capacity with sensitive implementation to retain the natural character and minimise the scale and impact of any proposed works, on visual amenity of the Heath and ambiance of Men's Bathing Pond, protect views from north.

- Environmental engineering.
- Indicative environmental mitigation and compensation including: Pond edge restoration, water quality improvement and ecological management.
- Indicative centreline of possible alternative spillway locations.
- Aeration using pipe diffusers.

Highgate No.1 Pond

5.10 In Option 4 the works here involve:

- Raising of the dam crest level by 1.25m with a short wall on the crest. This wall would have a reinforced concrete core with cladding eg timber, colour and material to be agreed.
- A 60m wide spillway, partly on the western end of the dam and partly along the natural ground to the west of the dam. This spillway would start at the wooden fence that runs up

the downstream slope and encloses a group of trees to be retained. It would be 570mm deep (relative to the top of the wall) which would mean some fill would be required downstream of the lower section of the wall. The works to line this spillway and create a level base for it would require the loss of a small number of trees on the downstream slope of the dam only, as the western half of the spillway would be routed to avoid losses to the trees on the natural ground such as the veteran oak. Tree loss numbers will be confirmed once

the latest topographical survey results are combined with the tree survey information.

Refer to [Page 27](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 10 – Across Highgate No. 1 Pond looking South
Existing



View Point 10 – Across Highgate No. 1 Pond looking South
1.25m wall (option 4)



View North on down stream slope of dam at Highgate No.1 Pond
Existing



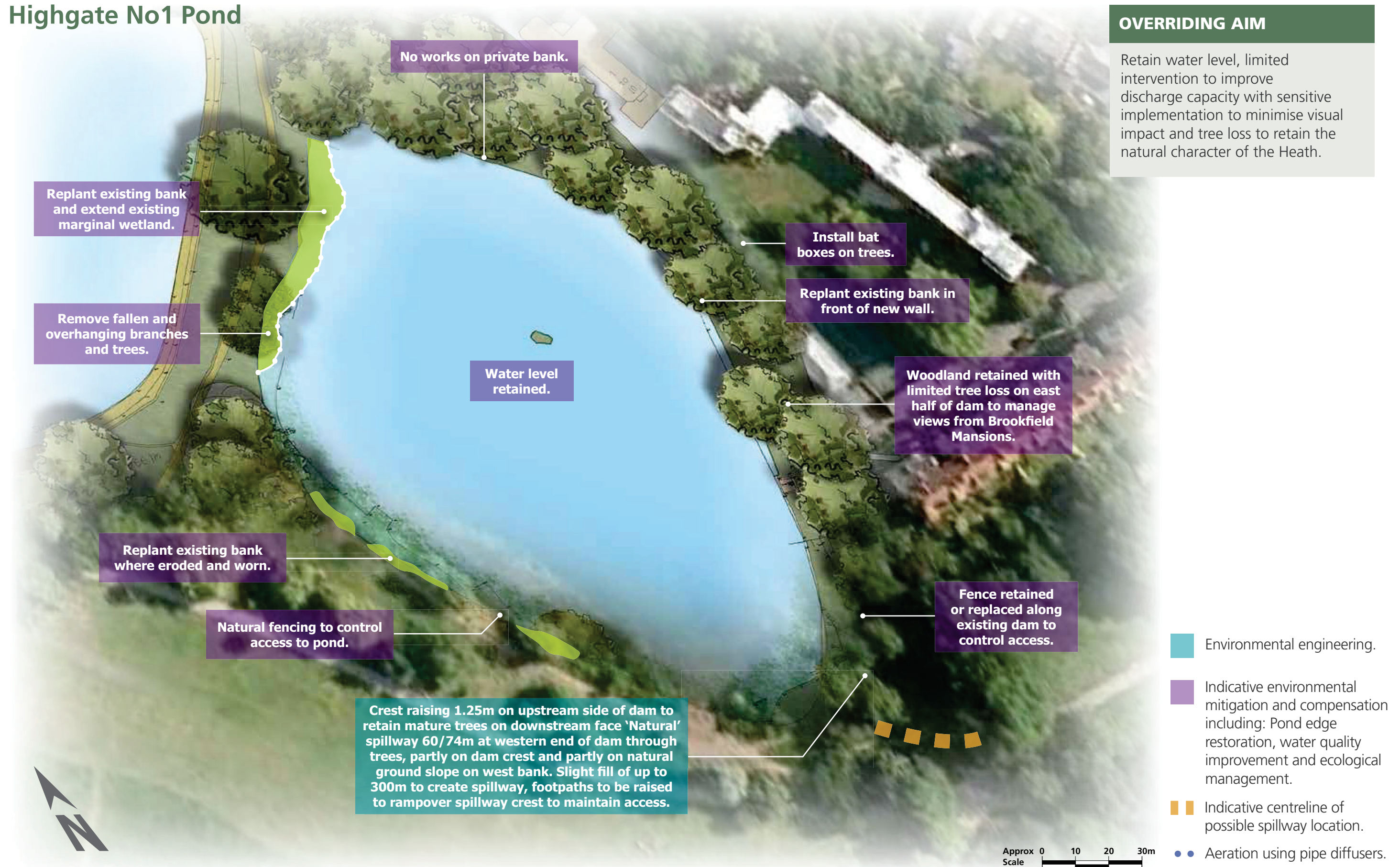
View North on down stream slope of dam at Highgate No.1 Pond
Option 4 + 6

Highgate No1 Pond

OVERRIDING AIM

Retain water level, limited intervention to improve discharge capacity with sensitive implementation to minimise visual impact and tree loss to retain the natural character of the Heath.

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Option 6

works description

Stock Pond, Ladies Bathing Pond and Bird Sanctuary Pond:

5.11 All works as described above for Option 4 – refer to paragraphs 5.5 – 5.7.

Refer to [Pages 12, 14 and 15](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Model Boating Pond

5.12 As described above for Option 4 – refer to paragraph 5.8 except for:

- The raising of the existing dam by 2.5m by constructing an earth embankment on the upstream face of the existing dam.
- The spillway location would be the same, but it would be 1.0m deep below the raised bank crest, so while the lower base width would be the same at 25m, the upper width would be slightly less at 44m.

Refer to [Page 21](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 6 – Model Boating Pond

Existing



View Point 6 – Model Boating Pond

2.5m Raising without landscaping on dam (option 6)



View Point 13 – View south west / west across Model Boating Pond from sunbathing bank in east
Existing



View Point 13 – View south west / west across Model Boating Pond from sunbathing bank in east of enlarged
pond area and wetland - 2.5m Raising (option 6)



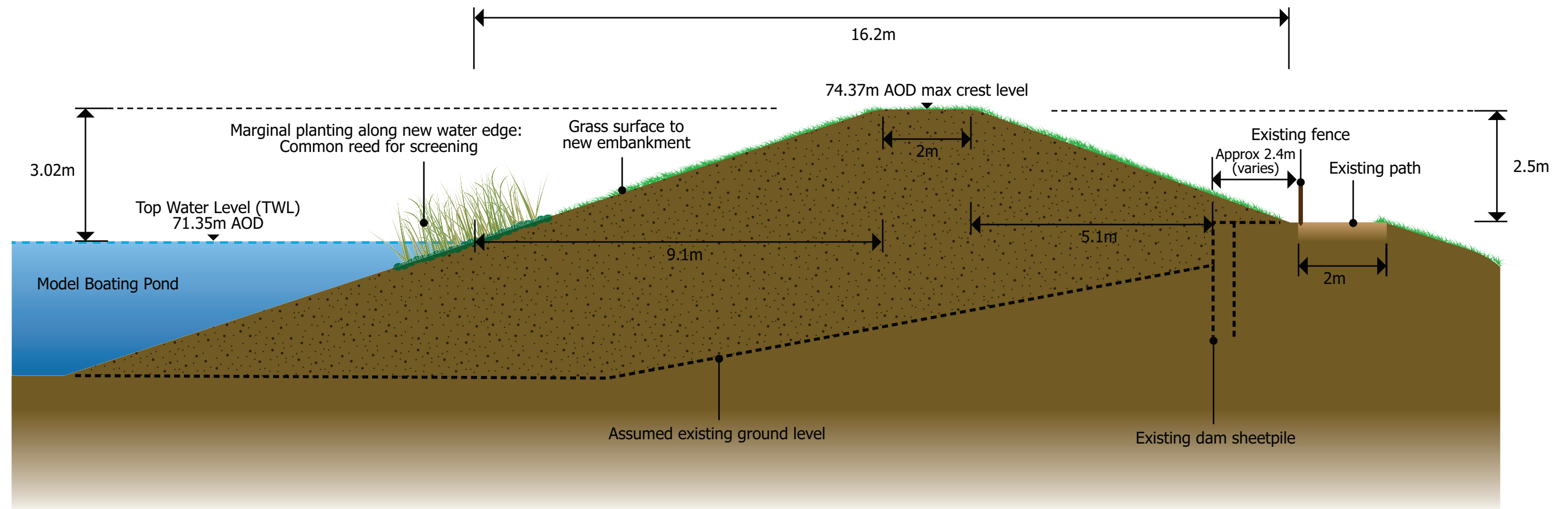
View Point 8 - View across Model Boating Pond looking East
Existing



View Point 8 - View across Model Boating Pond looking East
2.5m bund and wetland with indicative landscaping (option 6)

Model Boating Pond Option 6 - 2.5m raising

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Men's Bathing Pond

5.13 As described above for Option 4 – refer to paragraph 5.9 except for:

- The raising of the existing dam by building a wall 1.0m above dam crest level.
- Spillway to be the same width and depth relative to the raising wall top level, but location to be confirmed, for reasons explained above for Option 4 in paragraph 5.9.

Refer to [Page 24](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



Highgate No.1 Pond

5.14 As described above for Option 4 – refer to paragraph 5.10. Refer to [Page 27](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Comparison of Options 4 and 6

5.15 Both options achieve a higher standard of protection for people living downstream, with the return period for operation of the spillway being in the range of 1 in 1,000 years to 1 in 10,000 years. (The existing standard of protection, beyond which the dam at Highgate No.1 pond is overtopped, is 1 in 100 years).

5.16 Both options bring the discharge from the last ponds during a PMF to below the flow rates expected in the existing scenario. In the existing scenario, if flow round the low spot to the southwest of the dam is included, the total flow heading downstream is 38m³/s. In Option 4, the peak flow over the spillway is modelled at 32.7m³/s and the peak flow in Option 6 is 30.9m³/s.

5.17 Option 4 has less impact on the views towards and from the dam at Model Boating Pond since the raising embankment is 0.5m less. The lower height would mean that there would be less encroachment into the pond as the new dam would be 3m narrower above water level. However, the views across Men's Bathing Pond have a greater impact in Option 4 since the 1.5m high

wall is higher than the existing fence. The fence has panels 1.1 – 1.2m high with posts around 1.4m high), whereas the raising wall in Option 6 is 1.0m high. Therefore, the trade-offs between the two options on the Highgate chain relate to whether there is more visual impact at Model Boating Pond or at Men's Bathing Pond.

5.18 Out of the two preferred options, Option 6 (with 2.5m raising at Model Boating Pond) produces the lowest output flow in a PMF flood and therefore does the most to reduce the impact on people living downstream from flooding in extreme events. However, both options achieve the key objectives of this project in improving dam safety and not making the flood risk downstream worse.

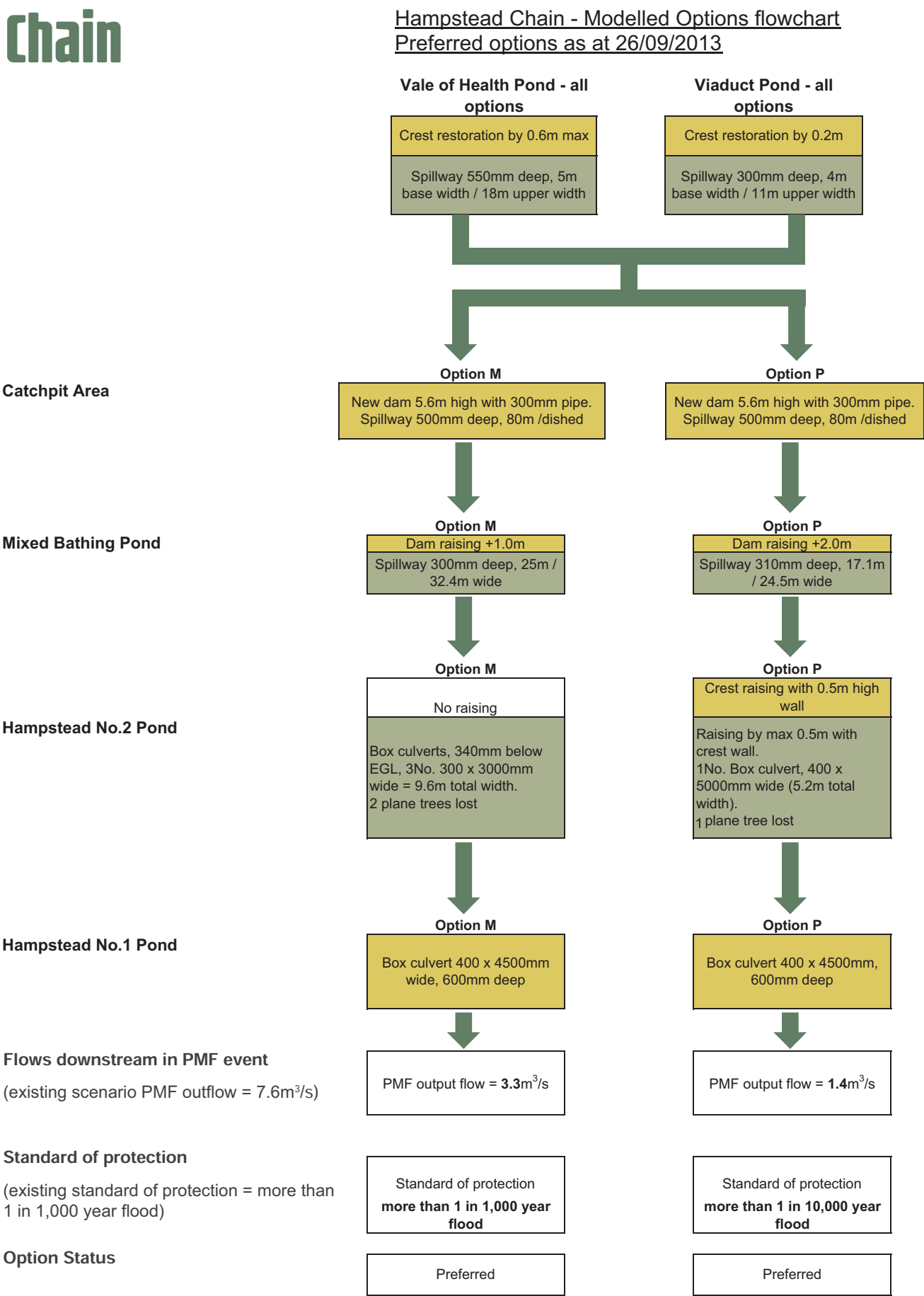
6. Preferred Options - Hampstead Chain

6.1 The preferred options for this chain are currently as follows:

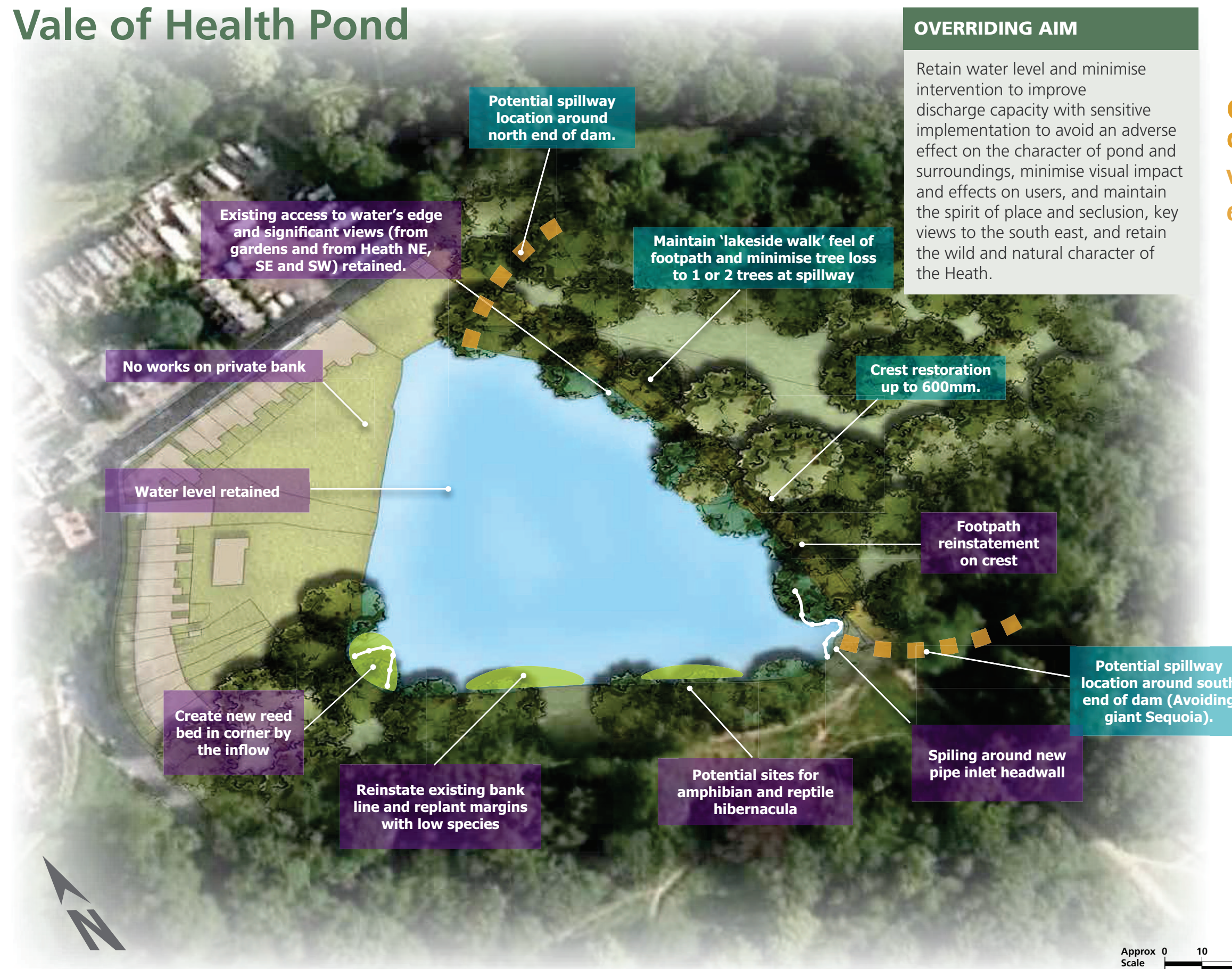
- **Option M:** Crest restoration and spillway works at Vale of Health and Viaduct Ponds, build new 5.6m high flood storage dam (with a 300mm pipe) at the Catchpit area, raise the dam at Mixed Bathing Pond 1.0m, install letterbox culvert spillways at Hampstead No.2 Pond and Hampstead No.1 Pond
- **Option P:** - Crest restoration and spillway works at Vale of Health and Viaduct Ponds, build new 5.6m high flood storage dam (with a 300mm pipe) at the Catchpit area, raise the dam at Mixed Bathing Pond 2.0m, raise the dam at Hampstead No.2 Pond with a 0.5m wall, install letterbox culvert spillways at Hampstead No.2 Pond and Hampstead No.1 Pond

Details of Preferred Options - Hampstead

6.2 These two options are shown in a schematic form on the revised options flowchart, which has been updated to include the provisional depths and widths of spillways, along with information on the standard of protection provided by the options.



Vale of Health Pond



OVERRIDING AIM

Retain water level and minimise intervention to improve discharge capacity with sensitive implementation to avoid an adverse effect on the character of pond and surroundings, minimise visual impact and effects on users, and maintain the spirit of place and seclusion, key views to the south east, and retain the wild and natural character of the Heath.

Option M works description

Vale of Health Pond

6.3 Proposed works involve:

- Crest restoration of the dam to a maximum of 0.6m above the lowest dam crest level.
- An open channel spillway, 550mm deep, 5m wide at the base, 18m wide at the top of the 1:12 side slopes, reinforced with topsoil and grass surface. The spillway will be located to run around either the south or north end of the dam. The exact location will be confirmed following further surveys and design development but will be chosen to minimise tree loss and avoid the sequoia tree near the south end.
- Installation of a 500mm diameter outlet pipe to either replace or augment the existing overflow arrangement.

See left for environmental mitigation and compensation measures proposed for pond restoration and water quality.

- Environmental engineering.
- Indicative environmental mitigation and compensation including: Pond edge restoration, water quality improvement and ecological management.
- Indicative centreline of possible alternative spillway locations.

Viaduct Pond

OVERRIDING AIM

Retain water level, minimise intervention to improve discharge capacity with sensitive implementation to minimise effect on visual amenity and features that contribute to setting of the Viaduct, and maintain the spirit of place and seclusion, key views to the south east, and retain the wild and natural character of the Heath.

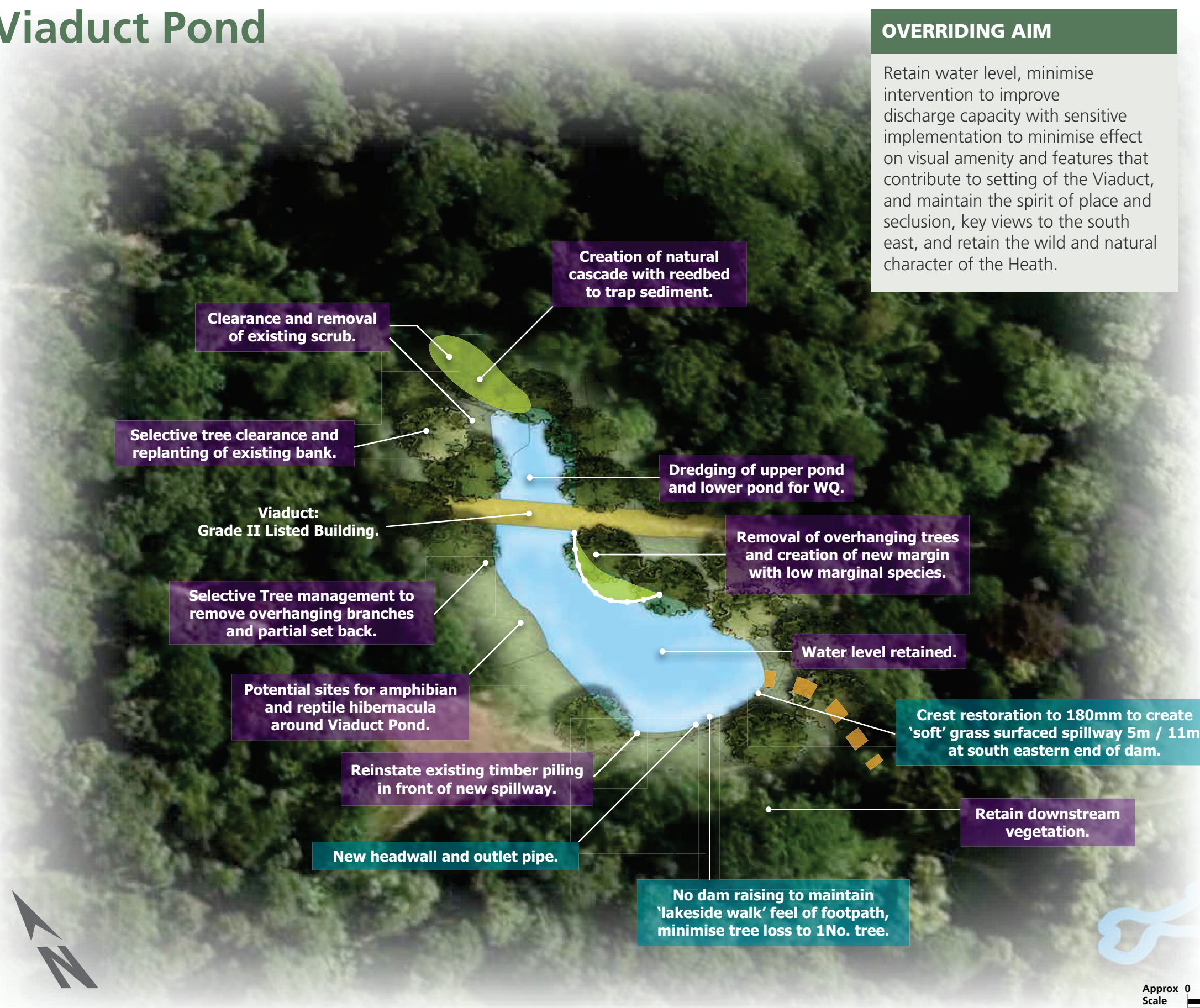
Viaduct Pond

6.4 Proposed engineering works involve:

- Crest restoration of the dam to a maximum of 180mm, which is likely to be achieved by local filling of low spots,
- Installation of a new 500mm overflow pipe, to augment or replace the existing overflow pipe. Alternatively there may be a possibility to improve the entrance to the existing pipe,
- A shallow (300mm deep) open channel spillway, 4m wide at the base, and 11m wide at the top of the side slopes if these are required to be 1:12. (As there is not a formal footpath at this dam, the slope lengths may be reduced.) This spillway is likely to be located around the east end of the dam, subject to checks on tree locations when information from the ongoing topographical survey is incorporated on the design plans.

See left for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Page 116



Environmental engineering.

Indicative environmental mitigation and compensation including: Pond edge restoration, water quality improvement and ecological management.

Indicative centreline of possible spillway location.

Approx Scale 0 10 20 30m

Catchpit Area

6.5 Works proposed here, in order to provide extra flood storage capacity in the middle of the pond chain and minimise the impact of works on downstream dams, include:

- Construction of a new flood storage dam, 5.6m high above the valley bottom. This dam would be earth embankment construction, with a grass surface, with some planting of isolated shrubs on the lower upstream face of the dam. Most of the crest would be one large spillway, designed to be overtopped along the whole length.

6.6 Up to 3 possible positions will be considered for the dam, in order to minimise impact on trees. The marked-up aerials below are only intended to give an indicative idea of the location of the dam if the route of the crest was to run straight across the valley.

The first position would be straight across the valley along the existing clearing / path.

A second possible position would be a straight dam located further upstream above the existing catchpit (which would require either rebuilding the catchpit pond or the creation of a new wetland habitat which would have a similar function in trapping sediments).

A third position would involve the crest forming an S-shaped route.

These routes will be considered in detail when the information from the new topographical survey is combined with the tree survey information.

6.7 The City of London are working with Atkins to identify borrow pit locations to provide material for the dam, such as the Field No.11 at the higher ground to the north of the clearing. A ground investigation early in 2014 will obtain material samples at these locations in order to assess the suitability of the ground.

Refer to [Page 40](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



Catchpit - Position 1 possible location



Catchpit - Position 2 possible location



Catchpit - Position 3 possible location

Catchpit - Landscape and Environmental Management

OVERRIDING AIM

Minimum intervention for maximum storage, sensitive implementation to minimise the effect on the visual amenity and footpath users, and the scrubland character of the valley, and to retain the wild and natural character of the Heath.



Existing Environmental Considerations:

- Open meandering stream, catchpit and mature oak trees
- Natural enclosed character, wooded valley with grass glades, that includes veteran and specimen trees
- Footpath forming tree lined route across the Heath linking to other important footpaths that have views into the area
- Use: Amenity, footpath users
- Opportunity for environmental improvements, including ecology

Landscape Mitigation & Compensation Options:

- Location and layout of embankment designed to minimise tree loss – especially veteran and specimen trees, by routing centre line of dam away from most valuable trees. Number of trees to be confirmed following combination of tree survey and topo survey
- Dam embankment merged into the existing natural topography – 3 potential positions to be considered using topographical and tree survey information
- Footpath link across valley retained
- Restore natural character of wooded valley and grass glades
- Naturalise appearance of dam with new planting to include species rich grassland
- Catchpit - pond restoration, water quality improvements and ecological management
- Potential for creation of wet woodland / reedbed habitat upstream of dam by careful positioning of pipe through dam, this habitat creation could improve water quality in Mixed Bathing Pond downstream

Options for pond restoration include:

- Extend the edge with new narrow marginal shelf to hide the existing hard engineering
- Catchpit option provides opportunity for new open water, aquatic and marginal planting
- Edge could be advanced by encouraging new waterside margins
- Replace concrete lined pond with wetland habitat and extend upstream of dam to provide water quality improvements

- Indicative outline of temporary stored floodwater.
- Indicative centreline of spillway (most of dam crest).
- Indicative centreline of dam (position to be confirmed).

Mixed Bathing Pond

6.8 In Option M the proposed works here involve:

- Raising the causeway dam by a maximum of 1.0m, by building up from the crest road. This would be achieved by adding up to 1m of fill onto the road at either end of the causeway. At the spillway, the net increase in road level would only be 0.7m, thus helping to reduce the visual impact on Mixed Bathing Pond. To avoid the two trees on the downstream slope of the west end of the causeway and the veteran oak at the east end, the downstream slope would be carried on up at the same gradient as existing (approximately 1:3), with a steep slope on the upstream face.
- Installing a spillway 300mm deep into the raised causeway, so that the net increase is 0.7m. The current spillway width has been modelled at 25m wide at the base (with 1:12 side slopes) but further modelling is planned that will investigate a wider spillway with more gentle slopes in order to minimise the visual impact of raising.
- Installing a spillway 300mm deep into the raised causeway, so that the net increase is 0.7m. The current spillway width has been modelled at 25m wide at the base (with 1:12 side slopes) but further modelling is planned that will investigate a wider spillway with more gentle slopes in order to minimise the visual impact of raising.

Refer to [Page 43](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 11 - View South across Mixed Bathing Pond
Existing



View Point 11 - View South across Mixed Bathing Pond
1m Raising (option M)



View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
Existing



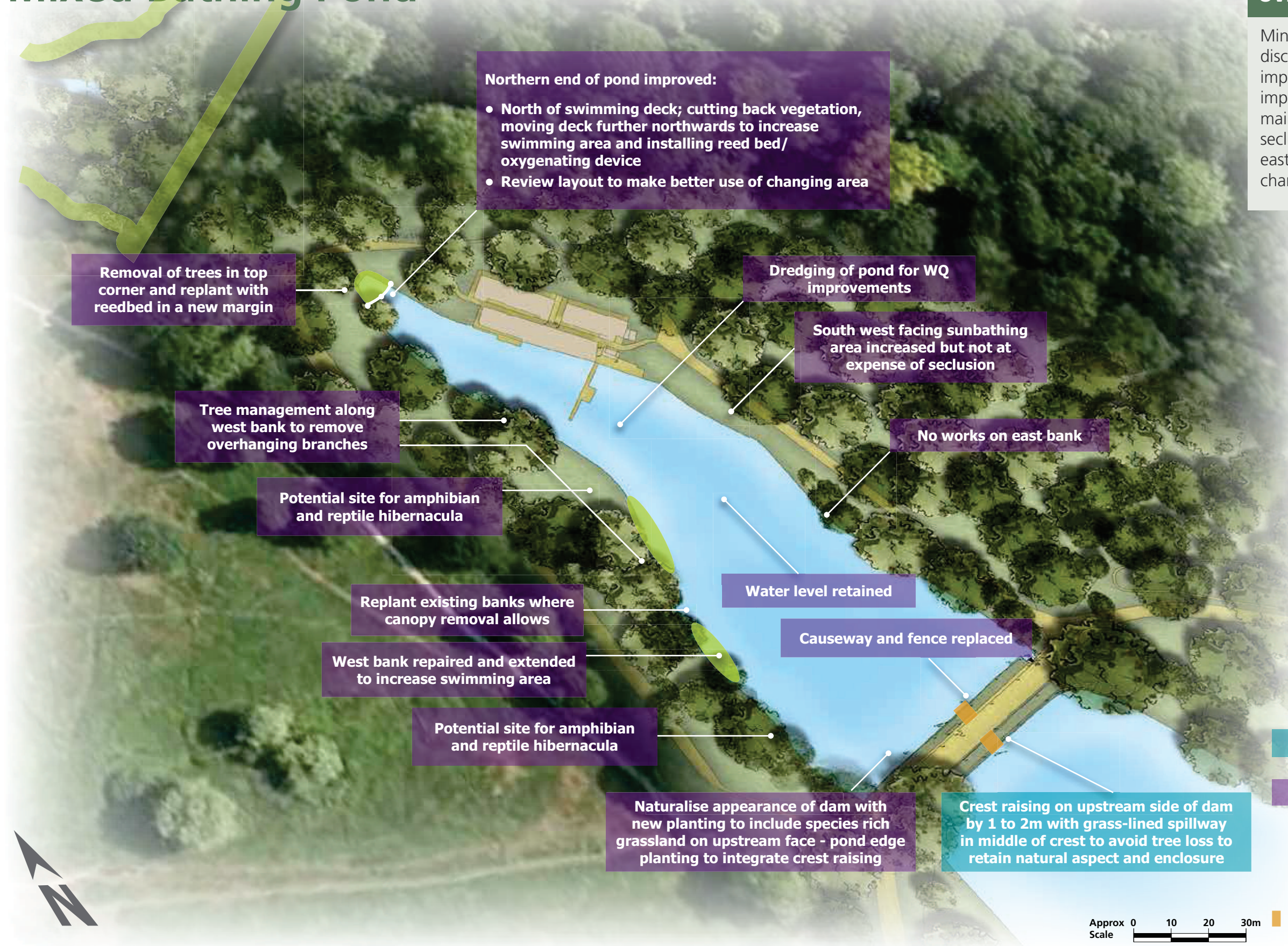
View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
1m Raising (option M)

Mixed Bathing Pond

OVERRIDING AIM

Minimum intervention to improve discharge capacity with sensitive implementation to minimise visual impact and effects on users, and maintain the spirit of place and seclusion, key views from the south east, and retain the wild and natural character of the Heath.

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Hampstead No.2 Pond

- 6.9 In Option M the proposed works here involve:
- Installation of three reinforced concrete box culvert spillways through the upper dam crest at the southwest end, each 300mm deep x 3000mm wide, making a total of approximately 9.6m wide,
 - Reinforced grass open channel spillway starting from the exit of the box culverts and running down the downstream slope of the dam to the next pond.

6.10 This option would lead to the loss of two plane trees from the downstream slope of the dam. While this is the same impact here as for Option K, the flow downstream from the last pond is higher and the peak water levels are higher at Hampstead No.2 Pond in Option M. Consequently the standard of protection in this option is less, being between 1 in 1,000 and 1 in 10,000 years.

Refer to [Page 46](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 4 – South across Hampstead No. 2 Pond
Existing



View Point 4 – South across Hampstead No. 2 Pond
2 Plane Trees Lost, 3 x (300 x 3000mm) culverts (option M)



View Point 3 – North across Hampstead No. 2 Pond
Existing



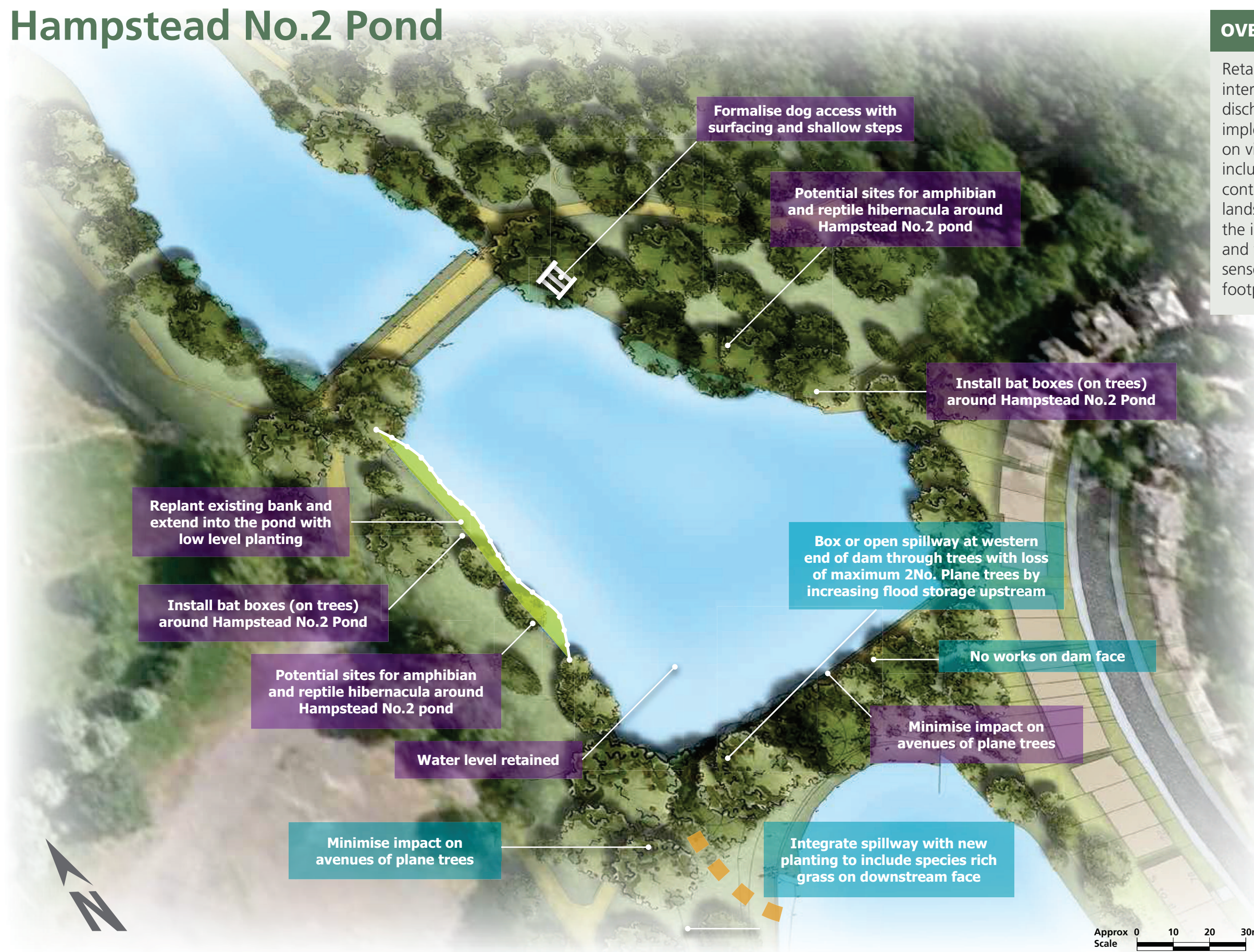
View Point 3 – North across Hampstead No. 2 Pond
Box Culvert Spillway – 2 Plane Trees Lost, 3 x (300 x 3000mm) culverts (option M)

Hampstead No.2 Pond

OVERRIDING AIM

Retain water level, minimum intervention to improve discharge capacity, with sensitive implementation to minimise effect on visual amenity and features, including avenue trees that contribute to the distinct natural, landscape character of the pond at the interface between the Heath and the community, maintaining the sense of place and key views from footpaths to the south and west.

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Hampstead No.1 Pond



Hampstead No.1 Pond

6.11 In Option M the proposed works here involve:

- Installation of one reinforced concrete box culvert spillway, 400mm deep x 4500mm wide, through the upper dam crest at the east end,
- Reinforced grass open channel spillway starting from the exit of the box culvert and running down the downstream slope of the dam. This part of the spillway could cause the loss of a maximum of one tree on the downstream slope, this will be confirmed.

See left for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Option P works description

6.12 Option P is a new option that has been investigated following stakeholders' requests to develop an option which can reduce the loss of plane trees at Hampstead No.2 Pond to one.

Vale of Health Pond, Viaduct Pond and Catchpit area

6.13 All works at these areas are the same as described above in Option M – refer to paragraphs 6.3-6.7.

Refer to [Page 35, 36 and 40](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Mixed Bathing Pond

6.14 In Option P the proposed works here involve:

- Raising the causeway dam 2.0m, by building up from the crest road. There are different methods for this; one could involve adding 2m of fill onto the road and encroaching into the Mixed Bathing Pond, the other could be by adding 1m of fill onto the road then making up the top 1m with a retaining wall. These two arrangements will be considered, and details will be developed that will avoid the two trees on the downstream slope of the west end of the causeway and the veteran oak which is in the natural ground but is near to the east end.
- Installing a spillway 300mm deep into the raised causeway, so that the net increase is 1.7m, thus helping to reduce the visual impact on Mixed Bathing Pond. Further modelling is planned that will investigate a wider spillway with more gentle slopes in order to minimise the visual impact of raising.

Refer to [Page 43](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.



View Point 11 - View South across Mixed Bathing Pond
Existing



View Point 11 - View South across Mixed Bathing Pond
2m Raising achieved with fill only (option P)



View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
Existing



View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
2m Raising achieved with fill only (option P)



View Point 11 - View South across Mixed Bathing Pond
Existing



View Point 11 - View South across Mixed Bathing Pond
1m bund +1m wall (option P)



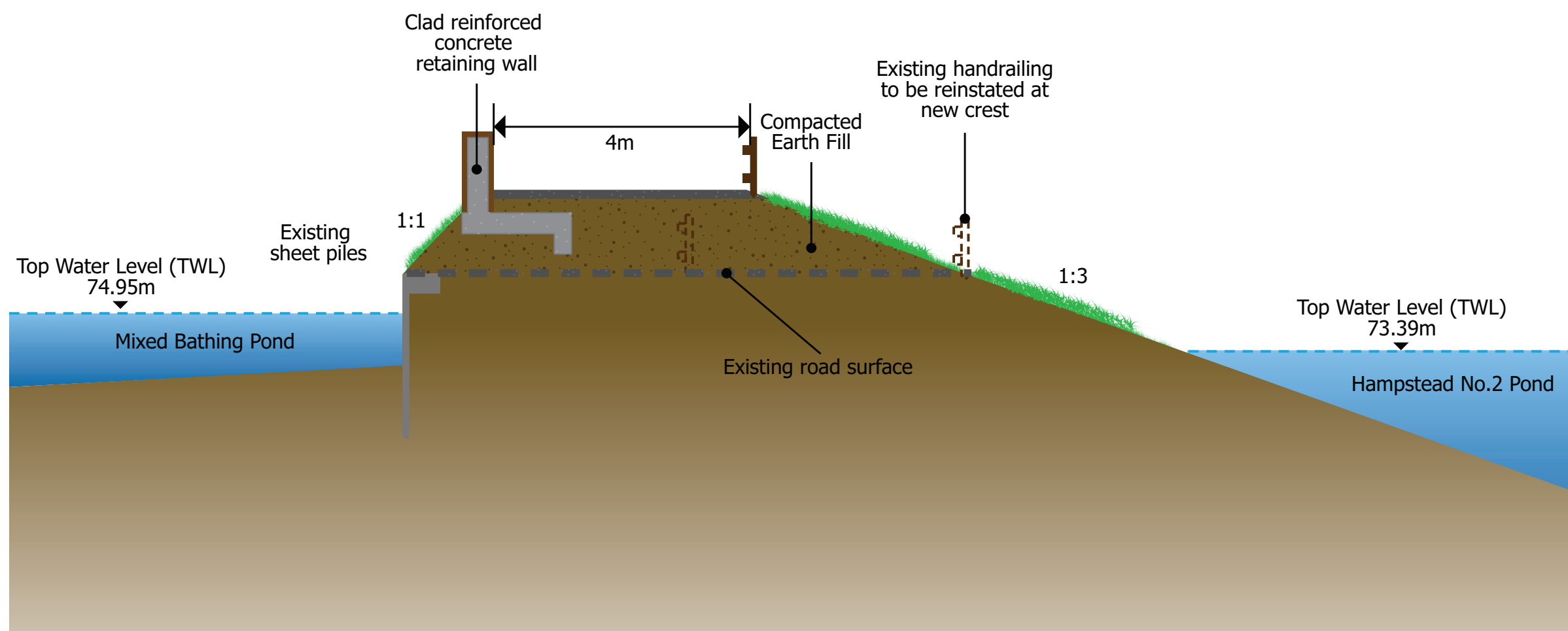
View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
Existing



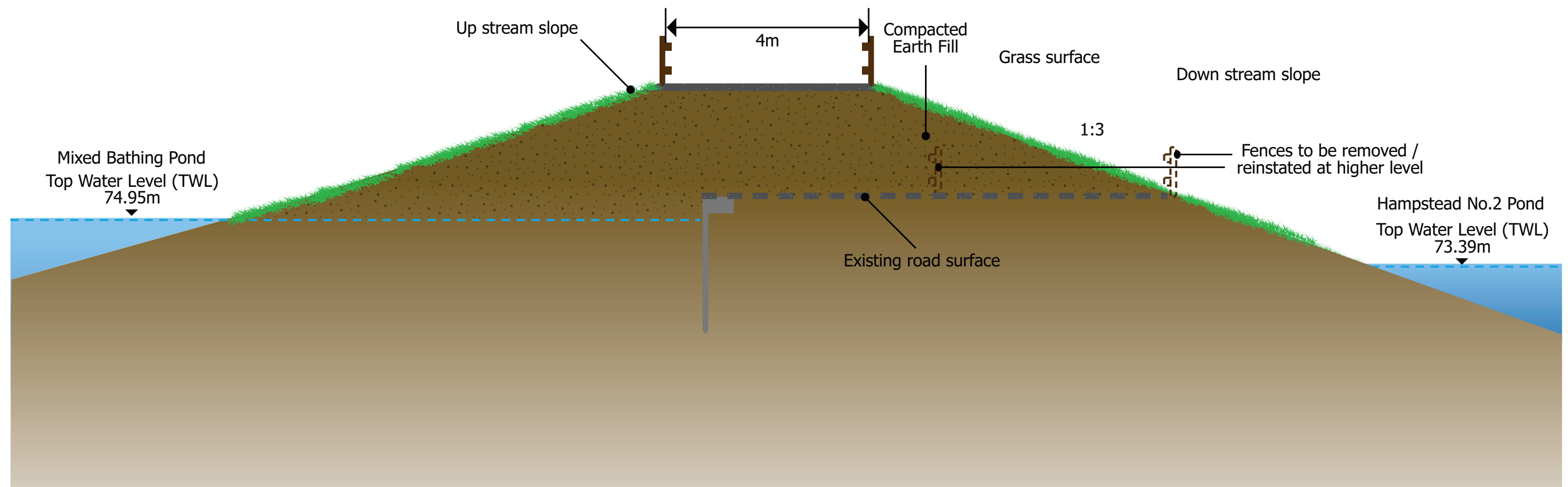
View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
1m bund +1m wall (option P)

Mixed Bathing - Option P, 2m raising using embankment fill only

Page 132



Mixed Bathing - Option P, 2m raising with combination of wall and embankment fill



Hampstead No.2 Pond

- 6.15** In Option P the proposed works here involve:
- Crest restoration with a 0.5m high concrete wall, clad in timber, above the existing sheet pile line. This would tie into the higher ends of the dam.
 - Installation of one reinforced concrete box culvert spillway through the upper dam crest at the southwest end, 400mm deep x 5000mm wide.
 - Reinforced grass open channel spillway starting from the exit of the box culvert and running down the downstream slope of the dam to the next pond.

- 6.16** By adding storage at this dam, and maximising storage at Mixed Bathing Pond, the loss of plane trees is reduced to one.
- 6.17** This option requires a check on the threshold levels of the houses on the east side of the pond, and the structural integrity of the boundary wall that adjoins the east end of the dam. However, the peak water level during a PMF has been modelled to be 250mm less than in the existing case, due to the extra flood storage upstream, so it is unlikely that there would be a net increase in flood risk

Refer to [Page 46](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality



View Point 4 – South across Hampstead No. 2 Pond
Existing



View Point 4 – South across Hampstead No. 2 Pond
1 tree lost (option P)



View Point 3 – North across Hampstead No. 2 Pond
Existing



View Point 3 – North across Hampstead No. 2 Pond
Box Culvert Spillway - 1 Plane Trees Lost, 400x5000mm culvert (Option P)

Hampstead No.1 Pond

- 6.18** In Option P the proposed works here consisting of:
 - Installation of one reinforced concrete box culvert spillway, 400mm deep x 4500mm wide,
 - Reinforced grass open channel spillway to carry on from the box culvert down the downstream slope.
- 6.19** This option achieves a higher standard of protection than the existing scenario or Option M, with the return period of the flood that causes operation of the spillway being more than 1 in 10,000 years. This option therefore would reduce the frequency of flooding downstream of the last pond, because of the storage added upstream even though the box culvert spillway cuts into the dam at Hampstead No.1 Pond. because of the storage added upstream.

Refer to [Page 47](#) for environmental mitigation and compensation measures proposed for pond restoration and water quality.

Comparison of Options

- 6.20** Option M limits the impact on the Mixed Bathing Pond to maximum 1m of raising, but would lead to the loss of two plane trees at Hampstead No.2 Pond, whereas Option P raises Mixed Bathing Pond by up to 2m but causes the loss of one plane tree at Hampstead No.2 Pond. There is therefore a trade-off on the Hampstead pond chain between raising Mixed Bathing Pond more, and losing a second plane tree at Hampstead No.2 Pond.
- 6.21** Option M would achieve the objectives of providing dam safety and not making the flooding downstream worse than existing, but Option P increases the Standard of Protection to 1:10,000.

7. Discounted options

Shortlist Options

7.1 The following options, previously described and considered in the Shortlist Options Report, have since been discounted as described below.

Highgate Chain

7.2 Option 5:

Spillway works to Stock and Ladies Bathing Ponds, raising of the dam at Model Boating Pond by 1m, raising of the dam at Men's Bathing Pond by 1.5m, and raising of the dam at Highgate No.1 Pond by 2m.

Option 5 has been discounted due to the impact of the works required to raise the last dam at Highgate No 1 by 2.0m. A 2 m high retaining wall would form a significant feature detracting from the local visual amenity. A retaining wall of this height would also require the construction of a substantial base that would impact on the dam crest and result in more widespread tree loss. An earth embankment would require borrow pits close by or large excavations to widen the pond resulting in further tree loss along the west bank and a change in the secluded character of the pond.

With only 1m of raising at Model Boating Pond, the spillway at the west abutment of Model Boating Pond would have to be 50m wide to avoid overtopping of the new and existing dams. This 50m wide channel would lead to more tree losses around the path crossroads and from the hornbeams on the downstream slope of the existing dam.

7.3 Option 3:

Spillway works to Stock and Ladies Bathing Ponds, raising of the dam at Model Boating Pond by 3m, raising of the dam at Men's Bathing Pond by 0.5m, and raising of the dam at Highgate No.1 Pond by 0.5m.

Option 3 has been discounted since it has been shown that the key objectives of the project can be met (and in some ways exceeded) with options involving 2.0m and 2.5m raising of the dam at Model Boating Pond, and so a raising of 3m is not necessary. In a PMF event, Options 4 and 6 both achieve an output flow from the modelled spillway at Highgate No.1 Pond that is lower than the total flow over and around the dam at Highgate No.1 Pond in the existing scenario. As a consequence of the works on the chain of ponds, the standards of protection provided by Options 4 and 6 are both higher than in the existing scenario.

Adopting the 2.0m and 2.5m raising options as preferred options would also address concerns expressed by stakeholders about the scale of the embankment required to raise the Model Boating Pond by 3m.

7.4 Option 3a:

This was a variation on Option 3, and was investigated in response to stakeholder concerns about the width of the proposed spillway at Highgate No.1 Pond in the Highgate chain options. The feasibility of reducing the spillway width was tested by increasing the raising of the dams of the two downstream ponds from 0.5m to 1.0m, while retaining the 3m raising embankment at Model Boating Pond.

While Option 3a provided a useful result in indicating that the spillway width could be reduced from 60m to 40m, thus reducing tree loss on the Highgate No.1 Pond dam, it has been discounted for the reasons given above for Option 3.

Hampstead Chain

7.5 All options involving open channel spillways at the dam at Hampstead No.2 Pond:

This applied to Options H, J, L, and N. The open channel spillways in these options were all between 20m and 27m wide at the top, and would have therefore required the removal of more than two of the plane trees on the dam. The modelling of the two types of spillway (box culvert and open channel), for each combination of additional upstream storage capacity, has indicated that the box culvert type is more efficient in passing the same flows through a narrower space. While the width of the base of the open channel spillways was just 11m, the need to maintain public access along the dam crest footpath (through which the spillways would pass) meant the side slopes would have to be at 1 in 12, causing the width of the upper spillway to be around double the lower width.

7.6 Any options leading to more than 2 plane trees being lost at Hampstead No.2 Pond:

This applied to Options H, J, L, and N. The removal of more than two trees from the avenue of plane trees on the dam would result in an impact on the

distinct character of this pond and would detract from views looking south over the Hampstead No.2 Pond towards the Royal Free Hospital.

7.7 Any options where the Standard of Protection is less than in the existing scenario (which is more than 1 in 1000 years return period):

This applied to Options C, D, and G that were discounted in the Shortlist Options report. At the time of this last report, Option M, which involved raising of the Mixed Bathing Pond by 1.0m, did not quite meet this standard, but the option has since been amended so that it complies with this.

7.8 Options where the spillway level at Hampstead No.2 Pond is too low:

This applied to Option I, where the dam raising at Mixed Bathing Pond was 1.5m. To prevent overtopping of the dam at Hampstead No.2 Pond, the invert of the box culvert spillway had to be set only 100mm above the typical water level, which would have meant that the spillway would be in operation more frequently than in other options where it was higher. However, this option has some value in being a compromise height between 1m and 2m of raising at Mixed Bathing Pond, and it may be possible to revisit this option and refine it to allow a higher spillway level so that the spillway does not operate so frequently.

7.9 Open channel spillway running between trees:

An alternative to a single open channel spillway was considered, whereby the open channel would be split into smaller channels in order to run between the

plane trees. However, this arrangement has been discounted for the following reasons:

- In order to avoid the damage associated with eddying of flows around the tree trunks, some material would have to be mounded up around the tree trunks. An arboriculturalist has recommended that the maximum amount of soil that can be added above the tree roots would be 200mm. The depth of flow over the spillways is indicated by the model as around 270mm – 330mm, which would exceed this limit of fill.

- Increasing the overall width of the combined spillways was increased in order to bring the depth of flow down below 200mm, the low part of the spillways between trees would have to be at the same level, but the ground levels at the bases of the trees all vary.
- Working above and around the roots of 5 – 6 trees to achieve the total width would spread the risk of damage to more trees than the two trees which would be lost in the box culvert options, by potentially overloading the structural roots with soil or reinforcement

materials. This could either crush the roots or over consolidate the soil above them so that their supply of oxygen is reduced.

- For a line of separated spillways to run through the middle of the plane trees, the second line of trees further down the downstream slope would have to be removed. This would reduce the screening of the view of the Royal Free Hospital that these trees currently provide, since they fill the 8m gaps between the plane tree trunks. This effect is shown in a visualisation below.



View Point 4 – South across Hampstead No. 2 Pond
Existing



View Point 4 – South across Hampstead No. 2 Pond
Box Culvert Spillway – 2 Plane Trees Lost (minimum loss of any option)

Stakeholder Options

7.10 The following options, proposed by stakeholder groups, have been considered, but discounted for the reasons described below:

7.11 Dry diversion channel bypassing Men's Bathing Pond and Highgate No.1 Pond

It side channel has been suggested, making the best use of the natural contours of the Heath, would carry the excess water down the side of Highgate No. 1 and Model Boating Ponds rather than through them. The proposed channel would be around 30m wide and 1m deep and could be where the existing north/south paths are (and these could remain in use as paths). The suggestion also includes a reinforced bund which could be constructed on the pond side of the channel in order to avoid the need for excavating a channel. The reinforced bund would prevent the water in the channel from flowing over and into the pond. Drains on either side of the path could deal with mild flooding so that water would not pond on the higher side of the bund. After the diversion channel proposal was provided, it was also suggested that a diversion channel could be combined with a reduced raising embankment at Model Boating Pond.

However, this proposal has not been incorporated into the project for the following reasons:

- **Increase in flooding frequency.** By starting the diversion channel at the level of the existing auxiliary spillway at Model Boating Pond, the channel would operate at a higher frequency than the

existing standard of protection provided by the pond chain, which is modelled to be almost exactly 1 in 100 year return period. The auxiliary spillway would be operating in floods of between 1 in 25 and 1 in 50 year return periods. The diversion channel would therefore increase the frequency of flooding to downstream properties, so it would not comply with the key objective of not making flooding worse downstream. In addition, the City of London would be held liable for any damage that resulted from flooding after operation of the diversion channel, since flooding would happen more frequently, and to a greater extent, than in the existing case.

- **Increase in rate of flow of floodwaters discharged.** If the last two ponds are bypassed, the existing flood storage capacities of these ponds (the combined total of which is estimated at 24,700m³) would not be used. By having a low spillway at the upstream end of the diversion channel at Model Boating Pond, the potential for maximising storage capacity at both Model Boating Pond and Bird Sanctuary Pond is also lost. Hydrographs (issued separately) demonstrate that providing extra flood storage capacity reduces both the rate of inflow into the last two ponds and the rate of outflow. By removing the existing storage capacity, the opposite effect will be achieved, with outflows downstream being increased for the same return period storm. The diversion channel would therefore not comply with the other key objective of not increasing the rate of flow from the last dam.

- **A combination with a low raising embankment at Model Boating Pond would reduce the standard of protection.** Previous modelling done for Option 5, which involved only a 1m raising embankment at Model Boating Pond, showed that a 50m wide spillway would be required in the new embankment in order to prevent the new and existing embankments from being overtopped. This 50m wide spillway would be of a similar order of size as the proposed diversion channel, and while the spillway crest would be higher than the existing dam, it would still be overtopped at floods of return periods between 1 in 25 and 1 in 50 years. The key objective of not making flooding worse downstream would still not be met.

- **Increased tree loss at Model Boating Pond.** The channel would have to be at least 60m wide to cope with the expected flows, and if it were to start from the Model Boating Pond (around the low spot which is the existing auxiliary spillway), the 60m is a large increase on the proposed spillway width of 20m in Options 4 and 6. This would have a greater impact on the group of trees at the west end of the dam at Model Boating Pond, these include a number of mature hornbeams. Currently, only one willow is predicted to be lost due to the 20m spillway designed in Options 4 and 6.
- **Increased tree loss due to size of dam required to support the diversion channel.** The natural contours do not support the theory that no excavation would be required to form channels, since the existing

ground is rarely lower than the dam crest levels, and the valley sides slope upwards by up to 1 in 7 near the downstream end of the Highgate No.1 Pond. The bund that would be required to support a 60m channel at that end would therefore need to be approximately 8.5m high. Even if the channel only needed to be 30m wide as suggested in the proposal, the downstream end of the bund would be over 4m high. This would be around 28m wide and would cause tree loss along the hillside at Highgate No.1 Pond and elsewhere. The total area affected by the dam, shown as around 420m long on the plan in the proposal, could therefore be up to 11,760m².

7.12 Permanent lowering of the typical water level at Model Boating Pond

It has been suggested that by lowering the typical water level at this pond by 0.5m, eg with a new, lower overflow pipe, the increase in floodwater storage would mean that the dam would not need to be raised as much as is proposed in Options 3 - 6.

This is technically feasible and would increase storage capacity. However, it should be noted that the increase in capacity of going down 0.5m would not be the same amount as the reduction in capacity due to reducing 0.5m from the new embankment, since the surface area used is only within the perimeter of the Model Boating Pond, whereas the raised embankment also makes use of the surface area of Bird Sanctuary pond for temporary flood storage.

The concept of permanent changes to water level has been discussed before and there was a general consensus that this was not desirable. It is reasonable to expect that other stakeholders would not accept the visual impact of exposing a further 0.5m of the sheet piles around the whole perimeter, or the loss of access for model boaters.

Water levels would be less in summer when the water levels drop below the overflow pipes, increasing the reduction in water level to more depth than 0.5m.

7.11 Making the whole dam at Model Boating Pond into an armoured spillway

The reasoning behind this suggestion is that the upper part of the raising embankment could be removed by an amount similar to the depth of the spillway. For example, in Option 3 where the dam is raised by 3m, the spillway is 1.1m deep (relative to the level of the raised crest). The proposal is to raise the dam by only 1.9m, plus an allowance for the height of flow over the whole dam crest in order to retain the same storage capacity, and the whole dam crest and downstream slope would be armoured / reinforced. It was suggested that damage to the trees on this dam could be acceptable.

The Panel Engineer has stated he would not accept overtopping of the main dam due to the trees on the downstream slope which are to be retained. These trees would cause eddying and turbulence which would increase the erosion of the dam during overtopping, and would have to be removed if the whole crest is to become a spillway, particularly when the steepness of the downstream slope is considered.

The kind of damage that would be accepted would be minor wear and tear of turf which could be replaced after a flood event. Erosion of channels around trees, or trees being pushed over and removing the root ball from the dam, are not acceptable. The trees on the dam would therefore have to be removed if the plan is to overtop along the whole dam width. The allowance for the height of the flow over the spillway would be of the order of 300 to 700mm, since the model indicates that the height of flow over the 20m wide spillway is around 700mm. If this allowance is added to the 1.9m high new embankment, to compensate for the loss of temporary storage, the net result would be a raising of around 2.2 to 2.3m, but with all trees lost from the dam. In comparison, Options 4 and 6 involve a raising embankment of 2.0m and 2.5m height respectively, but neither option would require tree loss on the downstream slope of the existing dam. Therefore, the reduction in total height of the raising embankment that is achieved by the proposal is not worth the loss of the downstream slope trees, which would be avoided by the proposed raising on the upstream face in Options 4 and 6.

8. The next stage

Revised programme

8.1 The following revised programme of consultation has been agreed between the City and Ponds Project Stakeholder Group (PPSG).

Activity	Date
Preferred Options Report issued	4 October
Comments back on Preferred Options Report	18 October
PPSG meeting	21 October – 6pm (moved from 14 Oct)
Hampstead Heath Consultative Committee	12 November (moved from 28 Oct)
PPSG meeting	18 November – 6pm (moved from 12 Nov)
Hampstead Heath Management Committee	25 November (moved from 11 Nov)
Public Consultation	26 November – 17 February 2014
PPSG meeting	9 December – 6pm
Selection of Preferred Options	23 April 2014
Target date for Planning Application	Summer 2014

Consultation

8.2 This remains key to the project and wider non-statutory consultation will be undertaken to help inform the development of the preferred option for each of the chain of ponds.

Construction Contractor

8.3 A construction contractor is being appointed early in the process to enable their experience to contribute to the development of solutions that minimise the impact on the Heath.

Continuing analysis and assessments

8.4 The results from testing of the sediment have been received and will now be analysed to allow an assessment of the treatment required to the sediment if it is to be located on site. Bathymetric surveying will obtain depths of silt present in the ponds, to allow the scope of desilting to be quantified.

8.5 This information and subsequent assessments will be shared with the contractors who are currently involved in the competitive dialogue stage of the tendering process, so that they can include considerations for earth and silt movements in their proposals.

Assessment of tree loss

8.6 Tree surveys of the areas of proposed works have been completed, and the latest topographical surveys are being delivered in stages. When these two sources of information are combined into accurate tree location plans then compared with proposed works locations, a more detailed assessment of tree loss at each pond (and mitigation) will be possible. This will allow refinement of the engineering and pond restoration options designs in the outline design phase, and also be included in the public exhibition phase of consultation.

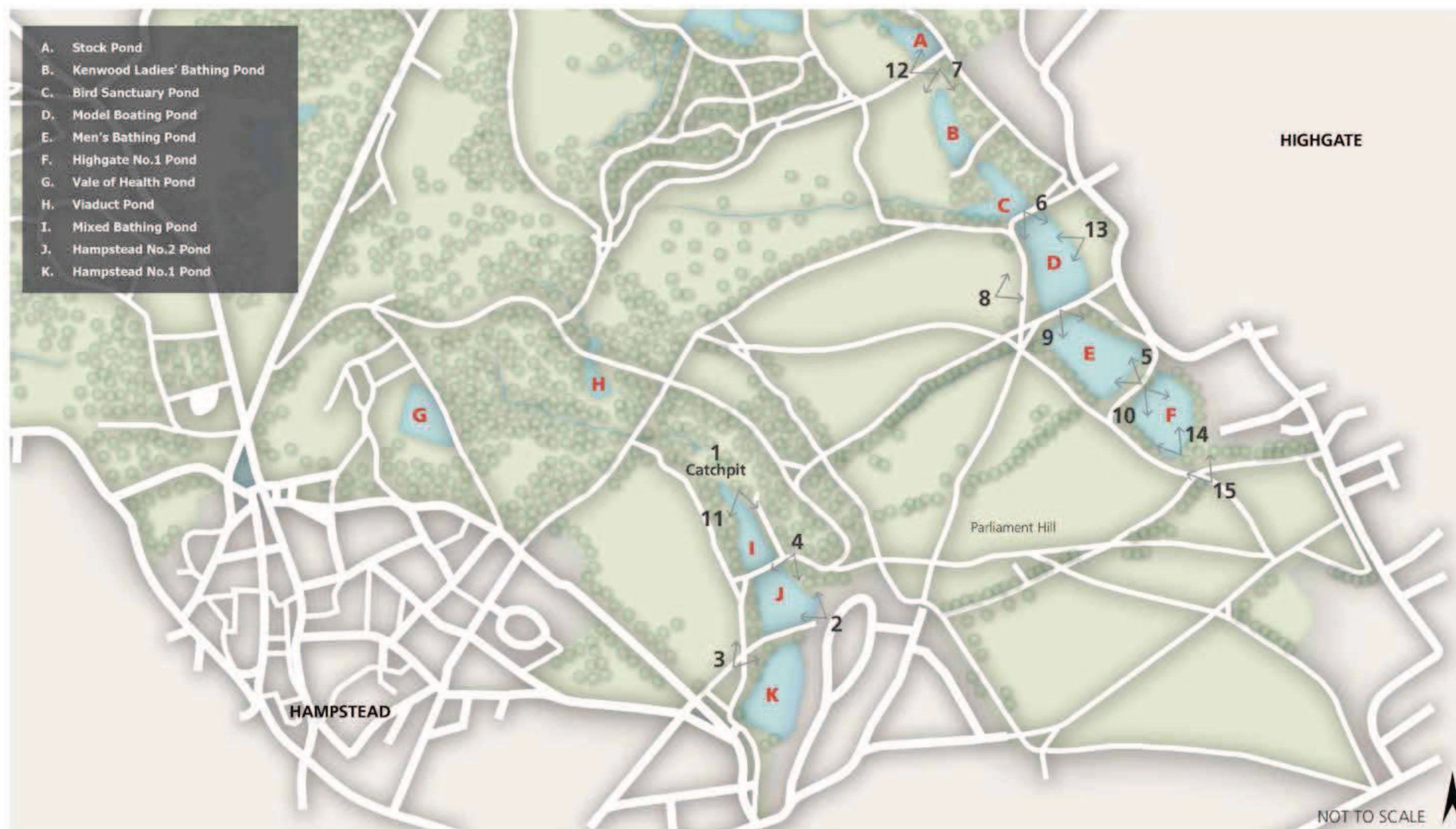
Option Development

8.7 The preferred options described above will be developed through early contractor involvement, further analysis of survey information, and analysis of the results of ground investigation. Assessment of the ecological surveys and non-statutory consultation with the public will continue to inform the design of options.

Appendices



Appendix A - Photo View Point Locations Plan



Appendix B - Hydrographs

Commentary

The following hydrographs are intended to show the differences between inflow and outflow in both the existing scenario and a typical proposed option scenario (where extra flood storage capacity is added upstream in the pond chain). The flows are extracted from the hydraulic model and are given in ‘cumecs’ (cubic metres per second, ie 1 cumec = 1 tonne of water per second).

The 1:10,000 year return period flood event and the PMF were used for this comparison, since in Option 4 the floodwater from all flood events up to and including the 1:1,000 year return period flood is stored below the weir level of the proposed spillway at Highgate No.1 in Option 4.

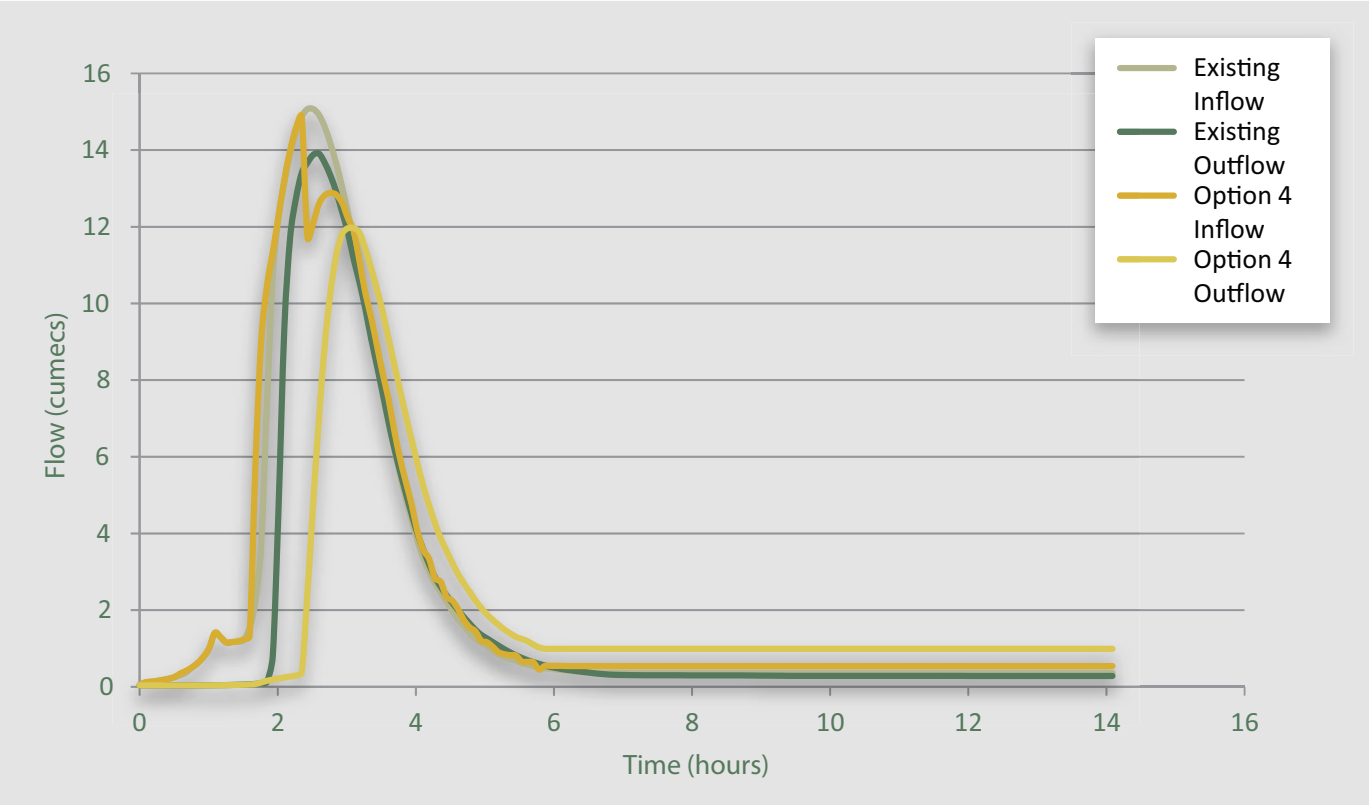
In each scenario, the following observations can be noted:

- The peak outflow occurs after the peak inflow, due to the storage capacity in the pond (either existing or in an option). This time difference, or ‘lag’ tends to be increased when extra storage is added.

- The peak outflow is usually less than the peak inflow, due to the flood storage capacity in the pond.
- By adding storage capacity to the chain, the timing of the peak outflow is delayed, which would give more time for people living downstream to be evacuated before the proposed spillway operates.
- The two smaller peaks on the rising limb of the inflow hydrograph (in green) before the main peak are due to a combination of inflows which peak at different times. The first peak is due to rainfall directly on the pond surface, the second peak is due to the water flowing in from the nearby valley sides from the pond’s sub-catchment, and the third, main, peak relates to the inflow from the upstream pond (either from the overflow pipe, or over the upstream dam or spillway crests). In some instances the timing of the second peak means that it merges with the third.
- Adding storage capacity to upstream ponds would reduce the inflow into the last pond in each chain and also delay the peak inflow.
- Adding storage capacity upstream would also reduce the outflow peak from the last pond in both flood events.

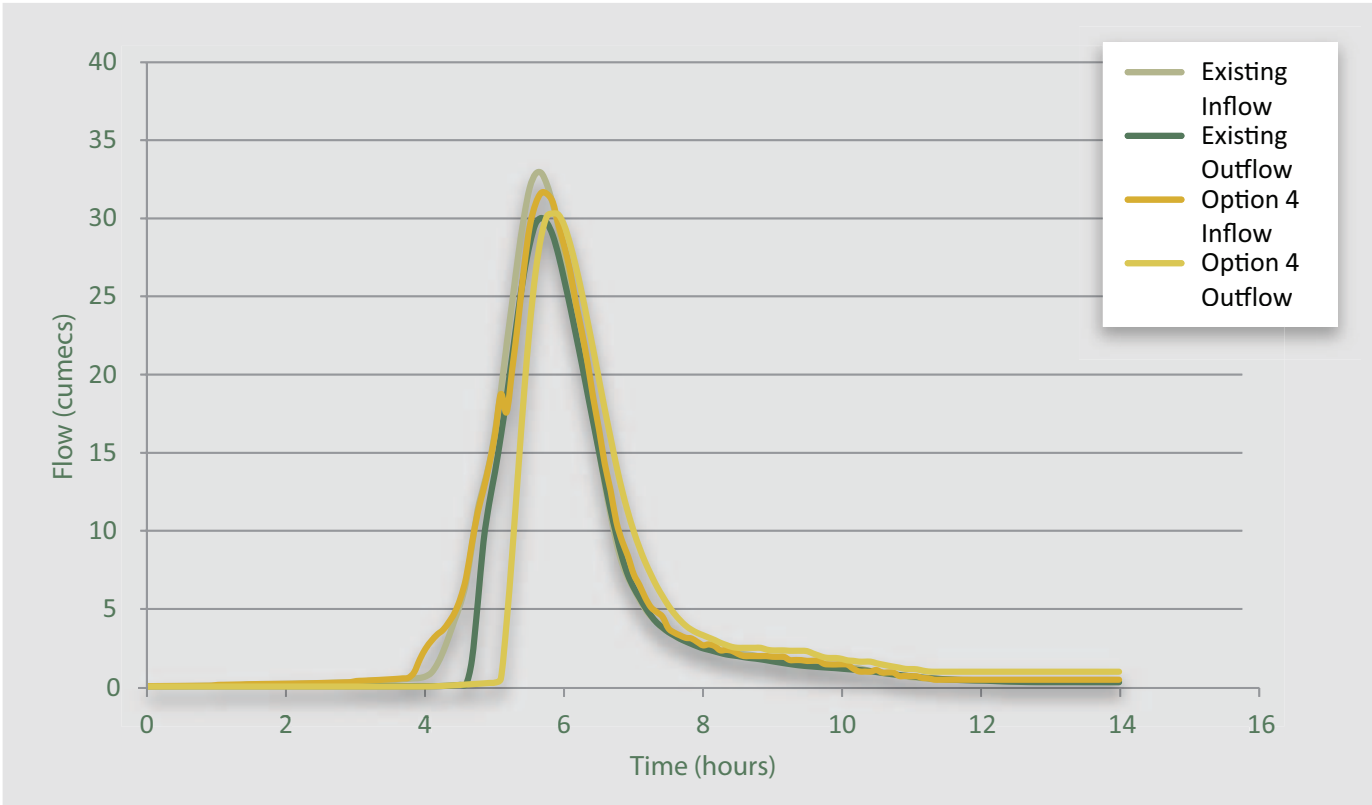
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Model Boating Pond - 10,000yr



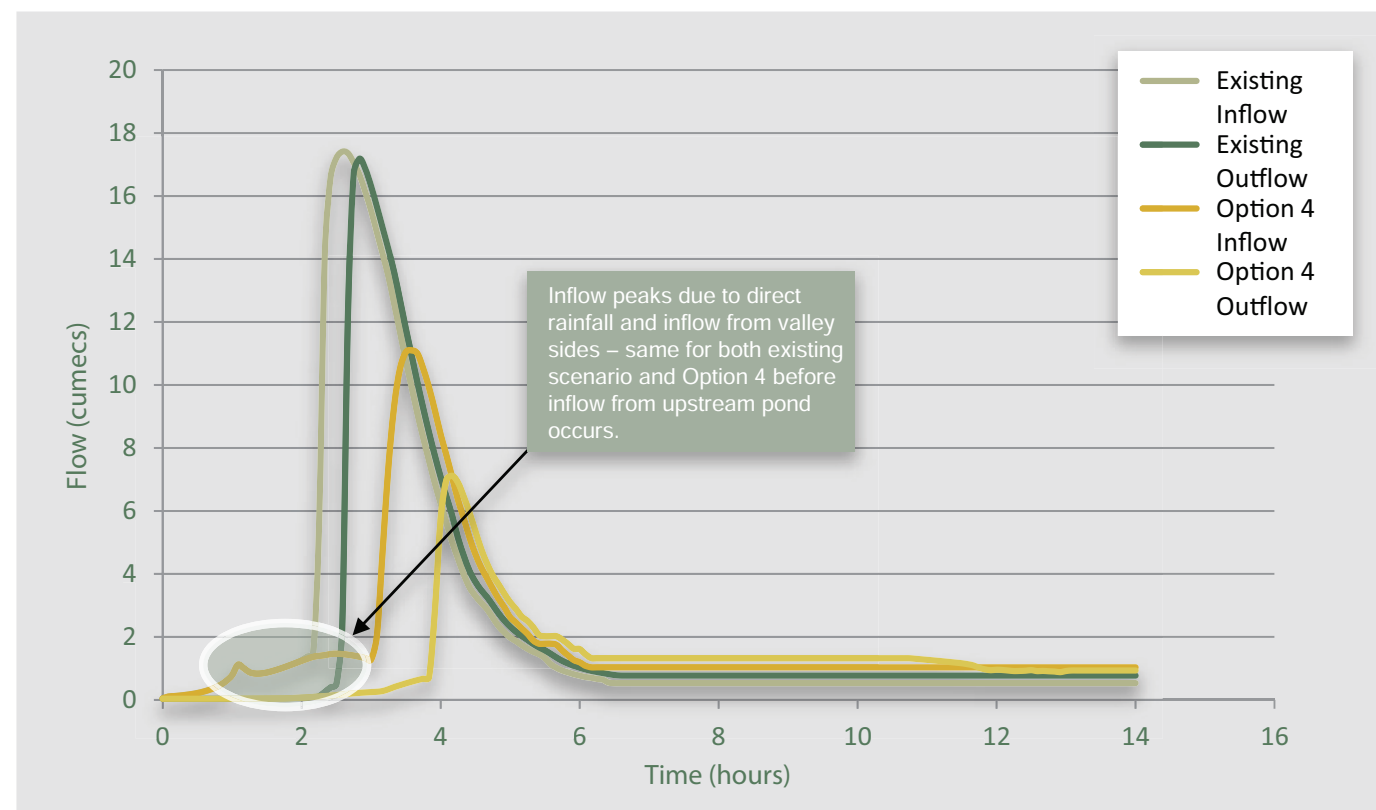
Model Boating Pond - 1:10,000 year event

Model Boating Pond - PMF



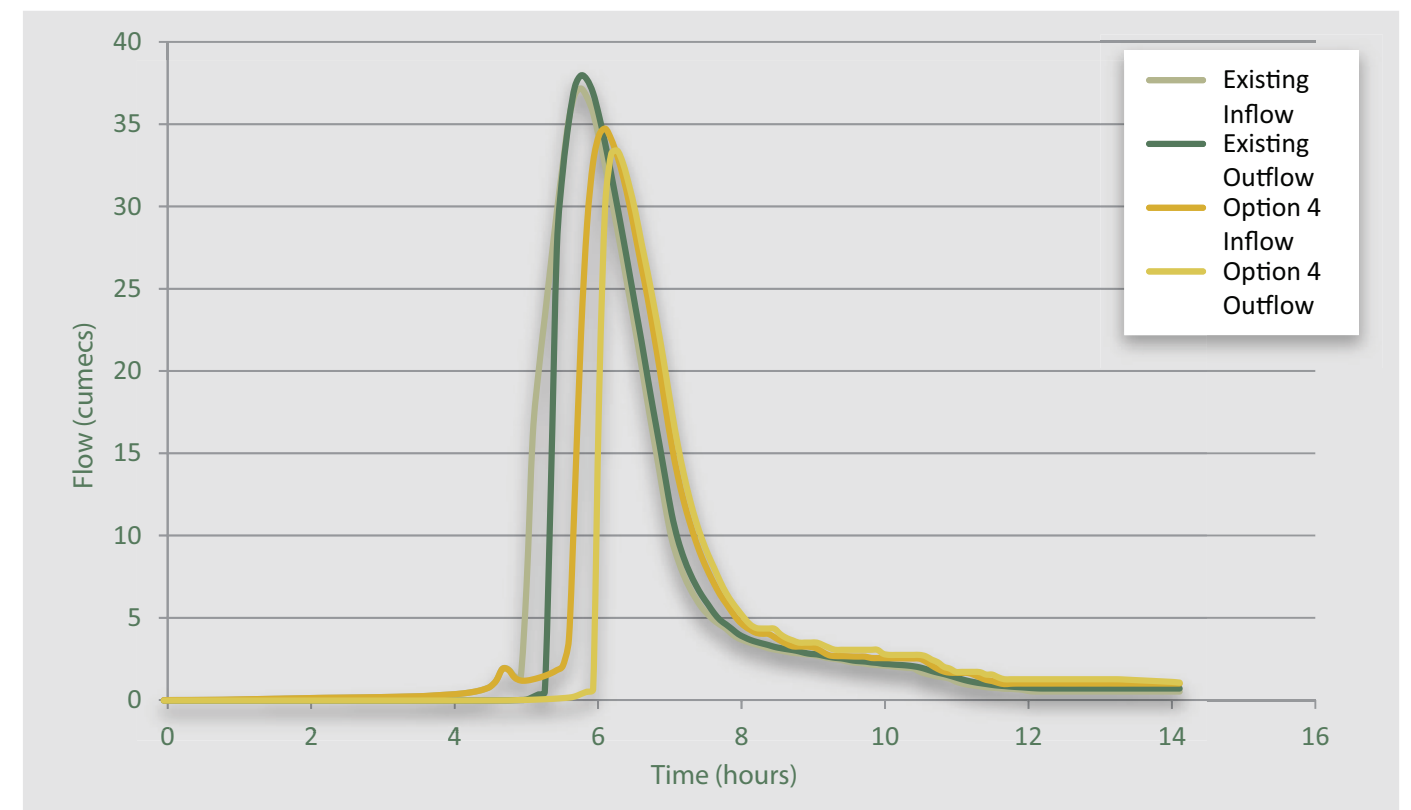
Model Boating Pond - PMF event

Highgate No.1 Pond - 10,000yr



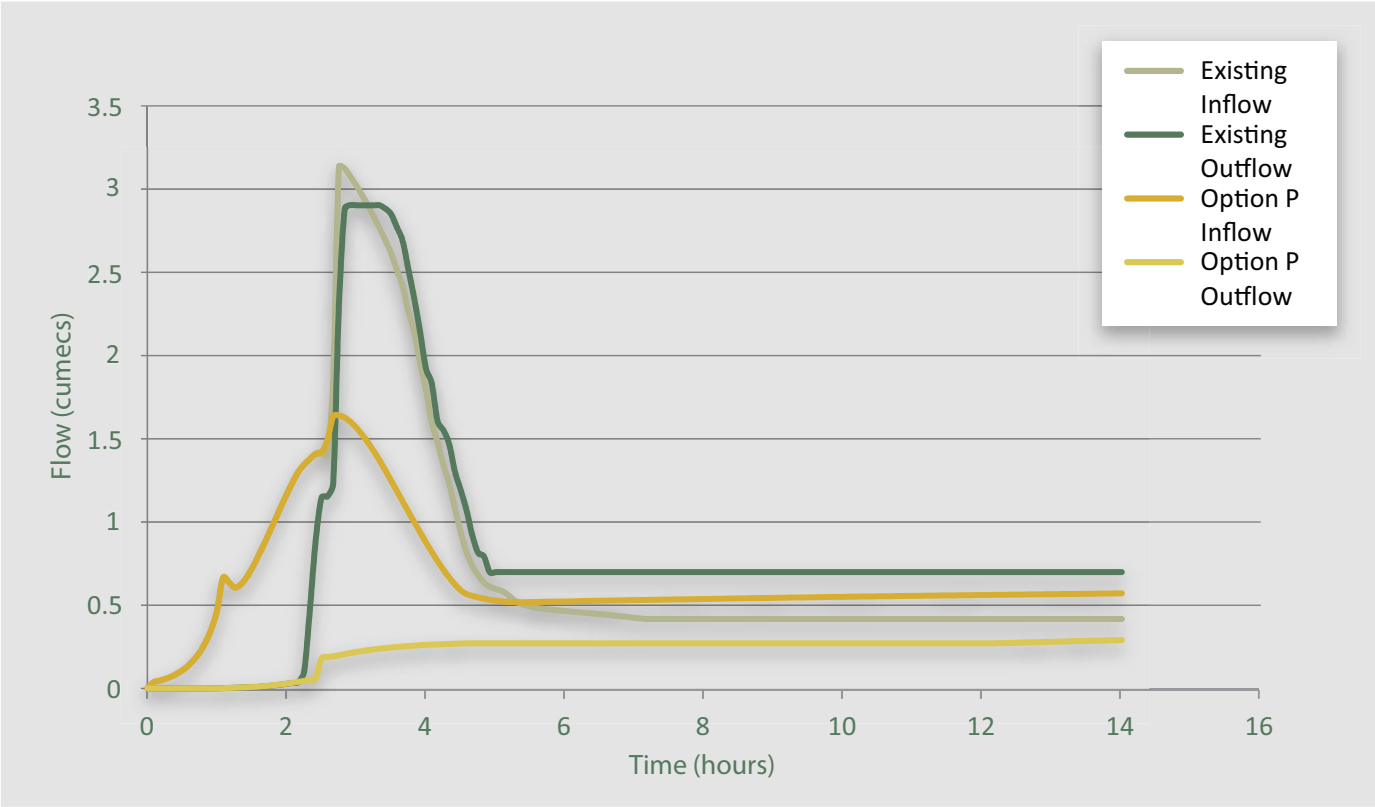
Highgate No.1 Pond - 1:10,000 year return period event

Highgate No.1 Pond - PMF



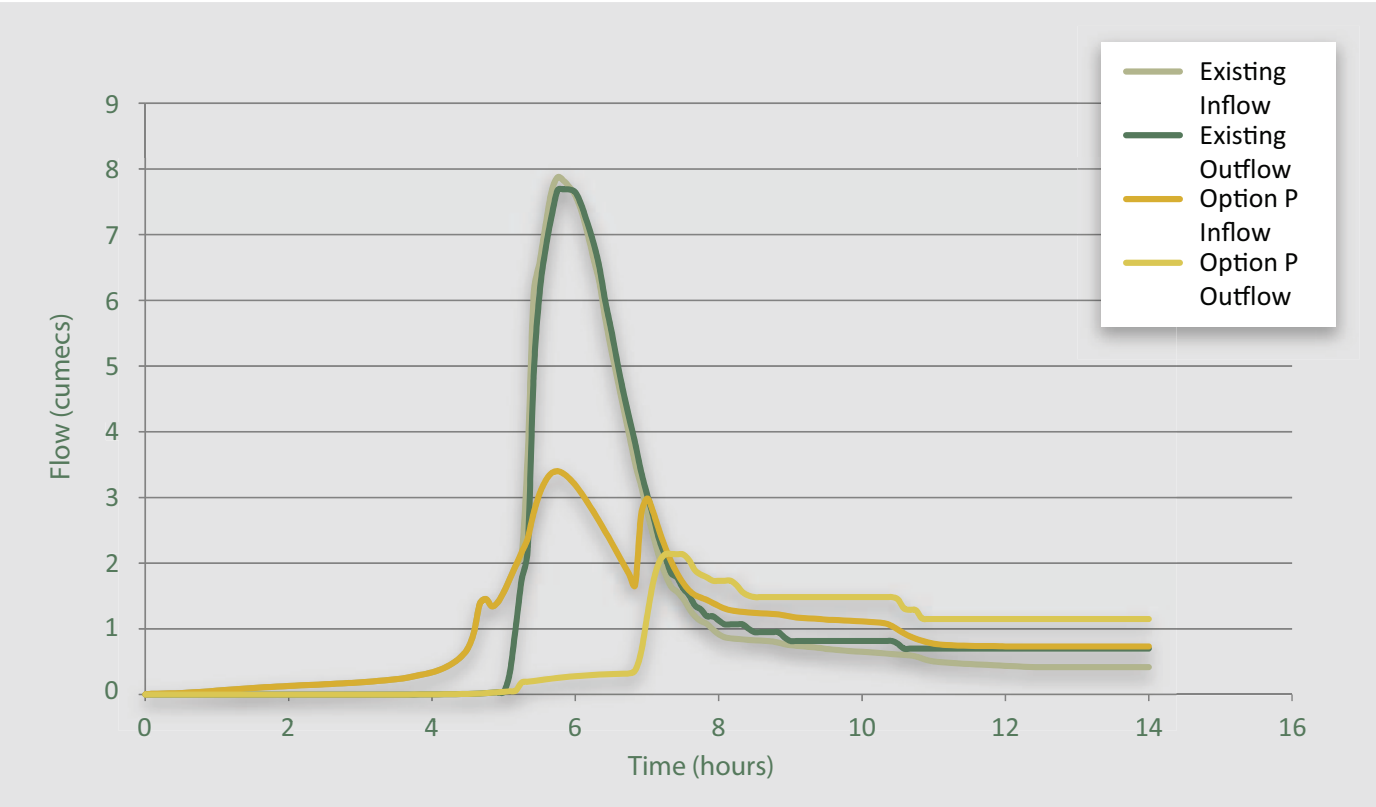
Highgate No.1 Pond - PMF event

Mixed Bathing Pond - 10,000yr



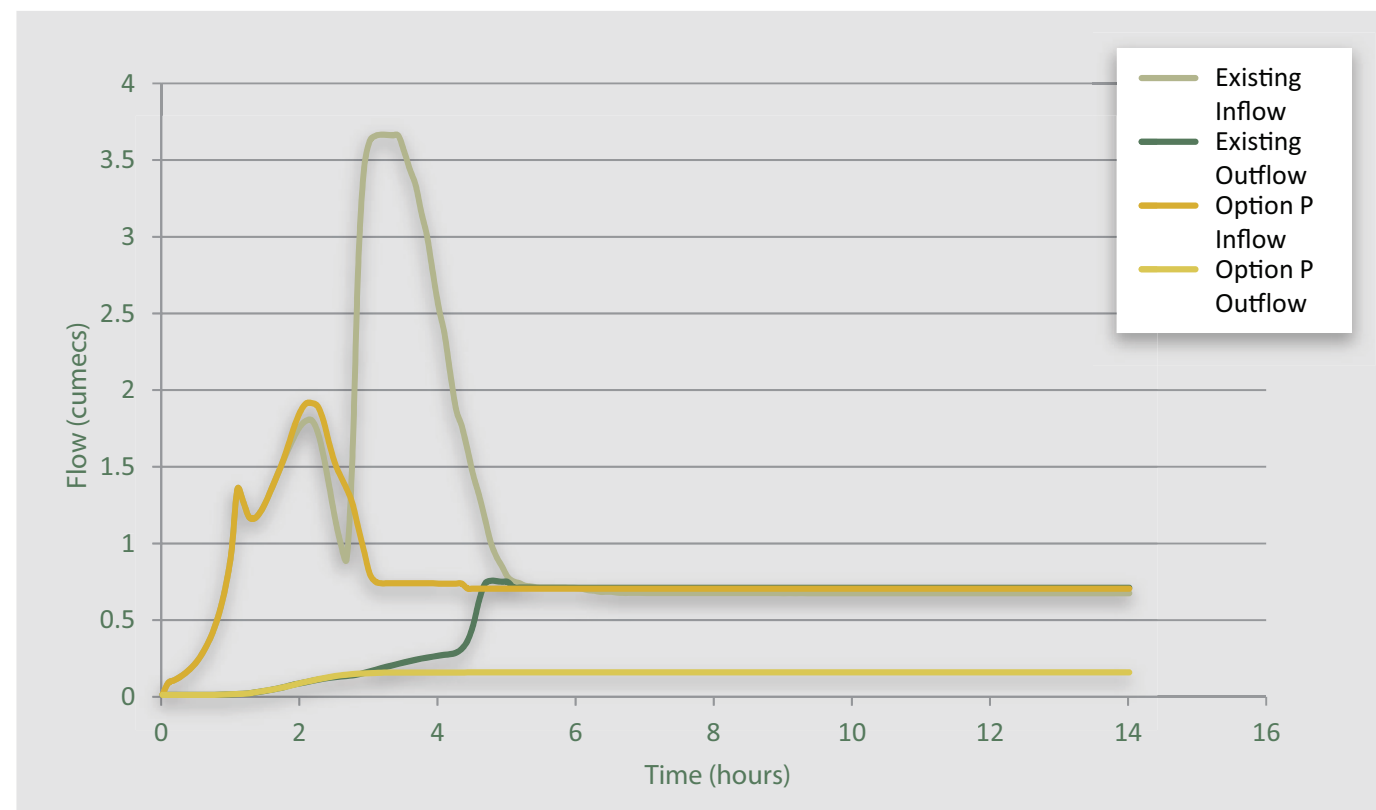
Mixed Bathing Pond: 1:10,000 year return period event

Mixed Bathing Pond - PMF



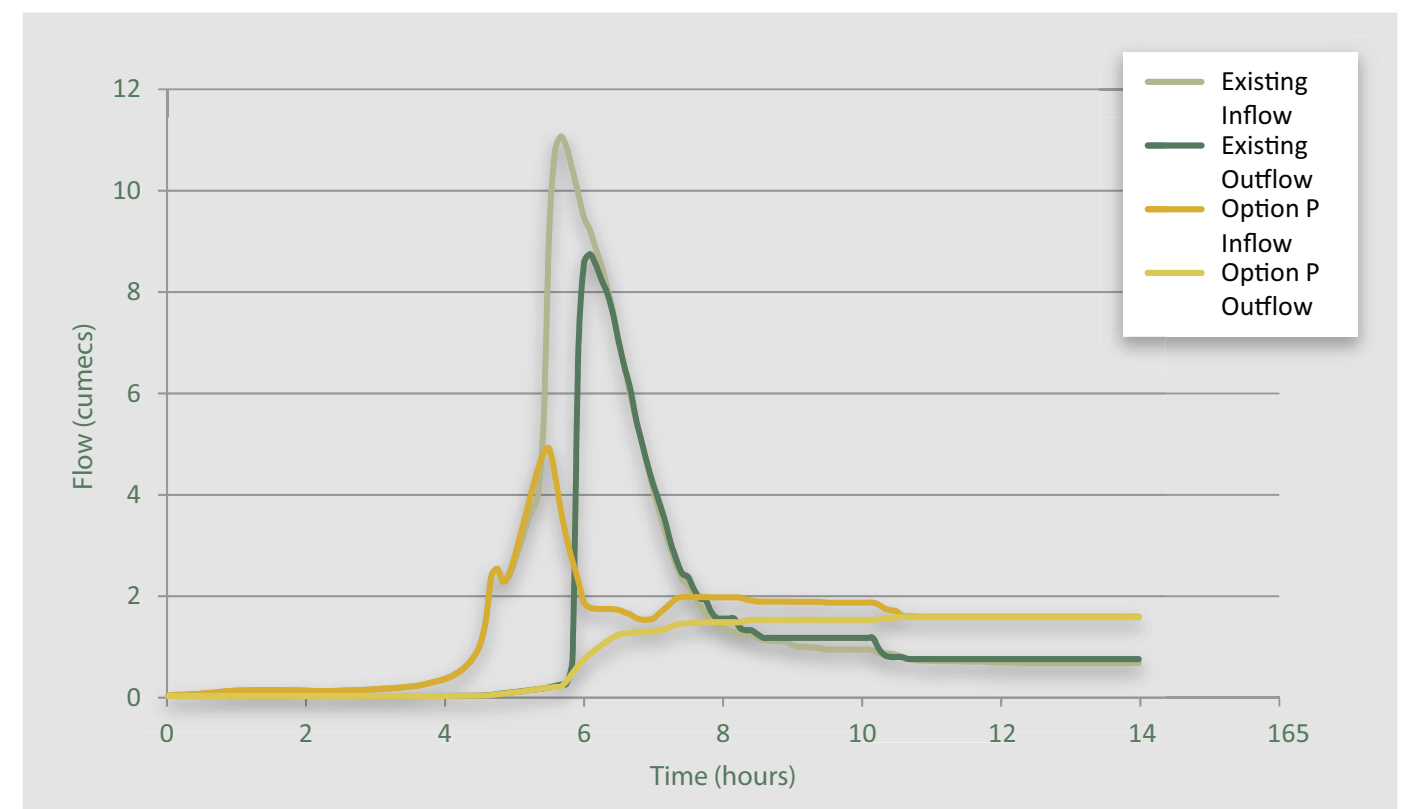
Mixed Bathing Pond: PMF event

Hampstead No.1 Pond - 10,000yr



Hampstead No.1 Pond: 1:10,000 year return period event

Hampstead No.1 Pond - PMF



Hampstead No.1 Pond: PMF event

Appendix C

Meeting notes from 14th September PPSG workshop and 30th September PPSG meeting, and comments from PPSG and West Hill Court on Preferred Options Report



**Ponds Project Stakeholder Group
Workshop**

Saturday 14 September 2013, 9:30am

Parliament Hill meeting room

Present:

Jeremy Simons	JLS	Elected Member, City of London (Deputy Chairman)
Charles Leonard	CL	Oak Village RA
Ed Reynolds	ER	Oak Village RA
Michael Hammerson	MH	Highgate Society
Mary Port	MP	Dartmouth Park CAAC
Jeremy Wright	JW	Heath & Hampstead Society
Tony Gilchik	TG	Heath &Hampstead Society
Geoff Goss	GG	Highgate Men’s Pond Association (HMPA)
Robert Sutherland-Smith	RSS	Highgate Men’s Pond Association (HMPA)
Jane Shallice	JS	Kenwood Ladies Pond Association
Mary Cane	MC	Kenwood Ladies Pond Association
Peter Wilder	PW	Strategic Landscape Architect, Wilder Associates (Facilitating)
Simon Lee	SL	Superintendent, Hampstead Heath
Richard Chamberlain	RC	Project Liaison, City Surveyor’s
Peter Snowdon	PS	Project Consultant, City Surveyor’s
Ivan O’Toole	IT	Cost Consultant, Capita Symonds
Jonathan Mears	AB	Conservation Manager, Hampstead Heath
Declan Gallagher	DG	Operations Service Manager, Hampstead Heath
Jennifer Wood	JMW	Communication Officer, City of London (notes)
Presenting		
Mike Woolgar	MW	MD, Environmental and Water Management, Atkins
Liz Brown	LB	Lead Landscape and Environment, Atkins
Ben Jones	BJ	Lead Engineer, Atkins
Mike Vaughan	MV	Environmental Engineer, Atkins

Introduction

- PW gave a brief introduction on the format of the day and said that there would be a specific meeting to deal with the QRA taking place at a later date – so this would not be dealt with in any detail at the workshop.
- JW – asked should he submit list of observations/comments on QRA prior to the meeting.
- SL – yes
- JW – programme is ludicrously short for this extremely important stage.
- SL – the revised timetable was presented to this group 2-3 months ago and the PPSG accepted it.
- JW – why is there such a problem with delaying the programme?
- GG – agrees with JW that there is not enough time to properly consult with groups, especially with so much paperwork. The PPSG were being asked to make big decisions.
- PW – programme was extended by 3 months.
- GG- not enough time. The HMPA do not feel the City are addressing their views.

- JS – still many people who do not know what the situation is and maybe this stage requires more time. It is a crucial time so perhaps extending is worth looking at.
- RSS- paramount importance that each group represented on PPSG has enough time to consult.
- PW – the PPSG agreed the timetable.
- JW – this was before they knew how much material and information they would be receiving.
- TG – not enough time spent addressing the queries on the Shortlist Options report.
- JW – when does City want written comments back on the next report?
- SL – must be in the two week time frame that was agreed.
- JW – this is not enough time.
- MC – this makes it a meaningless period of consultation.
- PW – Mike Woolgar and Atkins team will address some of the queries in the following presentation.
- MW introduced the project and said he understands it is a difficult situation and timescale is very tight.
- MW recapped the reasons behind the project and said to manage the energy of the flow, strategic storage must be added to each chain. The best location must be found where this storage will create the least damage to the Heath.
- MW gave background on Quantitative Risk Assessment – if lives are in danger, City has to do something about it. QRA is an attempt to quantify those aspects that cause risk. Difficulty with quantitative risk is there are a number of assumptions and it is difficult to quantify these. QRA should be used at the end of a design process to compare the cost effectiveness of the new design with the current situation. Rainfall is based on assumptions, as is how much water flows over and erosion (assumption based on empirical tests). Haycock used an earlier version and found up to 900 people at risk. Atkins found up to 1,400 at risk. This is too high a number for City to accept so it is taking responsible course of action to make dams safer.
- JS – this is an important document as the project has to be sold to wider public.
- TG – it is not a question that something has to be done, it is how little can be done to reduce the problem.
- MW – that is why Atkins are looking at storage in two areas and reducing the amount of work required elsewhere.
- JW- 1,400 lives at risk if dam breeches and 1,100 at risk if dam overtops – so looking at reducing the loss of life by 300 – this is marginal difference to loss of life.
- MW – not considered marginal by the City.
- RSS - even with the work there could still be substantial loss of life?
- MW – even if dams don't fail – a lot of water still goes over which there is no way of stopping.
- GG – would like to know more about the mathematical models behind this report. It could be tweaked to get different results. The model is hidden and it feels as if the PPSG and public are being blinded by science.
- MW – model is a simple mathematical type and is used in a standardized way.
- CL – interested in looking at the hydrographs for the lower return periods and has been asking for this information for over a year.
- MW – this will be done when a preferred option has been decided on.
- RSS – is it conceivable that another statistician could find this model unreliable?
- MW – inputs are audited. In these circumstances, the results are not in doubt.
- MW – we want passive systems that do not require human interaction (which often goes wrong) hence open spillways
- CL – can scour pipe at bottom of Highgate No. 1 be turned into an active system?
- SL – pipe is too small (450mm) and can't be modified to take the large amount of water it would need to.

- MW – it is a risk to rely on an active system.
- CL – can scour pipe be modified?
- SL – no.
- LB gave presentation which recapped on design principals and environmental mitigation (slides distributed)
- MV spoke about results back which showed the ponds to have poor water quality – which was not a surprise given what they already knew. Dredging is the best course of action to improve this.
- **Highgate Chain**
 - BJ talked through Options flowchart and introduced a new option – 3A. Said the standard of protection had gone up considerably which is good news for communities downstream. Now there is a 1 in 1000 standard of protection for all of the options.
 - GG – what is meant by crest restoration?
 - BJ – filling in low spots on crest (caused when a dam slumps) to bring it back to its original level.
 - JW – an increase in the standard of protection means more work on the Heath?
 - BJ – no the standard of protection increasing is a by-product.
 - RSS – do these new options take into account the comments made by HMPA on Shortlist Options Report? Has the idea of a dry diversion ditch, down the side of Model Boating and Men’s Bathing Pond been considered?
 - BJ – this option has been considered, but it makes the situation downstream worse.
 - JS – what are the measurements of the spillways?
 - JLS – from now on, can there be an upper width, a lower width and a depth of spillways on future charts?
 - BJ – yes.
 - BJ/LB and MV – talk through each pond, one by one.

The following questions were asked:

Stock Pond

- GG – will spillways increase amount of sediment entering ponds?
- BJ – it should reduce the amount of sediment
- PW – it will be dry most of the time. Spillways are self-preservation mechanism for the ponds.

Model Boating Pond

- JW – have you calculated the amount excavated and how it affects attenuation?
- GG – how wide is spillway?
- BJ – 20m and then it narrows.
- JW – H&HS found a 3m high dam to be too visually intrusive.
- GG – backs up H&HS statement, HMPA think 3m too high.
- MH – what will be the result of excavating west side on existing topography?
- LB – follow existing contours – 1 in 8 slope.
- GG – biggest radical change and also the most used pond. But doesn’t have a specific user group representing. Is City concerned by this?
- PW – it is being represented – by H&HS, Highgate Society and others.
- BJ – not been selected as it is an easy target – it is the best place to create storage.
- MH – section drawings showing changes to west side would be helpful.
- MP – Northern end of Model Boating Pond is ugly, what can be done here?
- ER – important not to lose ability to use model boats.
- LB- East edge and north edge being kept as hard edges which allows for model boating.

Men's Bathing Pond

- JW- why not bring spillway round from south west corner, and away from dam to avoid tree loss?
- BJ- lower than level of dam – but we will look into this proposal.
- GG- as there are cracks in dam, surely this needs to be checked out, before building on it?
- BJ – not had the ground investigations done yet.
- GG – in worst case scenario you may have to rebuild dam – could this not have an impact on whole project? Concerned it will become a design issue.
- MW – this is a low risk and the remedial works to the dam, such as grouting, would not be major.
- JW- in current proposals there is a half meter wall – what about increasing this to 1m?
- BJ – yes could be 1 m wall too.
- RSS- why does there have to be a wall?
- PW – embankment is narrow – so wall works best in this situation.

Highgate No. 1

- JW- What tree loss on South bank (in front of Brookfield and West Hill Court) with proposed wall?
- BJ – None at the northeast of the dam nearest Brookfield Mansions, some tree loss at the south-west end for the spillway.

Environmental Questions

- MC- will biological population of pond change with different oxygen levels?
- MV- yes biodiversity should get better.
- MC – Concerned about too many trees getting cut back, as ladies enjoy swimming under branches.
- MV – noted.
- MC – will fences be retained?
- MV – This will be looked into, but there are a few places where it would be good to keep dogs out.
- LB – fences are more of a wider management issue.
- GG – how will birdlife be protected?
- MV – contractors will be issued with orders of how to have least impact on birds.
- PW – is there merit with islands not being accessible so wildlife can be isolated?
- MV – yes.
- TG – but if island in Model Boating Pond not accessible, then not accessible for those with model boats.
- MH – management of overhanging trees needs to be explained carefully to public.
- JS – including the environmental opportunities confuses the project. Public consultation should be about the substance – the engineering, and should not be clouded by environmental gains.
- JLS – the “nice-to-have” (post implementation) work not part of the project – no authority to proceed with this work
- JW – raises idea put forward by H&HS about the whole dam between Model Boating Pond and Men's Bathing Pond becoming a spillway –the PMF could be allowed to overtop it.
- MW- face the problem of losing trees, reducing the amount of storage.
- JW draws section diagram.
- MW – if you remove storage then you need to do more work downstream.
- JW – needs written answers to comments and queries on Shortlist Options Report.
- Discussion follows on the above point with many members of PPSG feeling their concerns and queries not been adequately responded to and therefore not being properly consulted with.
- LB – Men's Bathing Pond have made a suggestion about a dry diversion ditch. Atkins plan to discuss this now and then include it in the next report.
- GG – needs to be addressed now so he can go back to his members.
- CL – needs to be addressed in writing.
- RSS – wants the options suggested by Men's Pond to appear in the options flowchart.

- BJ draws diagram and explains that in doing this the problem downstream is being exacerbated – reducing the amount of storage and increasing the amount and velocity of water heading down the hill.
- RSS- wants to see detailed modeling of this option and other options which put storage elsewhere – not next to Men’s Bathing Pond.
- GG – HMPA do not support any of the options so far put forward and think Atkins have not addressed their issues.
- JS – strategically the City and Atkins have not recognised what they are up against. Comments need to be taken seriously and responses need to be made.
- CL – the rest of the groups need to see the written responses to each group.
- PW – these comments deserve written answers.
- GG –this needs to be done urgently.
- SL – the period of stakeholder consultation can be extended by moving PSG to one week later in October – 21 October, means moving Consultative Committee back to 12th Nov and Management Committee to 21/22 Nov.
- JW – acknowledges City and Atkins have tried to accommodate enough time, but it is too tight and welcome this extension.
- SL – additional meetings will be set up with those who made queries (H&HS and HMPA) and written answers will be distributed to whole group.

Hampstead Chain

- BJ talked through Options flowchart and introduced a new option – P. Raising Mixed Pond by 2m and increasing dam at Hampstead 2 would reduce Plane tree loss to 1

Questions on Hampstead Chain:
Vale of Health

- JW – could there be a pipe instead of a spillway?
- BJ – it’s both at the moment but can be looked at.
- JW – if a pipe can reduce tree loss, then it is preferable.

Catchpit

- RSS – is the ‘S’ shaped dam still an option?
- BJ – yes, but need to get exact location of trees from topographic survey.
- JW - what about difference in volume stored?
- BJ – not got that yet, but don’t think it will make a huge difference.
- TG – could you go up to 5.8m height embankment, so no water would overtop?
- BJ – yes this could be done.
- PW – location of embankment is important – is it preferable to put it in an area where more trees would be lost, or where a few veteran trees would be lost?
- SL – it can be hidden better further north.

Mixed Bathing Pond

- JW –can whole dam be a reinforced spillway?
- SL – is an armalock reinforced slightly lower dam crest preferable to a spillway?
- MC – how much does new earth embankment encroach on pond?
- LB – 3 to 6 m with a 2m high embankment.
- GG – concerned that the increased height makes the ponds look like reservoirs.
- JW – surprised there is no silt analysis yet – if it is contaminated it will be costly to dispose of.
- SL – silt testing taking place soon.
- Discussion took place about 1m high raising and a 1m high wall to achieve the 2m. Wall could be clad in green oak. Pallet of finishes is detailed design issue.

Hampstead No. 2

- JW- Can the wall be raised more than half a meter?
- BJ – this may have an impact on the adjoining properties.

Hampstead No. 1

- JW- is spillway in far right corner – farthest right the better.
- BJ – yes.
- PW – should water quality be improved on this pond, as it is end of chain?
- MV – one of the most interesting ponds ecologically on Heath.
- JW – a site walk talking about environmental mitigation and compensation would be valuable.
- GG – got to be careful to cause confusion about what is driving the project. It should be dam safety, not water quality.
- PW – key issue on Hampstead Chain are location of Catchpit dam and height of mixed pond dam.
- MC – the 1 m raised embankment and 1 m wall might be visually better than 2m embankment at Mixed Pond.
- PW – Atkins need to summarise the trade-offs succinctly – 1m raising at Mixed Pond results in two trees lost at Hampstead No. 2. A 2m raising at Mixed Pond, results in 1 tree lost.
- ER – more section diagrams would be helpful.

Summing Up

- PW – these are all emotive issues. We are all concerned about the Heath. Stakeholders need answers to their questions. This is not the end of the consultation process, still much of the way to go and open to hear more questions and comments. The QRA is going to require more dialogue and a session on this will follow.

Workshop finished: 3 pm.



Ponds Project Stakeholder Group

Monday 30 September 2013, 6.00pm

Parliament Hill meeting room

Present:

Karen Beare	KB	Fitzroy Park RA (Acting Chair)
Jeremy Simons	JLS	City of London elected member (Deputy Chair)
Tom Brent	TB	South End Green RA
Rachel Douglas	RD	Mixed Pond Association
Geoff Goss	GG	Highgate Men's Pond Association
Michael Hammerson	MH	Highgate Society
Prem Holdaway	PH	Hampstead Heath Anglers Society
Harriet King	HK	Brookfield Mansions RA
Simon Lee	SL	Superintendent, Hampstead Heath
Mary Port	MP	Dartmouth Park CAAC
Ed Reynolds	ER	Oak Village RA
Jane Shallice	JS	Kenwood Ladies Pond Association
Ellin Stein	ES	Mansfield CAAC
Peter Wilder	PW	Strategic Landscape Architect, Wilder Associates
Jennifer Wood	JMW	Communication Officer, City of London (notes)
Jeremy Wright	JW	Heath & Hampstead Society

Alternate members observing

Harley Atkinson	HA	Fitzroy Park RA
Mary Cane	MC	Kenwood Ladies Pond Association
Tony Gilchik	TG	Heath & Hampstead Society
Susan Rose	SR	Highgate Society
Robert Sutherland-Smith	RSS	Highgate Men's Pond Association

Officers observing:

Liz Brown	LB	Lead landscape and environment, Atkins
Richard Chamberlain	RC	Senior Project Liaison Officer, City Surveyors
Declan Gallagher	DG	Operations Service Manager, Hampstead Heath
Ben Jones	BJ	Dam Engineer, Atkins
Ivan O'Toole	IOT	Client Representative, Capital Symonds
Paul Monaghan	PM	Assistant Director Engineering, City Surveyors
Peter Snowdon	PS	Project Consultant, City Surveyor's

JLS started meeting with a welcome to Prem Holdaway who was attending for the first time

1. Apologies

Charles Leonard (Oak Village RA)

2. Acting Chair and Deputy Chair

- JLS- upon discussion with Ian Harrison, Karen Beare had been appointed as Deputy Chair and will be Acting Chair.

- KB - thanked the group for supporting her, she recognised that this was a sensitive project and asked the members to be mindful of behaviour and language after a robust discussion at the workshop on September 14.

3. Approval of previous note

- Approved – MH to be added to apologies from July note.
- KB – thanked JMW for all her ongoing support for the HHPP.

4. Matters arising

- SL – all of the items will be picked-up on the main agenda
- HK – including the legal meeting?
- SL – yes – to be dealt with under item 6.
- KB – item 5 and 6 have been swapped round with item 6 to be taken next.

5/6.Update on other meetings and follow up to PPSP Workshop

Brookfield Mansions Meeting - 14 Aug

- SL – lots of work been going on over the summer. In August there was a meeting with Brookfield Mansions and Oak Village which focused on Highgate No.1 Pond. It was well attended and included representation from West Hill Court, which is next door to Brookfield. A detailed note was circulated to the PPSP with answers to the questions asked by Brookfield Mansions. Items discussed included: design options, discharge, valves, standard of protection, depths of proposed spillways.
- PH – where does proposed spillway from Highgate No. 1 pond go?
- SL – the water will follow its course down the hill and the spillway will take water into the street and sewer system.
- PH – could the scour pipe not be considered as a way of the water leaving the pond?
- SL – this pipe does not have the capacity in the large rainfall events – could surcharge the system and make the situation worse.
- HK – but was used in 2010 and did not make situation worse.
- SL – 2010 was a very small event and the pipe was only opened a tiny amount
- HK – Brookfield has never been flooded and the fact the scour pipe has been used before should be taken into account. Requested discharge capacity for scour pipe – this had previously been kept from PPSP.
- PM – the scour pipe cannot be used in large rainfall events and the location is on top of the dam and would be dangerous to access if water was flooding over top. Some dam information is kept confidential for security reasons.
- HK – would like to go through all of the responses with Rob Mitchell and Charles Leonard before coming back to the City and Atkins. Lots of technical information which is difficult to digest. Requested a contour map of the Highgate No. 1 area.
- SL – topographic surveys currently underway and will be shared as soon as received.
- KB- Questions from PPSP need to be answered promptly.

Men's Pond Association Meeting – 27 Sept

- SL – another meeting was held with Highgate Men's Pond Association (HMPA) to talk through some of their concerns.
- KB –HMPA members were sensitive of any potentially detrimental knock-on effects of their proposals particularly down-stream - no wish to make current situation worse.

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- GG – Highgate Men's Pond Association's concerned that a large dam at Model Boating Pond and a high wall at south end of Men's Bathing Pond not welcomed. They looked at mitigating the effect of concentrating the majority of the work in that area. HMPA feel that City is concentrating work here because it is cheaper. HMPA came up with a solution that puts a dry diversion ditch down the side of Men's Bathing Pond and Highgate No. 1 pond. This was discussed with Atkins and the City at a meeting on Friday 27 Sep. HMPA also want to know if it would work as a compromise, in combination with a smaller raising at Model Boating and a dry diversion ditch
- ES – what are the concerns of the HMPA – and were they being addressed?
- GG – high wall one side and 3m raising on other side could make pond feel more like a reservoir – destroy character.
- TB – concentrating work in middle of the chain of ponds is of huge benefit to Heath – that is a principal which was agreed in the beginning. A channel down the side would have a huge visual impact on the Heath.
- RSS – Men's Pond are not happy with current proposals – a 3m raising at Model Boating also a huge visual impact.
- GG – does not agree with TB.
- SL – the channel would have to be quite wide – around 50m.
- BJ – after doing some additional modeling, the flood return period would be lower than the current situation at Highgate No. 1 pond with a dry channel as suggested by HMPA . Standard of protection goes would be worse than existing - below 1:50.
- SL – these are the trade-offs. City must consider its responsibility as a good neighbour. The water would also be released at a faster speed.
- TB – with this proposal the ponds cease to be a chain.
- BJ – dry channel would need to be between 30m and 60 m wide.
- GG – what about if you have a 1m raising at Model Boating pond?
- BJ – 50m wide.
- GG – I think my colleagues in HMPA realise it is not a viable option, but we do want to look at other solutions.
- PH – a dry channel would destroy the aspect of Hampstead Heath. The pipe work should be upgraded and considered as an option.
- SL – the pipes are just not large enough to take the large flood events.
- PH – but correct balance between pipes and then reducing size of spillways should be considered.
- KB – this issue has been discussed and hopefully as we move on to discuss proposals this will be clear. Further modeling has shown that the proposed 3m at Model Boating Pond has been reduced to just over 2m.
- GG – still hard to sell these proposals to HMPA.
- SL – we recognise this.
- JS – does earth embankment have to be located where it is – could it be moved further north – with less impact on the Men's Pond?
- SL – if it goes too far north it ends up splitting the pond and you reduce the storage so height of embankment would need to go up.
- MH – unhappy with proposal to extend Model Boating Pond to the west as it will change the whole area. What about a pipe that runs the same course as the dry channel proposed by HMPA – 2m diameter?
- SL – just too much water – a pipe would not be big enough.
- TB – PMF has been over calculated.

Heath & Hampstead Society Meeting - 20 Sept

- JW talked about the meeting the H&HS had with Atkins to talk through his various ideas. One of his solutions is to allow overtopping of the whole dam at Model Boating Pond and

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same with Mixed Bathing Pond. A robust discussion took place but the feeling was every proposal H&HS made was batted back. Requested a number of cross sections of the Mixed Pond proposals. A number of his queries are still to be answered, including queries on QRA.

- SL - these are being dealt with at the moment.
- JW – thought the meeting would be an informal discussion with the designers with "sleeves rolled up" to think outside of the box but ended up being a more formal meeting attended by several City officers.
- TB – we're now 18 months into the process and lots of these ideas have been washed out in the discussions – why are they being brought up again?
- JW – because 3m high raising at Model Boating Pond is not acceptable.
- GG – good to bring in new ideas.

Proposals for the Highgate Chain

- BJ – talked through new proposals on Highgate Chain – 3m high raising has now been discounted. Options 4 and 6 are two preferred.

	Option 4	Option 6
Model Boating Pond	2m	2.5m
Men's Bathing Pond	1.5m (wall)	1m (wall)
Highgate No. 1 Pond	1.25m (wall)	1.25m(wall)
Standard of protection	1 in 1000 year	1 in 1000 year

- HK – not happy with 1.25m wall at Highgate No. 1.
- TB – how would wall be built?
- BJ – various different options on how it would be built, but could be clad in timber.
- GG – could vegetation be grown over?
- SL – yes.
- JW – standard of protection has gone up –what extra storage has had to be put in to achieve this?
- BJ – no extra storage, it's simply a by-product of these options. We were not aware of this before as we had not had a chance to run all of the models.
- JW – standard of protection being increased must have impact on Heath.
- SL – no. Design is to pass the PMF, so the final design must do this – not designed to get better standard of protection it is a by-product of the option to safely pass the PMF.
- HK – is standard of protection to do with overtopping?
- SL – no, it's when water starts to come over the spillway
- HK – request more visuals of the Highgate No. 1 pond area – showing what wall would look like.
- TB – we are now talking about 1m high walls – not as radical as had first been proposed. It's strange we are still looking at such a wide range of options at this stage.
- BJ – we start with the biggest (PMF) and then we ran all the different return period sized floods because people were concerned about the situation downstream being made worse.
- HK – has historical rainfall data been considered?
- BJ – we use a statistical model but historical data is considered by this model. It was considered.
- KB – have Atkins run the 1975 flood thorough the model?
- BJ – work has been done on 1975 flood and was shared with PPSG. Will share this again.
- SL – the design has to follow industry standard and it's not industry standard to run historic floods.
- GG – how high would the embankment need to be for the 1975 flood?
- SL – unfortunately it's irrelevant – we have to design to a standard set out by the Institute of Civil Engineers.

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- TG – if people are worried about the model, then why not run the 1975 flood through the model?
- SL – Haycock did a lot of work on the 1975 flood and it was not centered on the Heath.
- TB – can technology not be used to move the 1975 storm onto Heath and run the model?
- PM – we can't model the 1975 event as we don't know exactly what happened. For example, the previous Superintendent opened a valve – but we don't know when or for how long. We would not be comparing like for like.
- TB – it would be helpful for the layman as a comparator.
- HK – are the models not validated by previous events?
- SL – yes, figures in the Flood Estimation Handbook take into account previous events and local rainfall data.
- PH – in 1975, no dams overtopped – lots of bushes fell down and trapped a man.
- BJ – will get hydrologist to explain what they've done with the 1975 event.

Proposals for Hampstead Chain

- BJ - talked through new proposals on Hampstead Chain – Options M and P.

	Option M	Option P
Mixed Bathing Pond	1m	2m (embankment or wall combination)
Hampstead No. 2	3x 3m box culverts	0.5m wall, 1x4.5m box culvert
Hampstead No. 1	1x4.5m box culvert	1x4.5m box culvert
Standard of Protection	1 in 1000 year	1 in 10,000 year
Tree loss on Hampstead No. 2	2	1

- PH – what will be effect to angling to building walls and raising dams?
- SL – this will need to be looked at.
- RD – Mixed Pond Association feel very strongly that 1m is the absolute maximum they would accept otherwise the character of the pond will be lost.
- JW – these are not new options – no new innovative solutions.
- SL – worth remembering that Panel Engineer can still exercise his judgment over these designs.
- BJ – advised that it is difficult to look at safety of dam issues outside the box, what happens if this results in a failure and you end up in court.
- KB – need to move on to the QRA meeting and the legal meeting.

Legal Meeting -19 Sept

- JW – legal meeting took place between the City's Q.C and the H&HS's Q.C. Useful exchange of the two points of view.
- JLS – Edward Wood (City solicitor) and Marc Hutchinson are working on a note to be sent around the PPSG. No agreement from meeting. The issue of how you consider risk was discussed and City believes it is proceeding correctly.
- TB – how long before PPSG can see the note?
- SL – pressing to get this as soon as we can.
- KB – the note should be as full as possible
- HK – how far can you go with the project without this issue being resolved?
- SL – City must proceed – if the H&HS is going to call a Judicial Review we will deal with that when it comes.
- JW – H&HS will consider its options after the public consultation and this will depend on the final chosen design.

JMW/01/10/13

- PH – the project appeared on BBC Radio 2, Jeremy Vine show, someone from Atkins was interviewed. Have requested transcript.
- SL – not aware it was on this show – please share transcript.

Meeting on QRA – 27 Sept

- JW – QRA meeting, only Andy Hughes present, not the author of the QRA as had been promised. Discussion was political and strategic and the questions submitted by the H&HS were not answered.
- SL - there will be a written response provided.
- JW – no attempt to look at the reduction in loss of life if 2 hours warning is given, which H&HS believes there is plenty of time to do. H&HS has very little confidence in QRA and would like to see the answers to their queries.
- KB – at the meeting there was lots of discussion on early warning – both warning people and having weather warnings. The problem seems to be, in a PMF event – Heath officers, or Police and Fire cannot be expected to go in as it will be too dangerous. Weather forecast is not guaranteed. What still not understood is, if the number at risk is vastly reduced – how does this affect the design?
- PW – if fewer people are at risk, what should City do? If there is one life at risk, City must carry out the work.
- JW – people take risks every day i.e driving a car. Is it reasonable that the City builds impregnable dams to eliminate risk, when there are lots of other risks society accepts? Needs to be decided on in a court of law.
- TB – very difficult to meet in the middle with this.
- PH – what happens if there is another storm of the same size the following day?
- SL – it could happen. It's all about consequence, societal risk is different to individual risk.
- TB – early warning should be taken into account.
- KB – yes, but it cannot be warranted.
- TB – it's an issue for government. City must follow legislation.
- PW – Atkins need to come back with answers to outstanding queries and point people in the direction of the correct reports. QRA is complex but Atkins are following standards.
- KB – this is a long process with a lot of information, so questions need to be answered in context.
- HK – what is responsibility of Environment Agency?
- PM – In regards dams they are the enforcement authority. They have other responsibilities with river flooding, which does not affect us.
- GG – requests cross sections to help visualize proposals so decisions can be made.
- JW – cross sections in Model Boating Pond were very helpful.
- ES – helpful to see a glossary.
- SL – we will recirculate.

8. Update on Public Consultation – Jennifer Wood

- JMW - City has taken on an external consultant – Resources For Change. This organisation worked on the Heath previously and knows it well. The City met with them on Saturday and they are working up a detailed plan now, which will hopefully be with the city by the end of the week. **PPSG invited to meet with the consultants on Monday, 14 October at 6pm.**

7. Update on Contractor Appointment – Simon Lee

- SL – Thanked JW and SR for their involvement. Currently at site visiting stage and hope to have appointed by late November.

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- JW – impressed with quality of the contractor and the emphasis City has put on environment and working in a public space.

9. AOB

- JW – constituents are concerned by landscape and ecological proposals. Can City clarify these are only indicative and further detail, such as site walks, will follow.
- SL – yes, but still important to feed back any comments throughout the process.
- PH – request the diameter of pipes on both Highgate No.1 and Hampstead No. 1, plus length and angle.

Dates for future meetings:

- Monday, 14 October - meeting to discuss the Consultation
- Monday, 21 October
- Monday, 18 November
- Monday, 9 December

Comments from PPSG on Preferred Options Report

Source	Comment
Highgate Men's Pond Association (HMPA) 16 October 2013	<p>The HMPA recognises the efforts undertaken by the City and its advisers to reduce the scale of the proposed dam works from that originally proposed. Nevertheless, the HMPA does not support either of the so-called "preferred" options for the following reasons.</p> <ol style="list-style-type: none">1. The Hampstead Heath Act 1871 requires the Heath to be kept in its natural state and the proposed works, in their proposed scale, are in direct conflict with that requirement.2. The HMPA believes that appropriate levels of protection from flooding can be achieved with the use of various techniques, including early warning systems, which have been disregarded in the preparation of the Preferred Options Report. <p>On a separate matter, the HMPA considers that the coloured pictures and maps contained in the Report are highly misleading. In particular, the maps of the Model Boating Ponds and the Men's Bathing Pond misleadingly conceal the true and enormous size of the proposed spillways and the disfigurement they will cause to the surrounding landscape.</p>
Highgate Society 18 October 2013	<p>The Highgate Society is the amenity society for the Highgate area. It is a voluntary organisation with c. 1,400 members living in and around Highgate, and its purpose is to make Highgate a better place in which to live and work. It is a founder-member of the Hampstead Heath Consultative Committee, and the western part of Highgate is bordered by Hampstead Heath.</p> <p>We are focusing our comments on certain major aspects of the Highgate chain. We find it difficult to comment more constructively on a number of points which were flagged up in our response to the previous Options consultation paper in August but which do not appear to have been adequately addressed by the current paper; our members would appreciate a response to the points we raised in the August consultation. Our comments are as follows:</p> <p>A. Stock pond. We see no need for a fixed island, and consider that it would also be damaging to the character of the pond, which is particularly valued for the clear views across its often smooth water to the trees and vegetation around its edges. We also consider that any reduction of overhanging branches should be minimal, as this, too, is an essential element of the pond's character. The "environmental mitigation and compensation" measures should be dealt with at a later stage, once the engineering</p>

Source	Comment
	<p>issues have been decided. The imprecise descriptions of such proposed work also confuse the picture of what is really required, not least because the City of London remain unwilling to share their interpretation of the reservoirs legislation with the Stakeholder Group.</p> <p>B. Spillways. The stylised orange lines used to show the routes of spillways on all ponds are insufficient to allow reasonable comment, since the lines on the drawings are significantly narrower than the actual maximum width of the proposed spillways. We would ask that accurate, to-scale images should be produced, and that the maximum widths of all spillways should be marked on the ground to enable us to judge their actual impact. More detail is required regarding such issues as plants that can remain in the spillway, trees to be lost and resultant impact on views for Heath users.</p> <p>C. Bird sanctuary Pond. We consider that the proposed new channel and wetlands in the western sector of the pond are an unnecessary intervention and potentially disruptive to the established birds and other wildlife here. Water quality improvements, not water features, should be the main aim. The document indicates "no spillway", yet two are marked on the plan. We need more information about the "replacement of overflow pipe". The stated overriding aim: "Retain water level, minimize intervention to improve discharge capacity with sensitive implementation to minimise impact on wildlife habitats and visual amenity, and retain the wild and natural character of the Heath", as with much else in the long document, lacks clarity, confuses the issue of improvements with the fundamental one of rendering the dams safe, and should be considered in detail only after the basic dams reinforcement work has been agreed.</p> <p>D. Boating Pond. On the basis of the information available to us, we consider that Option 4 is preferable to option 6. However, a 2m increase in the height of the dam is still going to have a dramatic impact on the character of the area. We would consider it to be the maximum acceptable height by which the dam can be increased, but would nevertheless expect considerable public disquiet at the proposal at the wider public consultation stage. Our support for this option must therefore be dependent on more information:</p> <ul style="list-style-type: none">- much greater clarity about the location, size and look of the spillway;- greater clarity about the impact of pond widening on the steepness of the slope on the western bank; the proposed profile drawings in the document are not consistent and appear also to be incorrect, and they do not appear to relate to any of the actual sections indicated on the plan. At least three profiles of the "before and after slope", at equal points along the bank of the western edge of the pond, are necessary.

Source	Comment
	<p>E. Public consultation – next steps. We are increasingly concerned that the options report appears to be getting longer and more complex, while also being too vague on important points, with too little on engineering changes that will impact fundamentally on the Heath, and too much on “greening issues” which we believe cannot be finalized in detail until whatever major dam reinforcement works may be necessary have been agreed. It is vital that the Stakeholder Group is able to see and comment on the draft public consultation document, to be satisfied that that it shows the wider public, to whom this will be new and complex, in clear, simple and unambiguous language, what will change, how it will look and, most importantly, a clear legal justification of why the changes are needed.</p>
Hampstead Heath Anglers Society 18 October 2013	<p>Page 3/1. Summary.</p> <p>1.1/1.2. I take it these are the preferred options of the city of London and Atkins and not any of the stakeholders preferred options.</p> <p>Page 4/2. Overview of decision-making process and options development.</p> <p>2.1. From what I have read so far. The progress so far is entirely on the city of London and Atkins side and ignoring several pertinent questions including my own. What is the diameter, angle and length of the second run-off pipe behind the fencing on Highgate number one pond. I also have not been given the angles of both the Highgate Main run-off pipe and the Hampstead run-off pipe, which is relevant to their run-off capacities.</p> <p>You also state the options development phase will, culminate in a 12 week period of non-statutory public consultation over the winter months. Any consultation and exhibitions on the Heath should be done over the period of the summer months for maximum attendance of the general public.</p> <p>Page 4/2. Brief summary of problem definition.</p> <p>2.2. You State that, while complying with the reservoirs act 1975. This act was already complied with in the early 1980s. The stock pond had a new pipe put in at the western end, which was fitted above the then existing water level. Consequently raising that water level. No knowledge of what was done in the ladies pond. The bird sanctuary pond had a new pipe fitted in the western end. Approximately 2 feet above the then existing water level. The boating pond had a new larger diameter pipe fitted were it now exists and the old pipe removed. Do not know of any modifications to the men’s pond. The first pond. The existing pipe was increased in diameter. And a new pipe fitted the other side of the fence on the private land. So it is only the 2010 act or the parts of the 2010 act that affect Hampstead Heath that needs to be taken into account.</p>

Source	Comment
	<p>2.4. You State, however even at these lower values the dams will overtop. If the existing pipework is left in place then these dams will overtop. With a combination of larger pipework, as in my design and minimal raising of the dams. There should be no overtopping at all.</p> <p>2.9. As already said. The reservoirs act 1975 has already been complied with.</p> <p>2.10. In view of the work planned to be carried out. This is way over and above the requirements of the flood and water management act 2010. Therefore would be in complete contravention of the Hampstead Heath 1871 Act.</p> <p>Page 5/2. Key objectives</p> <p>2.11. See previous comments on reservoirs act 1975</p> <p>2.12. Why is the flow not being allowed to increase considering there were three six-foot diameter pipes going underneath the Midland line which we were informed. Two were for the flood relief of the Highgate chain and the third one was for the flood relief of the sewers. No idea what was done at the Hampstead chain. Apart from the dam at the number one pond was raised approximately 6 feet with a new outflow pipe and the stopping of anglers fishing from that bank because it was now too steep.</p> <p>Page 6/2. Design philosophy.</p> <p>2.15. The design philosophy includes:</p> <p>There has been lots of talk about margin planting and softening, removal of the bottom feeding fish. Also planting on upstream faces of the dams. Various protection for animals and habitat, softening of edges by creating new margins, softening the edges and banks by excavating new margins set back from pond.</p> <p>This gives the impression that you are trying to turn an animal/bird sanctuary on the lines of the Barnes reservoirs.</p> <p>In all of these works. No consideration has been given to the anglers and the need of access to all the banks that they have always had access to. Also there has been no consideration to wheelchair users (whether anglers or general public) that wish to get access to the banks. While wheelchair users have not always had access to all of the banks. They had access to the mixed swimming pond, southern bank (which will be lost under the current scheme) and the boating pond banks. East bank and West Bank. In the current plans they will lose the access to the West Bank. Also any model boat users will lose access to the boating pond. The bank softening and planting has already been carried out on the Wanstead Flats boating pond and the only thing that sails on there</p>

Source	Comment
	<p>now, are the ducks! There is also a lot of talk of adding islands to the ponds. Again this will be taking away the amenities and visual aspect from the public and also reduce any storage capacity.</p> <p>2.15. Paragraph 3. Planting on the upstream face of dams. Any planting on the dams faces would impede access by the anglers and the general public. Any raising of the dams should still allow access to those bank edges.</p> <p>Page 9/4. Incorporation of suggestions from stakeholders.</p> <p>4.4. Desilting of ponds.</p> <p>Both number one ponds should also be desilted as they are now very shallow compared to what they used to be.</p> <p>4.5. Retaining the group of trees on the West Bank of model boating pond and turning the area into a peninsula.</p> <p>The HHAS cannot agree with this at all. This is completely unnecessary and entirely in contravention of the Hampstead Heath 1871 act. Which states: And whereas it would be of great advantage to the inhabitants of the metropolis if the Heath were always kept uninclosed and unbuilt on, it's natural aspect and state being as far as may be preserved. It is also not required under the flood and water management act 2010.</p> <p>Page 11/5.5 I suspect with a crest restoration of up to 500mm would not be enough with a spillway, 500mm deep. This would put a spillway at the same depth as the water. With all the mitigation that you have planned for this stock pond. You are drastically reducing the surface area thus reducing potential storage area.</p> <p>Page 14. Kenwood ladies bathing pond. Any planting to the West of the ladies pond should be done with great care as that field has some rare orchids. Especially towards the northern end.</p> <p>Page 15. Bird sanctuary pond. This is the only pond that I think should have its water level lowered back to its original (or slightly less) prior to the 1975 dams act being carried out. At the moment it is approximately 2 feet higher than it used to be. Once brought back to its original level, this would allow the space to be used for any flood storage. Thus lowering any increase in dam heights further downstream.</p> <p>Page 16/21. Model boating pond.</p> <p>The size and shape including the existing bank edging should remain the same. This is a model boating pond and one of the few ponds that wheelchair users have access to and should remain the same. Any raising of the dams should be no more than 1 m with access to the water's edge still available to anglers.</p>

Source	Comment
	<p>Page 22. Men's bathing pond.</p> <p>Raising the dam by 1.5 m and yet you quote a spillway of 750 mm below the top of the new wall. To me this means the dams is at least 250 mm higher than it needs to be. There should be no creation of new margins as this would impede angling and also snag fish and possibly breaking lines, with the consequent hook and line left in the fish with the fish unable to move.</p> <p>The trees on the West Bank should be trimmed well back to allow the reed beds to regrow that used to be there. The fencing on the West and North bank should be removed as it is in contravention of the Hampstead Heath 1871 act. Prior to that fencing being put there, there were four places that could be fished from.</p> <p>Page 25/27 Highgate number 1 pond. Anglers no longer have access to this pond. When did this happen. Why is it the city of London are so intent on depriving the public access to the ponds by either fencing off with wooden fencing or using natural means.</p> <p>You are planning a spillway at the southern corner of this pond. Which is the route that this spillway will be taking. I believe it's only exit is via the public highway. I do wonder if this is legal to purposely run floodwater onto the public highway. Possibly endangering life.</p> <p>Page 28. Options 6. All the comments above also applies to this option.</p> <p>Page 34/6. Preferred options-Hampstead chain.</p> <p>page 35. Vale of health pond.</p> <p>The potential spillway to the northern end of the dam should not be considered. This is the only access to anglers on that side of the pond all previous accesses to that pond are now heavily overgrown with trees and trees that have collapsed. Making it impossible to fish from that side of the pond other than the northern corner.</p> <p>Any hibernacula's should be restricted to the ponds that have the original iron fencing around.</p> <p>Page 36. Viaduct pond.</p> <p>Any amphibian and reptile hibernacula should be restricted to the upstream side of the Viaduct and the East and West banks given back to the anglers. The reason for this is the southern bank. I.e. the dam crest is too narrow to fish from and allow public to pass by, without possible confrontation.</p>

Source	Comment
	<p>Page 43. Mixed bathing pond</p> <p>this pond is the only pond on the Hampstead chain that has access for wheelchair users. Whether anglers or public. Therefore we feel this dam should not be touched.</p> <p>Page 46. Hampstead number 2 pond.</p> <p>Any planting to the West Bank should give consideration to access by anglers. Again no hibernacula's should be considered.</p> <p>Page 47. Hampstead number 1 pond.</p> <p>This pond like the Highgate number 1 pond should be dredged, as it is a lot shallower now than what it used to be. It's also been fenced off with natural planting and fishing on both number one ponds have been taken away from anglers. Why is this. The East bank now seems to be considered as private land.</p> <p>There is a box culvert. Obviously going through the dam. Where does that go to. And where does the overflow pipe going to. They should both be going into the fleet drain, which should be able to take all of the PMF on the Hampstead chain.</p> <p>Page 48. Option P works description.</p> <p>All above comments to the above option, apply to this option P.</p> <p>Volume 2-comments on shortlist options report 11th of October 2013</p> <p>page 6. Query number 163. Jeremy Wright of the Heath and Hampstead society queries. On a single exception being made to the water level of the boating pond.</p> <p>If this pond was lowered to its original level (approximately some 4 inches lower than what it is now along with the lowering of the bird sanctuary to its original level) this would allow more storage with less dam height.</p> <p>Summary</p> <p>On many occasions there is talk of the spillways being designed for Possible Maximum Flood. Then on other occasions. The spillways to be designed to discharge the 1 in 10,000 year flood with the surplus PMF allowed to overtop. Why is this, considering the Flood and Water Management Act 2010 states that the dams must be able to pass a 1 in 10,000 year flood without collapsing?</p> <p>If these tributaries are part of the River fleet. I believe the law allows for, floodwater to be passed downstream, provided they do not cause a dam collapse. Therefore the 3 exit pipes should be enlarged to take the 1 in 10,000 year flood.</p>

Source	Comment
	<p>All 3 pipes should be increased to at least 4 feet in diameter. If the 2 people that I and some friends spoke to at the time of the 1975 dams act upgrades. The 4 foot pipes on the Highgate chain would then be running into 2 six-foot pipes. This would drastically reduce the requirement for water storage.</p> <p>The Hampstead chain. I believe should still be running into the fleet drain, so should be able to take all of the floodwater coming down the Hampstead chain through a suitable size pipe and spillway.</p> <p>I'm sorry to say this and if I offend anybody then I apologise, but I get the impression that the Corporation of London and Atkins are trying to pull the wool over the public's eyes. If not then why the scaremongering tactics of 1400 people being killed and the impression of the PMF coming down all in one go. Also. Why are they not involving the maximum amount of public that visits the Heath in the summer months and restricting the public consultation to the worst of the winter months, when the minimum amount of public visit the Heath</p>
Kenwood Ladies Pond Association 20 October 2013	<p>We know that the City has tried to ensure a wide measure of consultation with both those who use the Heath, and in particular with the swimmers' associations and with residents' associations from the surrounding areas, as well as with the Heath and Hampstead Society. We have been engaged for almost two years in discussing the reasons why the proposed works will be necessary and there has been explanations and discussions and work shops to ensure that as many are aware of both the urgency of the proposals and the ways that the potential problems could be dealt with.</p> <p>For the Kenwood Ladies Pond Association it became clear very early on in the process that some of the initial suggestions would make a quite catastrophic intervention into a pond, that is unique in its form but unique too in the people who use it. It is unique as there is no other women-only swimming pond in Britain or through Europe. It became clear that this is a pond which has great loyalty from its swimmers and which plays such an important part in their lives. Any works which would alter in any substantive way the pond and its surroundings would face huge opposition, and this was quickly recognized by the City and all of those on the stakeholders group. Consequently the initial thoughts of building up the dam and moving the lifeguards deck were quickly abandoned. This was warmly welcomed by all the KLPA, swimmers and lifeguards.</p>

Source	Comment
	<p>The proposals to restore the crest of the dam, as long as there will be no interference with the trees and vegetation would be accepted. There has been agreement that any new buildings would be designed and built with full consultation with and acceptance by the KLPA. The proposed spillway</p> <p>whilst substantial in size would be located in a discreet manner in the south west part of the pond and would wend its way through the wooded area at the north west end of the bird sanctuary pond. The views to the bird sanctuary pond would be maintained as at present.</p> <p>Generally however there is concern about any major interventions across the Heath, and many members are still unconvinced by the arguments about the hydrology and the impact of heavy rainfall, and the need for a major engineering project. It is felt that if there is to be work done, it should be guided by 'the less the better'. The concern of many members is evident and it is that the engineering solutions being proposed, for what in their eyes is a hypothetical flood, are not as yet understood as the possible solutions nor accepted as needed.</p> <p>We are also concerned that the schedule now appears to be very rushed when the timing for the public consultation is nearly upon us and the meetings of both the Consultative Committee and particularly the Management Committee are taking place immediately before the start of the public consultation. This implies that documentation presented to both will be passed without alteration. Possibly an accurate prediction but one which smacks of complacency and not democracy.</p>

Source	Comment
Heath & Hampstead Society 20 October 2013	<p>FINAL</p> <p>Hampstead Heath Ponds Project – Proposed ['Preferred'] Options Report dated 4.10.2013</p> <p>Comments by the Heath & Hampstead Society</p> <p>jw / Revision E / 19.10.13 / hs1150e</p> <p>WITHOUT PREJUDICE</p> <p>The Heath & Hampstead Society rejects all the Options now offered by the City. We also urge the City to rename this document and any document going out for public consultation as the "Proposed Options" since to call them "Preferred" is unnecessarily provocative to the very strong public objections they will undoubtedly stir up.</p> <p>We have made known to the City at recent meetings and through correspondence the reasons for our rejection. The position of the Society is confirmed in a separate letter from our Chairman to the Chairman of the Hampstead Heath Management Committee. In summary, we consider the proposed engineering to be based on an incorrect interpretation of the relevant law and, with the adoption of inappropriate safety assumptions, have led to the Proposed Options being unnecessarily obtrusive and damaging to the wild and natural state of the Heath, contrary to the 1871 Act.</p>

Source	Comment
	<p>We will continue to work with the City and its advisers in the hope that we may be able to find agreement on how the risk assessments should be made; what should be the appropriate safety standards and objectives behind the designs, and that this continued dialogue will result in proposals which do not damage the wild and natural state of the Heath.</p> <p>General Comments on the Design Development Procedures</p> <p>In this document, we will refer throughout to this latest report as the 'Proposed Options Report', rather than the '<i>Preferred Options Report</i>'.</p> <p>Concerns re the Consultation Process</p> <p>We have become increasingly concerned that although the City has made sincere efforts, at significant cost, to engage and consult with the Stakeholders, the designs and final intentions of the dam engineers appear to be driven forward, fundamentally unaltered, despite the extensive and constructive comments by the Stakeholders and others.</p> <p>For example the Proposed Options Report lists on p9 some 10 suggestions 'from stakeholders' which purport to show how stakeholder suggestions have been incorporated. However, most of these were suggested initially by the design team. Item 4.10 is our suggestion, but the Report only states that it could be modelled to reduce the height of the Mixed Pond dam. This suggestion has not been incorporated, even though Volume 2, giving the Design Team Responses to the many Stakeholder queries, acknowledges that there is scope to widen this spillway to reduce dam height. The extraordinary tight timescale imposed at this late stage has resulted in these responses being circulated very recently and may give rise to further queries from us after your deadline for this current stage.</p> <p>Concerns re the Programme from now to the Start of Public Consultation on the Proposed Options</p> <p>Stakeholders may suggest significant changes to the Proposed Options. For example, we suggest below variants on a Proposed Option which would require models to be re-run. The extremely compressed programme at this final stage does not appear to allow sufficient time for this or even more minor modifications to be made to the current report. Stakeholders have to submit comments by 18 October (recently extended to 21 October), and to discuss these comments at the PPSG meeting on 21 October. The City will issue the Final Proposed Options report to the Consultative Committee about one week later, around 29 October. This allows no time to revise the report to PPSG comments so we believe it will again be the current unaltered report, have to submit</p>

Source	Comment
	<p>comments by 18 October (recently extended to 21 October), and to discuss these comments at the PPSG meeting on 21 October. The City will issue the Final Proposed Options report to the Consultative Committee about one week later, around 29 October. This allows no time to revise the report to PPSG comments so we believe it will again be the current unaltered report, with Stakeholder comments as an appendix, that will go to the Consultative Committee for discussion on 12 November. For a meaningful consultation, the body of the report should be amended at minimum to include a proper summary of Stakeholder views contained in the Appendix.</p> <p>The Management Committee papers will then be issued about 18 November [i.e. again no time to absorb the Consultative Committee's comments]. The Management Committee will then decide on 25 November whether this Report should be used for public consultation. However, this public consultation starts the very next day, on 26 November!</p> <p>It is obvious throughout this period, and particularly at the Consultative and Management Committee stages, that no time has been allowed to make any significant changes to this report. We conclude therefore that the public will be consulted on the basis of an unaltered Proposed Options Report, and with Stakeholder comments again attached as an appendix, and this has now been confirmed, see below. In other words, the public will merely be asked to select one of the two proposed options per chain, which may not have support from Stakeholders and the Consultative Committee</p> <p>We therefore query the purpose of Stakeholders studying the reports in detail and issuing considered comments, apart from the City and Atkins being able to write '<i>we have consulted</i>'.</p> <p>Concerns re the Programme from the end of Public Consultation until Submission of a Planning Application</p> <p>The outline programme from when the public consultation ends on 17 February 2014 shows that the Planning Application preparation is from February to April, with submission in May of a Single Option per chain to LB Camden for planning purposes. Nothing has yet been issued that indicates how the Design Team will consider and take into account all the comments from the public and others, and the process to proceed from the two Proposed Options per chain down to the single Planning Option. Nothing confirms whether the PPSG, Consultative or Management Committees will have any input or involvement during this stage. We are most concerned that much of this will be by Atkins with little or no reference to Stakeholders.</p> <p>We therefore urge that a detailed Method Statement and Programme be issued for this stage without delay</p>

Source	Comment
	<p>Concerns re the Public Consultation Process</p> <p>The Public Consultation is scheduled to start on 26 November, i.e. in only 5 weeks' time! We are concerned that as yet no detailed plan has been shown to Stakeholders on precisely what will be carried out and what documents and material will be produced, despite having made detailed comments on preliminary proposals some months ago. The Proposed Options Report, with recently issued Appendices, is obviously far too detailed for the general public.</p> <p>We were pleased to attend the first informal discussion on 14 October with Resources for Change, who have just been appointed to manage the public consultation. It was confirmed then that they would use the current unaltered Proposed Options Report to prepare their consultation material, and that the Stakeholders would not see this before it is finalised.</p> <p>As there are no public meetings planned by the City, the Society will be holding a public meeting on 25 November.</p> <p>General Comments on Project Programme</p> <p>From the above, it will be appreciated that the Society is extremely concerned that, unlike the steadier earlier programme at the start of the project, this absolutely critical final stage is now being driven much more urgently, we suspect by the dam engineers, to a completely unrealistically tight programme. This will not allow time to make any alterations to the physical designs of the dams already determined by the engineers</p> <p>Comments on Quantified Risk Assessment</p> <p>Since the project inception in July 2012, we have always submitted that it is essential to understand the risks before designing a solution which largely eliminates them. The QRA, which was only issued on 28 August 2013, is the first document to evaluate the risks in detail. We queried some of the basic assumptions and the resulting conclusions of this QRA on 23 September and are concerned that answers will not be produced until at least 28 October.</p> <p>Comments on the Highgate Chain Engineering Proposals</p> <p>1. There is absolutely nothing new with these 2 engineering options presented on the Highgate chain. Because of opposition to the 3m dam, Atkins have resurrected two previously discarded schemes for 2.5 and 2.0 m raising at the Boat Pond, but these come with increased work on the two lower dams, which is why they were previously abandoned</p>


Source	Comment										
	<p>2. We consider the least worst option is Option 4, being</p> <table><tr><td></td><td>Option 4</td></tr><tr><td>Model Boating Pond</td><td>2m</td></tr><tr><td>Men's Bathing Pond</td><td>1.5m (wall)</td></tr><tr><td>Highgate No. 1 Pond</td><td>1.25m (wall)</td></tr><tr><td>Standard of protection</td><td>1 in 1000 year</td></tr></table> <p>However we consider that a 1.25m wall at Highgate No 1 will be too visually intrusive at this very visible pond. We feel that the wrong balance of work is proposed on the 2 downstream ponds. The Men's Pond dam is a 'formal' looking dam which is not readily visible from the public footpaths. When viewed from the south end of Highgate 1 only a short length of dam can be seen between the trees. The main view is south from the swimming area and from the Boat dam, but these are generally distant views. The impact on the general Heath user should be given priority over the far fewer swimmers. In contrast, Highgate 1 dam is viewed as you approach from the south, and all pedestrians walk past the W side of the dam, which is readily visible from the west, and when walking N-S along the footpath. It is covered with trees which screen the intrusive white West Hill Court and Brookfield Mansions from the Heath, and the impact on these should be minimised. Please therefore carry out further modelling to assess the effect on the Men's Pond dam if the wall at Highgate 1 were reduced to say 0.75m max. without raising the Model Boating Pond dam above 2m.</p> <p>3. The spillway on Highgate 1 will be 60/74m wide, and 570mm deep. This is huge, and it is only 50m from the Brookfield fence to the main path so will be difficult to fit in. We are sure that this may involve significant tree loss and asked in August for detailed plans of all spillways showing all tree loss on all dams but have not yet received them. The mock-up on p26 is not very revealing – we are sure there will be a major tree loss which will be very visible as one walks N towards the pond on the main and very heavily used N-S path</p> <p>4. The Standard of Protection has gone up from 1:50 to 1:1000 years. We have asked what additional dam height was required to provide this, and have been told only that it 'is a by-product of being able to pass the PMF safely'. Please answer the question we have raised re additional dam height</p>		Option 4	Model Boating Pond	2m	Men's Bathing Pond	1.5m (wall)	Highgate No. 1 Pond	1.25m (wall)	Standard of protection	1 in 1000 year
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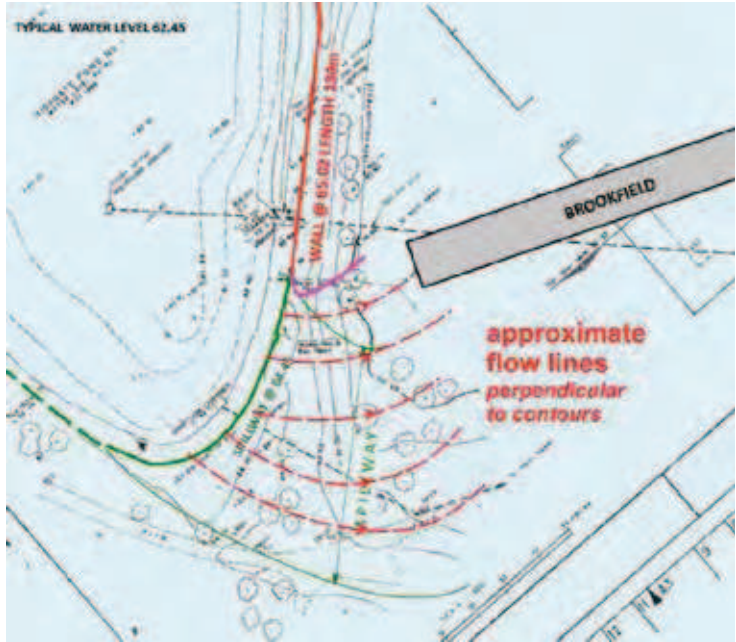
Source	Comment												
	<p>Comments on the Hampstead Chain Engineering Proposals</p> <p>5. We are very concerned that a 5.6m Catchpit dam will be too visually intrusive in this valley. We reject the option to have this centrally down the centre of this valley. It is impossible to decide on whether the least worst option would be to have it sited on the S side [next to the Mixed Pond] or on the N side [at the Catchpit site] until detailed plans have been provided showing its footprint, tree loss, and any tree or shrub planting on or by the mound to screen it.</p> <p>6. We consider the least worst option is Option P, being</p> <table><tr><td></td><td>Option P</td></tr><tr><td>Mixed Bathing Pond</td><td>2m (embankment or wall combination)</td></tr><tr><td>Hampstead No. 2</td><td>0.5m wall, 1x4.5m box culvert</td></tr><tr><td>Hampstead No. 1</td><td>1x4.5m box culvert</td></tr><tr><td>Standard of Protection</td><td>1in 10,000 year</td></tr><tr><td>Tree loss on Hampstead No. 2</td><td>1</td></tr></table> <p>However, we note on p9 that you could widen the Mixed Pond spillway to almost the clear width between the trees at either end of this dam, which would reduce the required dam height. We are surprised that it is just noted (in Volume 2) that there is scope for this. Please present an option with reduced dam height.</p> <p>7. The Standard of Protection has gone up from >1:1000 years for Option K to >10,000 years for Option P. We have asked what additional dam height was required to provide this, and have been told only that it 'is a by-product of being able to pass the PMF safely'. Please answer the question we have raised re additional dam height.</p> <p>Photographic Visualisations of Works on both Chains</p> <p>We urge that the images prepared to demonstrate the proposed works, especially for the most sensitive parts of the project, should be taken from the most sensitive viewpoints showing all the affected area, and that they should be accurate and not misleading. We are concerned that this is not so, for example:-</p> <ul style="list-style-type: none">• Highgate 1 spillway shows only a small part of the area that will be affected• The Model Boating Pond details (the photos on p16-18, the cross section on p19 and the plan on p21) appear not consistent in that the change in slope on the west bank (at its centre point, say, from the pair of trees on the hill down to the "island") will, we are sure, be much greater than the report says (on the cross section diagram, from 1:10 to 1:8)		Option P	Mixed Bathing Pond	2m (embankment or wall combination)	Hampstead No. 2	0.5m wall, 1x4.5m box culvert	Hampstead No. 1	1x4.5m box culvert	Standard of Protection	1in 10,000 year	Tree loss on Hampstead No. 2	1
	Option P												
Mixed Bathing Pond	2m (embankment or wall combination)												
Hampstead No. 2	0.5m wall, 1x4.5m box culvert												
Hampstead No. 1	1x4.5m box culvert												
Standard of Protection	1in 10,000 year												
Tree loss on Hampstead No. 2	1												

Source	Comment
	<ul style="list-style-type: none">• The main impact of the Boating pond raised dam may be seen from the path on the west side of the pond, when approaching it closely from the north. We have previously requested an image from this point and would be grateful for this• The proposed wall on Highgate 1 is shown only from long distance from the north. It would be helpful to have visuals much closer to the SW corner of the pond, looking in a SE direction <p>Comments on the Landscape and Environmental Management Proposals for both chains</p> <p>8. We make no comment on these proposals at this stage. We have stated previously that it is essential to inspect each pond on site with the Atkins Team and with the City of London, to discuss appropriate measures. We had been told by them that the proposals were purely indicative of the type of measures that could be carried out. We are therefore extremely concerned that these proposals appear to be going forward as part of the Public Consultation, after which there appears to be no provision to discuss details of the single Options that will be presented for Planning Application</p> <p>We therefore formally reject all landscape and environmental proposals until they have been discussed with Stakeholders on-site. The Final Option and the landscape and environmental management proposals must be fully discussed with Stakeholders before being submitted for Planning Application</p>
Brookfield and EGOVRA 20 October 2013	<p>It's crucial that all stakeholders, authorities, residents and insurance bodies understand how HG1 will respond in any size flood.</p> <p>Our main concern is the release of water from HG1, how it is controlled and where the water is delivered. CoL consider that they must guard against "a wave of water" in the Camden area due to a collapse of an earth embankment and/or of potential deaths from overtopping of the dam. They have also a responsibility if flooding occurs due to flows of surface water down the spillway into Camden or Brookfield.</p> <p>The assurance given by both the CoL and the Panel Engineer of ensuring that the conditions downstream are not made worse than the present conditions, by any sized rainfall, is welcomed. This assurance should be clearly demonstrated to be verified in advance for all options. (ref Constrained Options Report, 10th June 2013, Page 8).</p>

Source	Comment
	<p>The scour pipe has historically been opened to prevent the flooding of Brookfield and immediate neighbourhood. We do not accept that the scour pipe cannot be used in a passive flood management system in future. The effect of the scour pipe in carrying excess water to the drainage system should be included in your assessment of the existing situation.</p> <p>We understand that the Standard of Protection (SoP) applies only to dam overtopping, not to delivery of water down the spillway. Please confirm this.</p> <p>TWA have increased the storm water capacity of the sewers since 1975. We have asked that the effect of these in accepting early discharge from storms, ie allowing water to be taken out of the chain prior to reaching the spillway level at HG1, should be taken into account and this information made transparent.</p> <p>We feel the information we have been given is unclear and has been corrected and amended; in addition questions still have not been answered. This undermines the credibility of the process and is an ongoing issue of concern for us.</p> <p>Information should be based not only on statistical modelling but also on modelling of real and simulated historical data and should be validated against field measurements.</p> <p>Options 4 and 6 are identical in regard of the treatment of HG1. However the inflow into the HG1 is different with each option. The effect of this has not been made clear.</p> <p>2 Existing:</p> <p>2.1 Storm relief sewers: we have repeatedly asked for confirmation of the size and capacity of TWA's new storm water relief sewers and chambers and how much water they can accept from the Highgate chain in large storm events, including water from early discharge from both the Hampstead and Highgate chains.</p> <p>2.2 Overflow pipe: the overflow has been confirmed as 457mm diameter with a maximum discharge capacity estimated at 0.9m³/s. We should like this to be checked using field measurements. If the flows through the outflow pipe are currently over-estimated, water will flow over the spillway more frequently.</p> <p>2.3 Scour pipe: the scour pipe has been confirmed as 350mm diameter with a maximum discharge capacity of <1m³/s. Please confirm the discharge capacity, preferably by field measurement.</p> <p>2.4 The cumulative % of peak inflow that can be stored in HG1 at present is estimated by Atkins to be 5.2%.</p>

Source	Comment								
	<p>2.5 The cumulative peak inflow that can be stored in the chain at present is: ?</p> <p>3 Options 4 and 6</p> <p>3.1 Atkins has confirmed the following for both Options 4 and 6:</p> <table><tr><td>existing minimum dam crest</td><td>63.77</td></tr><tr><td>top of proposed wall</td><td>65.02</td></tr><tr><td>spillway weir level</td><td>64.45</td></tr><tr><td>TWL (and overflow invert)</td><td>62.45</td></tr></table> <p>Is the minimum dam crest the existing lowest point on the dam crest- if this is due to erosion or outstanding maintenance of the crest why is the dam crest not to be repaired?</p> <p>3.2 Please confirm the inflow values for different storm events and the cumulative % of peak inflow that can be stored in HG1 with Options 4 and 6 (c 15%?). Is this a substantial improvement?</p> <p>3.3 Please confirm the cumulative peak inflow that can be stored in the Highgate chain both for existing and for the proposed options.</p> <p>3.4 Please examine this using real historical data or generated realistic data for lesser floods to establish characteristics of when the water will come down the spillway at HG1. Please provide this with a range of values eg of duration and volume of water that will result in water coming over the spillway.</p> <p>3.5 The levels given indicate that the west bank of HG1 is below the level of the spillway. Is it proposed that water will flow over the west bank and be stored in this area, or that the bank will be raised to the level of the top of the wall (65.02). This would indicate a bank raising of up to 1.3m, alternatively, this area can become 'marsh' when the pond levels rise.</p> <p>3.6 Please place posts at the end of the wall and both ends of the spillway weir indicating its location and height. (These posts can be 1.5m high marked to show AOD levels- no one will trip over them).</p> <p>3.7 We have asked for contoured plans (200mm intervals) for both existing and proposed. Please include the surrounding area and give spot levels for all paths and main roads. Preferred scale 1:500.</p> <p>3.8 Please provide an update of Table 5.7 both for existing and Options 4 and 6.</p>	existing minimum dam crest	63.77	top of proposed wall	65.02	spillway weir level	64.45	TWL (and overflow invert)	62.45
existing minimum dam crest	63.77								
top of proposed wall	65.02								
spillway weir level	64.45								
TWL (and overflow invert)	62.45								

Source	Comment
	<p>4 Comments</p> <p>We have put forward the following suggestions aimed at reducing downstream flooding, These do not appear in your stakeholder comments or in options that were considered. We should like them to be considered, with the primary intention of mitigating downstream flooding and potential damage to people and property.</p> <p>A The scour pipe could be used to supplement the flows from the overflow pipe when there is a rise in the pond water level but before it flows over the spillway. This could contribute towards reducing possible flooding from surface water (via the spillway) downstream.</p> <p>eg the pipe could be converted to operate as a bellmouth spillway, constructed over the inlet end of the scour pipe or as a semi circular spillway close to the scour pipe valve house:</p>
	

Source	Comment
	<p>B An increase in the size of the overflow pipe, or an additional pipe which could give a discharge capacity equal or greater than that of the overflow and scour pipe combined and confirmation that the increased capacity of TWA storm water relief sewers would cope with this.</p> <p>C Construction of a dry reservoir (dry except in large floods) to the south or west of Brookfield. Consideration must be given to where the water in the spillway will be delivered.</p> <p>D What is the effect if water is discharged early from HG1 down either an additional overflow pipe or the scour pipe before the water level reaches the spillway with cumulative discharge capacity of eg 2m3/s; 5m3/s? Please model for 1:100; 1:1000; 1:10,000 flood; PMF and 1975 storm positioned over the Heath.</p> <p>E We have used an existing contoured map to show approximate flow lines in the spillway. Water flowing in this way will inevitably flood Brookfield and parts of Camden.</p>
	

Source	Comment
Mixed Pond Association 20 October 2013	<p>Overall Statement: The first priority for all users is that the Mixed Pond should be altered as little as possible and its natural character retained. It is recognised that some specific work is needed to keep the Pond in good condition for swimming - e.g. muddying out, pruning of overhanging vegetation, improvements to water quality - and that this could be a useful spin off from the Ponds Project. But it is hard for most users to get their head around what the CoL actually has to do to fulfill its obligations. Any Public Consultation must clarify this as exactly as it can. However, our fundamental view is that the POND is NOT a LIDO and should never be treated as such.</p> <p>1) Basis Principles - We need a clear and unequivocal statement of the CoL's legal obligations. We are told that "there has been a change in emphasis from flood defence to flood risk management, as it is now accepted that it is not possible to defend against the full range of natural disasters that could occur". To get ourselves and the general public involved in detailed argument about possible solutions to a problem that is still ill-defined is clearly nonsensical. In addition we are being offered solutions which afford either 1 in 1,000 year or 1 in 10,000 year protection, while being told the present dams offer 1 in 100 year protection, without any guidance as to the standard of protection that is actually thought to be necessary.</p> <p>2) Early Warning - We have been given various alarmist figures about potential loss of life in the unlikely event of a PMF event. We have no information of early warning systems that, even if only able to give a few hours warning of an impending storm, should prevent most if not all of these.</p> <p>3) Public Consultation - We are very concerned that the public consultation is taking place over the winter months, when the Heath is least used - and the Mixed Pond itself is closed. We are also concerned that the consultation will not establish how frequently the respondents use the Heath/Swimming Ponds, and how far they travel to do so. The Mixed Pond is a draw and people regularly come from all over London to swim in it (they also come from very much further afield, but not so regularly). These people may not be representative of the population at large and they may also not be around to respond to a consultation in the winter, but they are the ones who will be most affected by any changes. Will the question "Do you prefer Option M or P for the Hampstead Chain?" be asked directly or indirectly? If not, what information is it hoped will be gained from this exercise that is not already known - i.e. "Don't touch the Heath, we like it as it is!" ?</p>

Source	Comment
	<p>Once the above points have been answered satisfactorily, we offer the following comments on the area that most affects our members:</p> <p>4) Catchpit - General agreement that the Catchpit dam embankment to provide water attenuation in the event of flood is sensible. Strong feeling position 3 for dam (S-shaped structure, not shown in Report) avoiding most valuable trees is best. Creation of walkway/path along top of dam not discussed in detail - we feel that this should NOT become a major thoroughfare, as this would destroy the undisturbed nature of this small area. Essential that local soil be used for dam, sourced from dredging the Mixed Pond and/or Field 11. [N.B. The key on page 40 appears to have the blue and green rectangles transposed.]</p> <p>5) The Mixed Pond - We feel that Option M with the dam raised by 1 metre only is the least bad solution of those proposed. The dam to be naturalised with planting of species-rich grass, with a steep slope on the upstream side and a more gentle gradient downstream into Hampstead No. 2 Pond. The loss of two plane trees from the No. 2 Pond causeway is regretted, but nature will fill the gap; the effects of a 2 metre high dam at the Mixed Pond would be permanent. We strongly oppose Option P and, in particular, the suggestion that this should be topped with a retaining wall for the last 1 metre, a feature that has only just been introduced. [N.B. There appears to be duplication of the bullet point notations on pages 41 and 48.]</p>
South End Green Association 20 October 2013	<p>We confine our responses to the lower ponds on the Hampstead Chain.</p> <p>We wholly support the 'CATCHPIT' proposed intervention on the following basis.</p> <p>4) That the flood storage dam to be constructed to retain Possible Maximum Floodwaters and be designed to overtop, has a wild looking and loosely planted Crest that meanders when viewed from the air as would an organic mound. This must be ensured to accord with the nature of the Heath. Therefore we do not support the one option, to build a straight dam.</p> <p>5) The initial argument for creating 'Catchpit' was that it negated any serious works to downstream dams/ponds - Mixed Bathing to Hampstead No 2 and H.No 2 to H. No 1.</p> <p>6) However the Causeway south of Mixed Bathing and north of H.No2 is proposed to be raised by 2m- or 1.7m plus spillway of 300mm. We do not understand the need for or support this work. With the creation of Catchpit, enlarging the spillway and managing the flow between these two ponds and ensuring</p>

Source	Comment
	<p>absolute stability of the Causeway, (it being free of significant trees), ought to be able to be proved to suffice in a PMF.</p> <p>7) The Causeway between Hampstead No2 and Hampstead No1 has, until this Preferred Option Report been spared any height increase other than crest repair and downstream bank strengthening where eroded. This was to preserve the magnificent Plane Trees and the need to maintain the present water level. The current proposal to add a 0.5m wall over the sheet piling seems quite unnecessary intervention.</p> <p>8) We support the loss of one Plane tree in the SW corner of H.No 2 in order only to install a Box Culvert Spillway of 5000x400mm between H. No 2 Pond and H.No 1 Pond.</p> <p>9) The proposed works to Hampstead No 1 pond are generally found acceptable with the exception of 'Formal Dog Access point' being proposed oddly on the northern dam slope. More accessible for dog owners and appropriate, would be the western side either retaining the present position or moving this slightly northwards. Please note there is no avenue of plane trees on the western bank as suggested on the plan (pg 47).</p>
Vale of Health Society 21 October 2013	<p>The main consideration is the relative impact of the alternative proposed locations for the spillway. Given that the north end of the causeway is raised considerably above the water level compared to the southern end of the cuaseway, it would imply that the visual impact on the VoH pond & surrounding area would be considerably greater if the spillway were to be constructed at the northern end of the cuaseway.</p> <p>While obviously a spillway at the southern end needs to avoid the giant sequoia (and ideally the robinia which is beautiful in flower), it's visual impact / scarring on the surrounding landscape would be lower than at the northern end.</p> <p>This should be come self-evident upon site surveys.</p>
Fitzroy Park Residents Association 21 October 2013	<p>PRINCIPLES</p> <p>As before, then strategy of increasing attenuation in the middle of each chain, to take energy out of the system during a storm, and slow down the velocity and volume of water reaching Highgate No1 or Hampstead No1 is fully supported.</p> <p>The most recent Preferred Option Reports, dated 7-11 October and numbering well over 100 pages, was found to be confusing. The proposals appear to be much as they were at the previous iteration and finding exactly what details have been 'tweaked' in such a large document was extremely time consuming and somewhat frustrating.</p>

Source	Comment
	<p>Questions relating to the size, width, depth and form of the numerous spillways appear not to have been addressed and at this stage of the process, is considered a serious omission. Spillways have the capacity of being extremely voluminous and those that are poorly positioned run the risk of impacting visual amenity in a negative way or flooding downstream communities, such as Brookfield</p> <p>Mansions, who have never suffered a flood. Indicative diagrams without contours showing local topography are potentially misleading.</p> <p>The benefit of increasing dam heights has not been related to percentage attenuation as previously requested. For example understanding how raising a dam by 2m as opposed to 2.5m at the Boating Pond will affect this measure would help to put the works into some sort of context.</p> <p>Existing rates of protection that underpin the proposed works appear to be unreliable, particularly for the Highgate chain. Without Atkins providing, reliable data that affords a direct comparison between existing base-line protection and projected protection, the City, let alone constituents, surely cannot form a reliable opinion of the benefits of the proposed works in the context of eliminating risk.</p> <p>Many of the View Point photos existing vs proposed are almost impossible to interpret often looking identical. It is accepted that creating such visuals is extremely difficult to achieve when long view sight-lines are adopted, however it would be helpful to provide short view aspects on proposed works, as Heath visitors will need to consider how impacts look/feel from a distance as well as how they look/feel as they walk past them 'up close and personal'.</p> <p>Appendix B Hydrographs were presented next to each other and appear to be the same but the graph scales are not – the 1:10,000 left hand axis is 0-16 m3/sec but the PMF event is 0-35m3/sec. It would have been helpful for these to have had the same scale and to have included a 1:1000 event to demonstrate a meaningful comparison all on one graph.</p> <p>I am not sure if this is the right forum for these comments, but having attended the H&HS meeting with Atkins to discuss the QRA Interim Report, I remain unclear as to how the concept of an early warning system will directly relate to a reduction in the mass/bulk of any works on the Heath and would welcome clarity on this point.</p>

Source	Comment
	<p>Accepting that the QRA report is a 'coarse' tool, suggesting in very round terms 300 potential fatalities caused by dam breach and 1000+ potential fatalities caused by dam overtopping, clearly adopting some sort of comprehensive early warning system makes total sense. A strategy that integrates evacuation coupled with pre-emptive reduction of pond levels would have a positive effect on when overtopping occurs and as a consequence could reduce the number of fatalities linked to over-topping. We would therefore urge the City to leave no stone unturned in developing a comprehensive response in this regard, even if it cannot be warranted as part of the dam breach assessment.</p> <p>That said, I personally cannot see how stalling overtopping by a few hours, by actively managing pond water levels at Highgate No1 or Hampstead No1 ponds (assuming a practical/safe way can be found of doing this) by discharging relatively tiny volumes of water through a scour pipe or additional overflow pipes (without early surcharging of storm drains downstream) will make much impact on the volumes of water involved in the larger, more dangerous storms such as 1:1000, 1:10,000 (50,400m3/hr?) and the PMF (108,000m3/hr?) which, until H&HS pursue a JR and prove otherwise, the City believes is their legal base-line for risk design. (NB: the m3/hr estimates were taken from Appendix B – Hydrographs m3/sec and extrapolated/hr).</p> <p>To understand this more fully it would be helpful for Atkins to provide the maximum discharge rate m3/hr for the scour pipe at both Hampstead & Highgate No1 ponds (based on diameter & slope of pipe and head of water) and how this relates to a reduction in pond levels assuming no rainfall. ie: 1" per hour or 1' per hour? This would provide a helpful context for the larger storms and the existing outflow discharge. Apologies if this information has been provided before, I simply cannot find it in my files, or if more fundamentally I have missed the point...</p> <p>HAMPSTEAD CHAIN</p> <ul style="list-style-type: none">- the bund at Catchpit should ideally follow a natural shape (I believe an 's' shape has been suggested) not only strategically to miss important trees but to mould into the existing topography.- it is believed 1m dam raising at the Mixed Pond is the maximum such a site could integrate and the loss of two plane trees downstream (on condition that they are replaced with mature specimens post works) is accepted.

Source	Comment
	<p>HIGHGATE CHAIN</p> <ul style="list-style-type: none">- the discharge philosophy upstream from Stock to Ladies to Bird to Boating is now understood: in order to delay overtopping new overflow pipes are needed to manage pond levels early in the storm to prevent dam erosion and potential breach from extended periods of overtopping. The extra water will be held by the increased attenuation at Boating. Overflow pipes will be used rather than large spillways to reduce visual amenity impacts. Is this not exactly the same discharge philosophy that is being suggested as part of any early warning strategy for Highgate No1?- all efforts to reduce the bund at Boating Pond to 2m or below are welcomed.- further clarification is needed to the proposals for Mens Bathing and Highgate No1 before a reliable opinion can be offered particularly in relation to spillway location and .design.

Comments by West Hill Court Ponds Group on the Preferred Options Report – received 18 October 2013

Source	Comment
West Hill Court Ponds Group	<p>West Hill Court comments on the Preferred Options Report</p> <p>Many thanks for sending us the Preferred Options report and the additional documents. Thank you also for giving us the opportunity to make comments, which we have set out below.</p> <p>We should say that it is not clear to us that comments we and the Stakeholder Group make at this point will be material, as the report appears to be final and is now published on your website, but we look forward to clarification of this when we meet on 25th October.</p> <p>Our points are as follows:</p> <p>We very much appreciate that the clear concern expressed by ourselves and many others about the proposal to raise the Model Boating Pond dam by three metres has been recognised in the two options put forward. We consider that the design proposed for the pond, with a wetland area and promontory with existing trees, is creative and sympathetic.</p> <p>We raised the issue of access in our submission to the City of London’s consultation on the Shortlist Options report. We assume, but would be grateful to have confirmed, that the City of London’s commitment to ensuring good access for people with disabilities, and to improving access to the wider open spaces, as described for instance in the Hampstead Heath Management Plan 2007-2017, will mean that all the rebuilt dams will have an equal or better level of access than the existing dams, and that this will be addressed in detail at the design stage.</p> <p>Both options require that the No 1 Pond dam is raised by 1.25 metres. While we accept that this is needed in terms of the engineering requirements of the project, we are of course concerned about this work, given that our property directly borders and overlooks the length of the pond. We have discussed the project with Jeremy Sinclair, the owner of Millfield Cottage, which also borders the pond. He shares our concerns.</p> <p>Because West Hill Court and Millfield Cottage directly overlook No 1 Pond, we have a critical stake in discussions of the visual aspects of the wall, the extent to which it will reach around the pond, the management of woodland and tree loss and subsequent replanting at No 1 Pond. We are also concerned about the security of our properties (particularly if the pond is de-silted), and, as we made clear in our previous submission, the dangers of using Millfield Lane for heavy construction traffic.</p>

Source	Comment
	<p>As we stated in our previous submission, we are, because we overlook No 1 Pond, very concerned that our views should be taken into account. The West Hill Court Ponds Group very much appreciates Simon Lee’s and your efforts to meet us, and to reassure us that this will happen through our meetings with you, despite the fact that we are not currently represented on the Stakeholder Group.</p> <p>However we continue to be seriously concerned that, as the project moves towards detailed design and implementation, the residents’ associations that will be most affected by these aspects of the project are not represented on the Stakeholder Group. We note that the composition of the group has changed, and that a new interest group, representing anglers, has recently been admitted to the Group. Whilst we are very supportive of all visitors to the ponds and the areas around them, those of us who live immediately adjacent to them have a particular interest in the proposed developments and are particularly concerned to be positive partners in planning and effecting any change.</p> <p>A central point in our submission to the Shortlist Options report has not been addressed by the Preferred Options report. This reinforces the above concerns.</p> <p>We stated in our submission: “While we are pleased that the Stakeholder Group has established the principle that views on to the heath from neighbouring properties must be considered, we are alarmed that at this point only the views from Brookfield Mansions appear to have been taken into consideration.”</p> <p>The caption on page 33 of the Preferred Options report states, ‘Woodland retained with limited tree loss on east half of dam to manage views from Brookfield Mansions’ . This simply repeats the statement made in the earlier Shorter Options report - the basis for our concern.</p> <p>While we entirely respect that views from Brookfield Mansions, represented on the Stakeholder Group, should be taken into account, we are most concerned that the views of No 1 Pond and the new wall from West Hill Court, and indeed from Millfield Cottage, should be given equal consideration, and that there should not be a perception that the interests of members of the Stakeholder Group have been privileged by their membership of the group. We appreciate that this may be an oversight, and hope that it could be amended before the public consultation.</p>

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Hampstead Heath Ponds Project

**PREFERRED OPTIONS REPORT
VOLUME 2 – COMMENTS, QUERIES AND ANSWERS
ON SHORTLIST OPTIONS REPORT**

25th October 2013



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Volume 2 – Comments, Queries and Answers
on Shortlist Options Report

This volume of the Preferred Option Report - Volume 2, includes collated comments and queries from engagement with the Ponds Project Stakeholder Group (PPSG) and feed back from the wider public on the Shortlist Options Report. Responses to the queries on the Shortlist Options Report have been prepared by the design team and included in this Volume.

All external consultation on the Ponds Project from January 2011 and all queries from engagement with the Ponds Project Stakeholder Group (PPSG) and feed back from the wider public since October 2012 are included in the Log of Questions and Answers on the Hampstead Heath Ponds Project. A 'live' document that is regularly updated and includes responses to queries by the design team.

Shortlist Options Report – Schedule of Comments
(For response to queries refer to Questions and Answers on page 17)

Source	Comment Number	Comment
Kenwood Ladies Pond Association	1	<p>It is clear that in large measure the concerns that we had about the impact of works on the Ladies Pond have mainly been assuaged. It is obvious that all recognise the extremely sensitive nature and beauty of the pond and are aware that there must be very little that alters any of its aesthetic qualities. The dam will not be raised but the crest restored i.e. levelled out along the path. There will be a "soft" spillway created at the western end of the pond, near to the back gate and it will curve gently down through the wood into the bird sanctuary pond. The argument about the siting of the lifeguards hut and the changing rooms has been won and will be located at the current positions. Obviously with all of these factors there will be extensive discussion about the plans and construction of these features.</p> <p>We would want the pond to be muddied out, and are uncertain what the caveat is about such work, but rely on further discussion. We would be concerned if there were to be any major works which would affect the screen of large trees which are aligned along the west side, although it is said it would be "long term tree set back". We assume that means they would be planting trees along the edge of the large external meadow but set back from the fence. We are aware the pond, along the east side below the meadow, is increasingly over grown and there was a time when there were views of the water from the meadow although it is also clear that for many women sunbathing the vegetation acts as a screen.</p> <p>If it were to be proposed that work be done on raising the dam at the Stock Pond, we would need to be assured there would be no impact on the Ladies pond. In relation to the options for the Highgate Chain it seem that the proposal to have all major works hinged on the Boating Pond is sensible, but as work below our pond does not affect the Ladies pond we do not have an opinion on the options. Recognising that the Ladies Pond and the Bird Sanctuary Pond are the two ponds which should have as little intervention as possible, the view from the small meadow is also maintained. As yet there is no information to indicate what the impact on the view from the Ladies pond would be if the largest bund were to be built.</p> <p>PS. While recognizing that the visualisations are fine, but unless you know exactly where the views are from i.e. at what height the assumed eye level is, they don't mean much. We assume that when we see the detailed proposals we will have :</p> <ul style="list-style-type: none">Plans which show the detailed proposals, including the materials that are to be used.Cross sections :<ul style="list-style-type: none">The longitudinal section through the pond, dam, meadow, stock pond, boating pond and men's pond.Cross section down the middle of the access lane down to the dam and changing rooms.Cross section through our meadow, the pond and the meadow to the West.Detailed cross sections through the different conditions around the edge of the pond i.e. through the dam, the spillway, the West side, the North side and the East side.Visualisations of the proposals from the path, the dam, the spillway, the lifeguards' lookout, the changing rooms, the water, and the meadow.

Source	Comment Number	Comment
Heath & Hampstead Society	2	<p>I attach the 'Without Prejudice' comments of the Heath & Hampstead Society, [hs1130E], on the Shortlist Options Report dated 2 August 2013.</p> <p>In consulting on this, several members of our General Committee and Heath Sub-committee strongly feel that it is imperative that the City urgently organises a series of at least 3 public meetings held in public venues that are easily accessible, that sufficient advance notice is given of these meetings, that members of the public are invited to ask questions at these meetings, and that the meetings are spread over a period that does not include the Christmas vacation.</p> <p>We made these points on 6 August as our response to your Draft Public Consultation Brief that we received on 2 August, and then followed up with further comments on 6 August. Additionally, some members have recently stated that the City should provide, and be prepared to justify in detail, the precise legal requirements for the proposed work to proceed at all, and make clear exactly on whose authority it rests. Also that meetings should be held before final plans are prepared, in order that the public may have a realistic opportunity to contribute their views</p> <p>We therefore very much hope that the City circulate their amended Public Consultation Brief well in advance of the next Stakeholders meeting on 16 September, and that this be an agenda item at that meeting so that there can be adequate discussion</p> <p>FINAL Hampstead Heath Ponds Project – Shortlist Options Report dated 2.8.2013 Preliminary Comments by the Heath & Hampstead Society</p> <p>jw / 24.8.13 / hs1130E</p> <p>WITHOUT PREJUDICE General</p> <p>We first review the report page by page, and give comments and queries on details, and request further information without which it is difficult to form a view. Key issues and queries are shown in bold.</p> <p>We then consider the available options on a pond by pond basis and give some views. However, in order to give our views, we consider it essential to consider now the detailed impacts that may arise for each of the presented options. Some of our comments therefore inevitably cover detailed design aspects that will be considered in depth in the next iteration that will select 2 main options for each chain.</p> <p>Please note that the Society is reviewing the legal background for the project, which could fundamentally change our position. We therefore reserve the right to challenge designs if appropriate, and to take into account the minimum work legally required, if and when this is established, and to amend our comments accordingly.</p> <p>PAGE BY PAGE REVIEW OF SHORTLIST OPTIONS REPORT Page No.</p> <p>Page 2. The public have been invited to comment on this complex and detailed report, so there needs to be guidance on the key issues where comments are most sought. As this document may be read as a 'stand alone' report by the public, we consider that Section 2 'Brief Summary' is too condensed and does not provide a logical justification for the works, particularly for persons who have not read the preceding documents. In particular, the phrase 'Essentially, more storage is needed' is not a logical conclusion of what goes before in this section. Also, the primary objective of the project to prevent dam break is not stated, and the phrase '...to improve the resilience of the dams....' is obscure to the uninformed. An additional two or three sentences might help considerably.</p> <p>Page 6, 8 and 9. We are somewhat bemused by the plethora of 'Design Principles', and fear that the general public will receive a confused message. We note the 4 principles on page 6, 3rd column, which are then supplemented by 2 more in column 4. These are then supplemented by a further 6 on page 8, column 3, and then on page 9 there are a further 3 'key objectives'. We suggest that it would be helpful to state one clear set of aims, consistent with duties under legislation.</p> <p>Page 9, 25, 47. We note Atkins statements [p9, 25] ..wherever possible, the majority of the [PMF] must be passed through spillways in order to minimise flows over the unprotected parts of the dam crests. Also, [p25], the Highgate chain is designed such that ...the [total] design PMF flood [is] passed safely through the new spillways without spilling over the upper dam crests.</p> <p>Please clarify if the same principle is applied to the Hampstead chain, as p47 is silent. We assume that it also applies.</p> <p>We note that the design team/Dr Hughes has said that some damage can be accepted. We also note that ICE 'Floods and Reservoir Safety' Table 1 recommends that spillways for Category A dams be designed for 1:10,000, with the remainder of the shorter duration and rarer surplus PMF spilling over the crest if overtopping is tolerable.</p>

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p>We recognise that PMF spillways are a prudent design principle that would also avoid intrusive works to reinforce our existing and sensitive dams to take overtopping. However, if PMF overtopping could be tolerated on two dams, we suggest this could reduce dam raising by approx 1m, being the depth of spillways below the crest. We will address this in detail when we review options, specifically for the Model Boating pond, and the Mixed Bathing pond.</p> <p>Page 9, 25, 47. Please explain, if all the PMF is routed through spillways and does not overtop the crest, why crest restoration is required on many dams, with possible impact on crest vegetation, as their crests will normally be above water level. This query applies to Stock, Ladies, Bird, Vale and Viaduct ponds</p> <p>Page 9, 25, 47. Please clarify, as most existing dams will currently overtop in PMF, if the proposed spillway depth is say approx 1m and some dams have crest raising/restoration less than this, does this mean that these modified dams will store less water than the current existing dams?</p> <p>Page 10. Highgate chain flowchart: Please explain:-</p> <ul style="list-style-type: none"> • why are spillway widths on the Boating Pond identical for options 3, 4 and 6, rather than being tailored for the different surplus floods? Are they oversized for the higher dams? We note [p21] that spillway size is a key consideration, as vegetation clearance will be needed, hence we urge that these be the minimum size possible • Men's and Highgate 1 spillways – why are these identical for all options, irrespective of the height of the Boating pond dam? • Option 5 shows a 2.0m raising on Highgate 1, but only a 1.5m raising on the Men's pond. Both these raisings may require an earth dam to be built inside the ponds, [page 33], which may have a major impact on screening vegetation and trees on Highgate 1. Could you please test this option with a max 1.25m raising at Highgate 1 [ie. with a wall], to determine the amount of dam raising then needed on the Men's pond dam? <p>Page 9, 10, 25. We note, re 'standard of protection', that the return period.....that causes overtopping of the last dam in the existing scenario is compared with the flood event that causes the proposed spillway in each option to start to spill water. Despite major attenuation on each chain, the standard of protection and peak velocities appear from the flowcharts to remain virtually unchanged, without any improvement. To assess this, please supply the current and proposed rate of flow versus time graphs [hydrographs] for all options for the bottom 2 ponds, the Mixed Bathing Pond and the Boating pond, and also for all the ponds if possible.</p> <p>Page 12. Hampstead Chain Flowchart. Please explain:-</p> <ul style="list-style-type: none"> • The chart shows Vale pond crest restoration as 0.2m max, whereas the text [p47] states 0.6m max. Please clarify • The chart shows Viaduct pond crest restoration as 0.5m, whereas the text [p47] states 0.18m max. Please clarify • The Flowchart shows the Catchpit with three different options of pipe size through the same 5.6m high dam. Please explain the effect of these different options re timing, duration, velocity and total volume of flood water on the downstream dams. We do not understand the benefits of these different options • We much welcome the presentation of so many different options, but are puzzled at some of the figures presented. We would appreciate clarification. For example, referring to the spillway/culvert options for Hampstead No 2 pond:- <ul style="list-style-type: none"> o why is Option J spillway significantly larger than Option H [where both have 1.5m raising of the Mixed Pond]? o why is Option N spillway almost the same size as Option C [which has much less stored water]? o why are the cross sectional spillway areas [calculated up to crest level] significantly greater than the cross sectional areas of the culverts, when comparing pairs for the same flows? Spillway areas vary from 1.5x to 3.1x larger in area than the equivalent culverts. Surely spillway flow would be smoother and more efficient than culvert flow which could be turbulent, which could be expected to make spillway area less than culvert area? o why is there this variation in the ratio of spillway areas to the equivalent culvert areas? Surely there should be the same ratio throughout? For example, the spillway area in Option L is 1.5x the area of the equivalent culverts in Option K, whereas the spillway area in Option J is 3.1x the area of the culverts in Option I. Is spillway J twice the size needed? <p>Page 14, 22. We note in all cases it is assumed that water levels remain as today. We endorse this principle generally, as agreed at the 13 July workshop, as lowering could affect ecology and visual appearance. However, we query if a single exception might be made for the Boating Pond, as lowering the water level may enable the proposed dam to be reduced in height. We discuss this in detail later.</p> <p>Page 26. Viewpoint 6, 3m raising, still shows the canopy of a tree that would be removed with this option. There are similar instances in several photo visualisations. We urge for accurate imagery in the next report.</p>

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p>Page 31. We note that most of the advantages and disadvantages quoted for Option 3 are changes that are irrelevant to dam height, and apply therefore to all the options, not just to Option 3.</p> <p>Page 37. Errors. Option 5 on lines 4 and 14 should read Option 6</p> <p>Page 55. Error. Viaduct Pond 'Existing Environmental Considerations' is a repeat of that for the Vale of Health Pond</p> <p>Page 55. Error. ...grass surfaced spillway at south EASTERN end of the dam.</p> <p>Page 59. Error. Existing Environmental Considerations bullet 2 should read South Hill Park [NOT Gardens]</p> <p>Page 85. Error. Bullet 2 should read Land drops away to the EAST</p> <p>Page 86. Why no 'Indicative private ownership boundary' marked? What is meaning of red dotted line?</p> <p>Page 95. What is meaning of red dotted line?</p> <p>Page 97. Error. Captions should read South Hill Park [NOT Road]</p> <p>Page 98. What is meaning of red dotted line?</p> <p>Page 99. Error. Photo captions B and C are transposed. Description B should also read View looking south EAST. Error. Captions should read South Hill Park [NOT Road]</p> <p>Page 102. Errors in photo captions. B should read View looking south EAST..., C should read View looking EAST..., and D should read View looking south EAST..</p> <p>CONSIDERATION OF OPTIONS – HIGHGATE CHAIN (see particularly pages 9-10, 25-46)</p> <p>Key Principles and Selected Options In assessing these options, we have considered the following key principles:-</p> <p>1. Store/attenuate as much of the PMF as possible at the Boating pond, but minimise landscape impact. This implies Option 3 [3.0m raising], but we have reservations, and suggestions as below. We would like to limit the apparent height to approx 1.5m</p> <p>2. On Highgate 1, minimise any loss of trees and vegetation that screen the Heath from residential buildings, particularly Brookfield Mansions and the intrusive white blocks of West Hill Court [see comment on page 31]. Page 34 indicates that a 0.5m or 1.25m dam raising on Highgate 1 could be accommodated with a wall on the crest which would have less impact on the vegetation than an earth dam. However, this is partly contradicted by page 33, which implies that an earth dam might have to be built for the 1.25m dam raising, and any higher raising. This therefore implies Option 3, or perhaps Option 6, but we have queries.</p> <p>3. Carry out the minimum possible work on all other dams</p> <p>We detail these principles on the following review of the proposals for each pond, based on Option 3 stored volume, but with a Boat Pond dam raising of much less than 3m if our suggestions are incorporated:-</p> <p>Highgate Chain – pond by pond review Spillways generally Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where 'natural' spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p> <p>Stock Pond – crest restore 0.5m to 1.0m We presume that this height of dam raising is principally to allow a spillway to be inserted into the crest without unduly lowering the normal water level, rather than for crest restoration. Please clarify. We would prefer timber facing to the proposed retaining wall which we consider more visually appropriate than brick. There could be planting in front as screening. English Heritage screened the raised Wood Pond dam like this, which seems visually acceptable. This remark also applies to the proposed walls at the Men's Pond and Highgate No 1. We note that two [pond side?] trees may be lost in building the retaining wall [page 38] and query if this can be avoided through design As the proposed spillway is to be reinforced, with topsoil and grass cover over, could there be some bushes or shrubs on its downstream slope? Is it intended that this pond be dredged as part of the works [p44], as there is deep silt in this pond?</p>

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p>Ladies Bathing Pond – crest restore by 0.2m Please detail the position of the spillway, with any tree loss.</p> <p>Bird Sanctuary Pond – crest restore by 0.1m Please clarify if there will be any tree loss when carrying out the crest restoration. If so, we query why any work needs to be carried out. This dam is the most robust on the Heath, there is a tarmac road on the crest which significantly will protect from any erosion, and under flood conditions the dam will probably be overwhelmed by rising water in the Boat pond before formation of any small gullies</p> <p>Model Boating Pond – raise dam to store equivalent volume of water of a 3.0m raising It appears desirable to store approx 106,000 cu m or more if possible behind this dam, as in Option 3 which has 3m dam raising. However, we consider that this extra height could severely impact on the landscape, and suggest that the raising ideally be limited to an apparent 1.5m, whilst still storing this volume of water. We suggest that this might be achieved by the following three measures:-</p> <p>1. Design the spillway to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest. This might reduce the raising by approx 1.1m, being the height of the spillway. Please clarify and confirm. The old and new dams would then have to be protected from erosion from the overtopping PMF, and the need for this will depend on the rate of flow and duration, hence please supply the hydrograph.</p> <p>The new raised earth dam could have all slopes and the crest easily protected with reinforced grass [plastic Enkamat or similar] installed during construction and this would present a similar surface to that proposed for Option 3, ie. uniform grass, with possibly a berm/path and some bushes or shrubs on the upstream face to soften the appearance.</p> <p>The crest/cycle track on the existing dam is already in hard tarmac construction, but this could be re-laid in harder construction to ensure that it would not be eroded or undermined. It will then form a berm on the downstream slope,</p> <p>The downstream slope of the existing dam into the Men's Pond is broadly uniform grass with some specimen trees which are to be retained. If the hydrograph indicates that this downstream slope needs to be protected, then reinforced grass could be laid on it and around the trees without significantly altering the appearance. We accept that this may not provide the same protection as on a new dam, but suggest that it should be adequate, taking into account the fully protected crest, and the massive thickness of the combined existing and new dams. There could perhaps be some surface damage but no structural damage, and we understand that some damage can be accepted.</p> <p>2. Lower the water level in the pond by say, 0.5m max, and hence trim further height off the raised dam. As stated above, we absolutely agree that water levels should remain unchanged on all other ponds, due to the adverse effect on ecology and visual aspects. However, we suggest that the Boating pond is a special case. It is an artificial looking pond, of no significant ecological value. To construct the new dam, we believe that the pond may have to be completely drained with areas dredged for the new dam, and the two small reed beds and other planting will not survive. It is also proposed to cut back the west slopes significantly into the rising land, to win fill and create a more natural edge</p> <p>Whilst this work is being carried out, it would be extremely simple to dredge the pond deeper and lower the water level permanently without reducing the surface area of the pond. We suggest this be limited to say 0.5m max. We accept that disposal of silt, particularly if contaminated, may be a problem, but significant quantities may have to be disposed anyway, even if the water level is not reduced. The design of the dam and west slopes can easily be adjusted for a lower water level. However, this could leave the untouched east and north edges higher above and slightly more remote from the water. We therefore suggest that the existing east and north perimeter path could be re-constructed to the same height above the lowered water level as now. Alternatively, these paths could remain as now, but a new stepped water's edge could be formed advanced into the pond, broadly as on page 16, but with a walkway just above water level. Some marginal plants could be added if required to soften and conceal the walkway, but full access would still exist for model boats. We suggest that this could further 'naturalise' the pond attractively. A similar suggestion was also made at the Stakeholders workshop on 16 July 2013 [p45].</p> <p>3. The additional area of the pond, formed by excavating the west bank, may allow the raised dam to be trimmed further in height. We await calculations on this with interest [page 31]. However, we are very concerned at the possible visual impact of extending the pond width by up to 70m, which we understand may be mainly at the north end. This would double the width of the pond. We are also concerned at the proposed steepening of the west bank slopes from 1:13 to 1:5, which could look very artificial. We are also concerned at any tree loss that would be caused by this widening, please clarify. This major widening of the pond is not reflected in the plan-diagram on page 41. If this enlarged width is proposed mainly to win earth for the dam construction, rather than import earth, we strongly suggest that serious consideration be given to the option of digging deeper into the pond, rather than making it wider. Also, if suitable and unobtrusive locations can be found for borrow pits to obtain fill for the dam, these may possibly be backfilled with unsuitable soil and silt if ponds are de-silted, rather than transport off-site. In summary, we hope that these three measures will enable the apparent dam raising to be limited to approx. 1.5m, whilst still storing the same volume of water as Option 3. Because the footprint of the dam would be reduced, we hope that both mature willows at the west end just north of the ancient oak could then be retained. Please also advise if the large and the medium hornbeams at the west end of the causeway can be retained.</p>

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p>We are concerned at suggested tree loss for the proposed spillway works on the downstream slope of the existing dam [p28/29]. It is essential that a detailed plan be provided showing tree loss. P29 states that a low earth bund would train the [water] flow away from the dam and therefore avoid the need to line[reinforce] a wider area or cut into the ground to form a spillway chute. Excellent! However, we therefore feel that there should be no need to touch any trees on this spillway route, and we contest that two London planes have to be felled to form this corridor for the lower spillway.</p> <p>Men’s Swimming Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable, screened with marginal vegetation.</p> <p>We request a plan showing the layout of the proposed spillway, and then have a joint review on site. We are surprised at the large width [25m/43m]. However, if it is sited partly on the west bank, by the rangers’ bothy, we believe that it could follow a natural slope over shallow ground down to the next pond and no reshaping of the ground would be needed. As this natural route completely avoids the dam toe, no reinforcement of the spillway is needed, except at the dam crest and spillway mitres. Also, no trees, bushes or fences need be removed on this route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway as proposed.</p> <p>Highgate No 1 Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable. We urge that this wall be hand constructed so that there is no tree loss on the crest or dam slopes which would expose West Hill Court and Brookfield Mansions from the Heath. As the wall is on the crest with a sloping upstream face, we urge that it be concealed with vegetation and shrubs on both sides.</p> <p>We are greatly surprised that the spillway is proposed to be 60m/74m long, and ask that calculations be provided to substantiate this extraordinary width. This spillway [p30] would be partly on the west end of the dam and partly along the natural ground to the west of the dam. At this position two large trees [including a very large horse chestnut adjacent to the path,] and a smaller lime and two alders would be felled. There is also a veteran oak adjacent, about which the report is silent [except for mention on page 33].</p> <p>We consider this tree loss to be unacceptable, and query if fewer trees would be lost if the raised dam is continued round the waters edge almost to the dog swimming area. The west bank from this point northwards would then form a ‘natural’ spillway which could flood across the path to the low lying area to the west, and then fill up before overflowing south through a natural depression broadly along the line of the existing footpath. As most of this natural route, which is further to the west than proposed in the report, would avoid the dam toe, then little or no reinforcing may be required. It may also slightly reduce any impact of the flood to Brookfield Mansions</p> <p>We request a plan showing the layout of the proposed spillway with trees that would be lost, and a detailed level survey and plan of our alternative proposal above. There should then be a joint review on site. On these plans, please indicate the general direction this overtopping surface water will take after leaving the dam</p> <p>Please clarify what is intended by - new spillway could be planted as a bioswale feature [p43]</p> <p>Environmental Management Options [p44/45]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p> <p>CONSIDERATION OF OPTIONS – HAMPSTEAD CHAIN (see particularly pages 11-12, 47-61)</p> <p>Key Principles and Selected Options</p> <p>In assessing these options, we have considered the following key principles:-</p> <ol style="list-style-type: none">1. To minimize tree loss on Hampstead No 2 pond2. To attenuate/store more flood water than proposed in the report, provided that this would reduce the tree loss on Hampstead No 2. We particularly query if more storage is possible at the Catchpit, the Mixed pond, and at Hampstead No 23. To minimize the visual impact of the works at all ponds

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p>Hampstead Chain – pond by pond review</p> <p>Spillways generally</p> <p>Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where 'natural' spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p> <p>Vale of Health Pond – crest restoration 0.2m max [or 0.6m?]</p> <p>It has been stated that this pond has never overflowed and is spring fed with a small catchment area. The irregular tarmac crest has not been noted as of any concern. We therefore query why crest restoration is needed, with possible impact on crest trees</p> <p>Please clarify if use of a pipe larger than 500mm would avoid the use of a spillway with consequent tree loss. We would prefer this</p> <p>Please clarify proposed spillway and pipe discharge routes re the large sequoia tree, and detail any tree loss.</p> <p>Viaduct Pond – crest restoration 0.5m [or 0.18m?]</p> <p>Please clarify spillway route and tree loss</p> <p>Catchpit – suggest 5.8m dam</p> <p>We note that a 5.6m dam is proposed because the 7.2m dam reached a max water level only 160mm higher than with the 5.6m dam. Why not increase the proposed dam to 5.8m, in order to store the absolute maximum volume of flood? The Flowchart [p12] indicates the value of more storage, when one compares the 4.4m and 5.6m dams</p> <p>We have considered the two positions suggested for the dam – a) a sinuous curve on the S side of the valley, or b) moving the dam c.25m back upstream. Before giving a view, it is essential that detailed plans of these options be provided, showing trees that would be lost. We would then like again to view these options on site, as option b) was not considered at the last site visit.</p> <p>We initially favour Option a), but only if it can be designed not to endanger the two hybrid black poplars and hornbeams. This option would hold more flood water than option b).</p> <p>If Option b) is constructed, we presume the oak that would be lost is just inside the Catchpit fence. However, it is essential that a mature oak at the top of the west slope near the Catchpit be retained, as this should significantly screen the new works from Pryors Field. Many willows on the Catchpit boundary on the east side may be lost, - there should be replacement planting on the dam toe.</p> <p>We note on p49 that an advantage of Option b) appears to be that the Catchpit infrastructure could be rebuilt and improved, with potential for creation of a wetland habitat upstream. If this is desirable, we suggest that it could be carried out irrespective of the position of the new dam</p> <p>Option b) on the north side will store less water than option a). Please re-calculate storage volumes, and indicate what adjustments should be made to this and other dam heights to compensate</p> <p>As this dam is a 'dry' dam, we presume that shrubs and bushes can be planted on the slopes. Please confirm. If the slopes are in woodland, then we would want bushes for screening. If the slope faces grassland, then we wish to review on site</p> <p>Mixed Bathing Pond</p> <p>Options K, I and M indicate that two plane trees may be lost on Hampstead 2 Pond dam. If this loss could be reduced to only one tree by increasing the flood storage at the Mixed Pond more than proposed, then we would support this option. This short dam is already an artificial looking causeway with steep descents onto it at both ends, and raising it significantly should be simple. However, the key issues to consider include:-</p> <ul style="list-style-type: none">• pedestrians on the causeway should still be able to view the water on this pond and Hampstead No 2 pond at the same time, which implies raising the crest road to enable one to look north over the crest of the new dam which would be built within the Mixed Pond, similarly to the proposed Boat Pond dam• loss of the glimpse of water of the Mixed Pond when viewed from Hampstead No 2 Pond causeway. However, this glimpse will be lost if the dam is raised less than 1/2m, so a greater raising would not affect this aspect.

Source	Comment Number	Comment
Heath & Hampstead Society (Cont.)	2	<p> <ul style="list-style-type: none"> The effect of the raised dam when viewed from the swimming enclosure, although we presume it could have some shrubs, and a wildflower seed mix. We note from the Flowchart [p12] that 1.5m raising is suggested without qualification, but a 2.0m raising is not preferred by some stakeholders. </p> <p>Ultimately, the amount the dam is raised may be a balance between saving one plane trees on Hampstead No 2 and the feelings of the swimmers re a raised dam to the south. To make this decision, we need information on how more water storage at the Mixed Pond might influence loss of plane trees on No 2 dam.</p> <p>However, assuming the spillway is designed for PMF [as on the Highgate chain], then if the spillway is re-designed to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest, this might reduce the raising by approx 1m, being the height of the spillway. Please refer to our comments re the Boating Pond, clarify and confirm.</p> <p>If this option is selected, then the whole dam may have to be reinforced to take overtopping. This should be very simple, as the slopes are short, and the existing downstream slope is already uniform grass and has no trees along its critical length. Also, this dam is the second most robust dam on the Heath [after the Bird Sanctuary dam]. This option may therefore enable more water to be stored without further raising the dam</p> <p>Will the pond be dredged, as it is very shallow, particularly along the whole of the west bank?</p> <p>Hampstead No 2 Pond</p> <p>1. Options K, I and M indicate that two plane trees may be lost on this dam. If this loss could be reduced to only one tree by increasing the flood storage at this pond, then we would support this option, but as a last resort only if necessary, after our other suggestions have been adopted.</p> <p>We note that Haycock proposed to raise the crest by 1.0m, and Colvin and Moggridge, Landscape Architects, suggested in Nov 2010 that one could replace the existing fence [posts 900mm high] with a buttressed wall 1m high. This will raise the level of the dam with minimum impact on tree roots. Access could be provided to the fishermen’s path at the waters edge. This option might cause flood water to enter the lowest part of the gardens of some houses in South Hill Park, but if so, this would be briefly during exceptionally rare extreme flood events, and the houses should not be affected. This suggestion would require very careful landscaping so as not to be intrusive when viewed from the north. The path may have to be raised, and the wall may need to be screened with vegetation on the north side. In order to assess this option, please provide details on whether storage at this pond would be beneficial.</p> <p>2. We have considered the options of spillways versus culverts. Please provide details of your investigation of the possibility of splitting up the spillways to run between the trees. However, we initially favour culverts, to be sited as far west as possible</p> <p>3. Your View Point 3 [page 52] shows two trees would be lost. If the tree on the east is removed, then the Royal Free Hospital will become visible through the gap when viewed from the west end of the Mixed Pond causeway, much further west than View Point 4 which is from the east end of the causeway. However, if only the tree on the west is removed, then the hospital will not be visible as the gap will be screened by trees overhanging the west bank of Hampstead No 2 pond. We therefore urge that only the west tree be removed.</p> <p>4. We therefore query if the wide but shallow box culvert could be constructed with a taper in plan to form a narrow waist but deeper section as it passes between the trees so that only the west tree need be removed.</p> <p>5. We also hope that more storage at the Catchpit, Mixed Pond and Hampstead No 2 pond, when combined, might result in the reduction of the number of 3m wide culvert to two, which presumably will have a width of 6.5m. If so, we suggest that only one plane need be lost, as they are at 8m centres</p> <p>6. If two trees will still be lost with shallow culverts, we query if a letterbox drop culvert, with a low level thrust bored or tunnelled culvert could be constructed below the tree roots, to save one or both of the trees proposed for felling with shallow culverts</p> <p>7. We note suggestion for an island [p58]. We would like to meet on site to discuss details and particularly the size of any proposals</p> <p>Hampstead No 1 Pond</p> <p>We presume the outflow will be sited at the extreme east end of the dam. If so, then this should be concealed from the footpath on the south by the belt of trees and shrubs at the dam toe, which widens out at the east end. We would therefore prefer a spillway which should be less intrusive when viewed from upstream. However, we suggest that this should be made as narrow as possible, and query if the side slopes could be made steeper, as access to the crest is private. We note suggestion for an island [p59]. We would like to meet on site to discuss details and particularly the size of any proposals.</p> <p>Environmental Management Options [p60/61]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p>

Source	Comment Number	Comment
Highgate Society	3	<p>We have focussed our comments on the Highgate chain of Ponds. Our main comments are as follows:</p> <ol style="list-style-type: none"> 1. Legal and analytical foundations. The planned work on the Highgate chain is very heavily focused on the boating pond, where It is proposed to raise the current dam by 3m and double the width of the pond, widening it by up to 70m. We are concerned that neither the legal requirement under the 1871 Hampstead Heath Act, nor the analytical justification for making such dramatic changes, are adequately explained. If any such works are to carry the public with them, there needs to be greater clarity about the legal and data/modeling aspects underlying the plans. Simply stating (page 4) that “more storage is needed” is not adequate. We understand that the legal basis is still under discussion; this should surely be finalised before the project develops even more momentum. Tables setting out key model assumptions and data examples should be included. We certainly welcome the reduction in the scale of the work across the chain from that originally proposed but, in the absence of more clarity, consider that the documents as they stand do not justify the scale of work proposed. It is also impossible to choose between options 3-6 when no ready-reckoner type calculations are available for the extra storage capacity gained by cutting into the existing slopes above the existing water level. (p.31). 2. The underlying principles remain unclear. The early pages of the paper – notably pages 4-9 – have several series of principles. The list needs to be slimmed down and stated more clearly, so that the proposed works can be sensibly judged against them. We welcome the effort to leave most of the Highgate chain relatively untouched, but are concerned about the extent of work planned for the boating pond. 3. Water storage needs. Clarity is also needed on the rationale for the extent of extra water storage planned for the boating pond. The case for that much extra storage is not clear-cut if the overriding legal requirement driving the project is to ensure that the dams lower down the chain do not fail in the event of the extreme flood case. 4. Misleading images. We find the images on pages 26/27, and especially that on page 41, to be misleading. They give no real impression of what a 70m width increase (as set out on page 31) - which would double the pond area - would actually look like. The impact on the west bank – steepening it from 1:13 to 1:5 – must be shown clearly. This would be a very major change, with a major impact on users of the slopes above the Pond. Visualisations from all viewpoints are needed, and a model to be displayed at public events would also be important. 5. Wider v deeper. If material is to be taken from the Model Boating pond to build the dam (which we would approve if the result was to minimise traffic flow on the access roads), the pond should be made deeper, not wider. This would have no visual or safety outcomes. 6. Access, not naturalisation. We do not believe that the boating pond edges should be be softened or made more “natural”, beyond what is already being done on the way of reed-bed planting. One of its great attractions now is that it is the only pond on the Highgate chain on which the edge can be accessed by all, including children’s buggies and electric wheel chairs - much more so, perhaps, than any other pond on the Heath. We believe that this is valued by Heath users and that this access must be maintained. 7. Western “roadway”. The pathway/road along the western side of the boating pond is one of the Heath’s major thoroughfares, for people and Heath vehicles. It is far from clear how it will be reconfigured and what will be its subsequent relationship with any new edge to the pond. Drawings are required. 8. Spillways: hard v soft. The creation of spillways is crucial to minimising the addition to dam heights required in the Highgate chain. While the spillways for more frequent flood events (say, 10/25 year events) need to be “engineered” in various ways and kept free of large plants, the spillways for 1,000-year events can use the lie of the land to shift the water. Such rare events will presumably cause extensive damage on and beyond the Heath, and the loss of trees and plants on the “natural” spillways will be a small part of any such damage. A tree with a life expectancy of 50/100 years does not need to be protected from a 1000-year event. 9. Boardwalks. We are unconvinced about the merits of boardwalks around the boating pond. They can be slippery, need replacing/maintenance and will prove to be too narrow. Hard edges, such as those existing on the boating pond, are ideal for all users and far more durable and easy to maintain. Edges should be as close to water level as possible. 10. Trees on pond edges. We are strongly against the “tree maintenance” suggestion (page 18) that trees on pond banks be removed, or “moved back”(?), so as to reduce leaf litter in the ponds. This would alter the character of the Ponds irreparably and would, we consider, be completely counter to the requirements of the 1871 Act, if the aim is to reduce tree cover simply for ease of maintenance.

Source	Comment Number	Comment
Highgate Society (Cont.)	3	<p>11. Road access. Merton Lane and Millfield Lane must be kept open to pedestrian traffic throughout such works as are eventually undertaken. Not only are they the main means of access for Highgate residents to the Heath (and for many coming from further afield from the east), but residents on the roads need to be able to access their homes at all times. We have major concerns about the suitability of Millfield Lane (effectively a single lane residential road) for access of numerous HGVs to the site; access must be achieved from more suitable two-way roads wherever possible.</p> <p>12. Phasing the works. Pedestrian access to the Heath from the ponds area (Millfield Lane) needs to be maintained at all times. It is therefore important that the works be phased so that only one or two pond causeways are blocked at any time.</p> <p>13. Active water management. A fundamental aspect of the overall aims of the project is surely the active management of water levels in advance of a predicted storm, to which little attention appears to have been given so far. More detailed consideration of this aspect of water flow control could have a major impact on the amount of works required to dams and pond banks. The impact of such measures on a 10,000-year flood will be limited but for lesser, more frequent events, the implementation of improved measures to allow the controlled lowering of water levels in the day or hours before forecast heavy rainfall should go some way towards mitigating the negative impact of dam works.</p> <p>14. Public consultation. We are concerned that public consultation plans are still unclear, and risk being presented in a way which will give the wider public the feeling that they are in effect being presented with a fait accompli. We would urge that sufficient flexibility be built into the options presented for wider consultation to be able to satisfy the public that their input can be a real one.</p>
Dartmouth Park CAAC	4	<p>The consensus of opinion of those responding to the consultation was that Option No.3, concentrating the works at the Model Boating pond was the least undesirable. Inevitably, there was concern about raising the height of the dam to three metres, but it is accepted that there is scope for improving the municipal appearance of the pond, while tree loss would be only one tree on site, with a reduction of potential loss on the Downstream ponds.</p> <p>Additionally it. Is agreed the reunion of works on the Downstream ponds will clearly be beneficial, while excavations on the west side will provide material on site, thus avoiding construction traffic through neighbouring residential streets, which is highly desirable.</p> <p>In conclusions he Report paper, though there are disadvantages, as set out in the Report paper, such as the changes to views from the N W end and east side of the MBP , the extension of the pond to the west losing waterside access, in addition to the Reilly higher dam, on balance the advantages predominate.</p>
Highgate Men’s Pond Association	5	<p>Model Boating Pond (“BP”) and Highgate Men’s Pond (“MP”) – Comments by reference to pages in the Report</p> <p>A. Model Boating Pond</p> <p>We reject all of options 3, 4, 5 and 6.</p> <p>We are in particular opposed to the construction of the 3 metre dam on the BP for these reasons:</p> <ul style="list-style-type: none"> it is unlikely to be accepted by the general membership of the HMPA it is unlikely to be accepted by the general public the scale of the construction introduces an increased engineering risk it represents “building against nature” in a way antithetical to the ideal of the Heath. <p>The traffic and pedestrian path currently heavily used on the west bank of the BP is proposed to be significantly raised, making the traffic and pedestrians much more visible, robbing the place of its hitherto discreet tranquillity, and unsightly to those seated on the grass on the east bank. We have real concerns that the creation of the proposed uniform grass bank on the west side will give the place a lido-like appearance and require the destruction of trees and vegetation and the habitat of shoreline animal and bird life.</p> <p>We have assumed – but ask for this to be confirmed – that this raised path will not go up and over or around the crescent-shaped westward continuation of the raised BP dam.</p>

Source	Comment Number	Comment
Highgate Men's Pond Association (Cont.)	5	<p>B. Men's Bathing Pond</p> <ol style="list-style-type: none"> 1. Is the proposed spillway on the dam of the MP to be a hard spillway on which trees cannot grow? 2. Is it the case that a broader spillway on the Men's Pond would result in a lesser raised dam on the Men's Pond while retaining the existing trees? <p>We would like to see a plan and picture showing the returns on the east and west of the MP dam as well as the full "brick" wall. Why is brick chosen? To conceal concrete?</p> <p>On page 29 of the Report there is a reference to the dam slope needing to be 1:12. We do not understand the need for this in the absence of an accessible path to the top of the dam.</p> <p>Will it be necessary to close the MP facility in order to construct the proposed spillway and/or raise the MP dam? If so, why?</p> <p>Regardless of the actual works at the MP, is it intended, in any circumstances, to use the MP facility as a engineering compound for the storage of plant or material?</p> <p>C. Conclusion</p> <ol style="list-style-type: none"> 1. We continue to regard the application of the 1871 Act as of paramount importance in terms of preserving the natural landscape of the Heath and the freedom of access by the public to the swimming ponds and their adjoining facilities. <p>We still consider that insufficient thought has been given to the construction of a side channel which, making the best use of the natural contours of the Heath, would carry the excess water down the side of No. 1 and No. 2 Ponds rather than through them. The channels could be where the existing north/south paths are (and these could remain in use as paths) and creation of the channels would not involve the felling of trees. We anticipate they might be approximately 60 metres wide but would not need to be excavated as channels. Rather a reinforced bund could be constructed on the pond side of the channel with the natural slope of Parliament Hill providing the "bund" on the east side. Drains on either side of the path could deal with mild flooding. The reinforced bund would prevent the water in the channel from flowing over and into the pond.</p>
Brookfield Mansions and EGOVRA	6	<p>The residents of Brookfield and EGOVRA have shared concerns regarding the planned Hampstead Health Ponds Project (HHPP) and consequently present here our joint comments on the project.</p> <p>In order that City of London (CoL) to meet its statutory obligation to ensure the structural integrity of the dams and so manage the risk to life and property of a dam failure it is implementing the HHPP. It is to protect the residents downstream, such as Brookfield and EGOVRA, that this legislation has been put in place. Our overriding interest therefore is that we proceed with an option that offers the greatest protection to life and property from flooding and sewer surcharges during all return periods and that it is at least as good as the existing protection offered by the dams during these return periods. Unfortunately based upon the information we have received to date it is not possible for us to determine which option if any offers this.</p> <p>In advance of the Stakeholder Meeting held at Highgate No1 Pond on 14 August 2013 we submitted questions that we need to obtain answers to in order for us to be able to assess the Shortlist Options, which are now being presented. We attach these as an appendix to these comments. We would be grateful if we could receive answers, to these questions as agreed. Many of these have been outstanding for a very long time; we have previously and several times been promised answers. It is unreasonable that CoL should impose a deadline on our response to the Shortlist Options Report (the Report) without providing the information they promised. Can you please advise us when you propose to give us answers to these questions?</p> <p>In the Report it is specified that a Design Principle is to "Avoid making downstream flooding worse, by ensuring the flows discharged by the last pond on each chain are no greater than in the existing case." In the Assessment of Design Flood it specifies that the standard of protection for Highgate No1 Pond falls between 1 in 50 and 1 in 100 years. All the Options for the Highgate Chain in the Report are worked to a 1 in 50 standard of protection. The Design Principle for the Highgate Chain has consequently not been met. If the standard of protection is assessed as a range the design should meet the top of the range, 1 in 100, to satisfy the Design Principle.</p> <p>The Report specifies that "Less severe floods have also been used to assess the system response to ensure that the options for passing the PMF do not exacerbate the flows downstream during lesser floods." We would like to see the results of this work as it may go some way to satisfy us that these options do not result in worse floods arising in lower return periods than at present. Intuitively the increased storage in the pond system should reduce the potential of flooding, however, the design team have not been able to confirm this for us.</p> <p>Under Common Law CoL has an obligation to ensure that water is not "deliberately drained" onto lower neighbours' land as a result of "artificial alterations", such as spillways. The description of the spillway on Highgate No1 suggests an extremely long spillway that comes over a steep part of the dam face and into Brookfield. The floodwater is not been directed beyond the crest of the dam and in a major flood looks like it could undermine the base of the dam. CoL needs to have consideration for how floodwater is managed over its land and delivered into adjacent properties in order to meet its obligations. The Report does not adequately address how this is to be achieved.</p> <p>On behalf of Brookfield and EGOVRA</p>

Source	Comment Number	Comment
Brookfield Mansions and EGOVRA (Cont.)	6	<p>Appendix</p> <p>Outstanding Questions Re Highgate No1 Pond</p> <p>Existing pond</p> <p>1. What is the existing standard of protection for Highgate No1 Pond (HGNo1)? The Assessment of Flood Design specifies this falls between 50 and 100 years. Please provide this with greater accuracy.</p> <p>2. Does the determination of the standard of protection include the utilization of all pipes (Overflow Pipe and the Scour Pipe) leaving HGNo1?</p> <p>3. What are the flood management procedures that have been used to manage the floodwaters of HGNo1 including both through existing drainage systems and any other means e.g. surface water?</p> <p>4. Who owns or is responsible for each pipe leaving HGNo1 including their maintenance?</p> <p>5. What is the existing height of the dam above the normal water level?</p> <p>6. What are the dimensions, maximum discharge flow rate and volume of each pipe (Overflow and Scour Pipes) that leaves HGNo1?</p> <p>7. Please provide figures for the existing volume and discharge flow rates of water passing through the overflow pipe during 1) normal conditions (i.e. when there isn't any rain) and 2) storm events of 1 in 10, 20, 30 and 50 and at the point when overtopping begins? This is to establish the current conditions for comparison with the expected conditions after the proposed works have been completed.</p> <p>8. Provide details of the existing total volume, peak discharge flow rate, depth of overtopping and overtopping duration in 50, 75 and 100 year storm events.</p> <p>Proposed Scheme</p> <p>1. Provide a topographical map of HGNo1 identifying the location dimensions and design of the proposed spillway, the pond area that would be inundated by a flood prior to water coming down the spillway, where the spillway will discharge water and the expected direction of water flow off the City of London (CoL) property</p> <p>2. Is it proposed that there will be any earthworks (bund or otherwise) to manage the direction and speed of water flow once it has come down the spillway?</p> <p>3. Is it proposed to change the flood management procedures in future and if so why are these changes being introduced and what are the proposed new flood management procedures including through existing drainage and surface water systems? Is any consideration being given to a system that pre-empts periods of expected high rainfall by increasing the water discharged from the pond in advance of the storm?</p> <p>4. At what height above normal water level will the proposed spillway begin passing water?</p> <p>5. What are the proposed public facilities that are to be made available on HGNo1? Are there plans to introduce angling on this pond?</p> <p>6. What dam raising can be achieved on this pond without affecting the tree cover of the pond?</p> <p>7. The Design Philosophy states "...the works to the ponds will not make the flooding situation downstream worse". Is this the case for all storm events and how will this be demonstrated/verified?</p> <p>8. It is proposed to "...improve the discharge capacity..." at HGNo1 pond. How is this to be achieved and why? Our concern is that surface water will be discharged sooner than is currently the case and at a faster rate.</p> <p>9. Please provide us with a map of the drainage pipe system around the Heath and advise us how it is envisaged that water will drain through this system in different storm events.</p> <p>10. In the Assessment of Design Flood it anticipates 276,996 m³ total PMF volume entering the Highgate Chain and total available storage in the Highgate Chain of 42,518 m³. This means the Highgate Chain can only currently store 15% of the PMF. What is the proposed impact of the proposed scheme on the storage of the PMF in the Highgate Chain Ponds?</p> <p>11. What is the impact of the scheme on the smaller storm events? The implication is that they will overtop less frequently as more storage exists in the system.</p> <p>12. What is the impact of the scheme on the available storage in HGNo1?</p>

Source	Comment Number	Comment
Brookfield Mansions and EGOVRA (Cont.)	6	<p>13. Please provide figures for the proposed total volume and peak discharge flow rates of water passing through the overflow pipe during 1) normal conditions (i.e. when there isn't any rain) and 2) storm events of 1 in 10, 20, 30 and 50 and at the point when overtopping begins? We want to be sure that Camden and Thames Water have sufficient information to calculate the impact of this extra water on their drains and sewers.</p> <p>14. Provide details of the proposed total volume, peak discharge flow rate, depth of overtopping and overtopping duration in 50, 75 and 100 year storm events.</p> <p>Legal</p> <p>1. The positioning of the spillway and the nature of its discharge of water is a factor in determining liability if the water is caused to flow in a more concentrated form than it naturally would as the result of artificial alterations. Please advise us how this is being addressed?</p> <p>2. Please provide us with a copy of CoL emergency action plan.</p> <p>3. Please advise us of CoL's legal responsibility to residents and properties on the Heath boundary with regard to the delivery of 1) surface water and 2) underground/piped water. Also, please clarify how the CoL's understanding of their responsibilities in this matter have changed, if at all, since the circulation to the WMSG of the "Position Statement on Discharge of Water (Overtopping of Ponds and Surface Water) from Hampstead Heath" on 28th November 2012.</p> <p>4. Does the proposed scheme comply with the requirements anticipated under the 2010 Act? If not in what way does it not comply?</p> <p>5. What is the essence of the legal dispute between Hampstead and Highgate Society and CoL?</p> <p>Authorities</p> <p>1. Please clarify what discussions have taken place with any concerned Authorities including Camden Council, Thames Water and Environment Agency.</p> <p>2. Does the scheme take into consideration the Preliminary Flood Risk Assessment prepared by Camden and Camden's study on surface water flooding?</p>
Fitzroy Park Residents Association	7	<p>Key principles:</p> <p>Agreement that management of MPF is best achieved by maximising increased storage (attenuation) in the middle of each chain: respectively Catch Pit for Hampstead and Boating Pond for Highgate and to work from this point.</p> <p>Fully support pond restoration options and water quality improvement options including floating islands. Atkins needs to guard against losing unique feel of each pond by repeating same solutions down the chain – too generic.</p> <p>Acceptance that this is a generational scheme and, as such, it is important to give Atkins scope to explore more fully options that are not simply determined on height of bund at each in order to create new diverse environments for the Heath eg: widening of Model Boating by excavating west back by 50m+.</p> <p>Actual data for expected attenuation down the chain, presented as %age of PMF and other 1:1000 or 1:5000 year flood is critical in justifying these significant works.</p> <p>If only clays are used for construction of new dams, concerns remain at the sheer mass and presence of proposed bunds in both sites: detrimental impact on visual amenity, diversion of pathways, removal of trees. To mitigate these impacts we suggest Atkins consider use of more hard-core materials to reduce massing with PW advising on alternatives to concrete.</p> <p>Where access to water's edge currently exists for anglers or children to play safely this amenity should be retained.</p> <p>Use of spillways needs some further clarification and how they will be engineered needs further clarification.</p> <p>Tree 'set back' to reduce leaf litter is not considered appropriate or viable.</p>

Source	Comment Number	Comment
Fitzroy Park Residents Association (Cont.)	7	<p>Specific feedback on Options shortlist:</p> <p>Highgate Chain: 3m raising of MBP is considered too invasive for landscape. 1m raising of MBP has too much of an impact downstream on Mens’ Bathing Pond & Highgate No1. Consideration of a solution between 1.5m and 2.5m in conjunction with a widening of MBP as described above would be preferable = Option 4 nearest option.</p> <p>Hampstead Chain: 2m raising of Mixed Bathing Pond would be to invasive. Preference would be 1m. Preference would be for letterbox culvert spillways, not open spillways so long as these can be designed by Atkins to retain as many existing trees as possible. It is accepted that loss of two plane trees at Hampstead No2 would be inevitable. Best choice on current information would be Option M.</p>
Mixed Pond Association	8	<p>We would like to stress that the MPA feels that ANY increase to the height of the Mixed Pond Dam will detract from the experience of swimming there. Nevertheless we recognise that the dam needs to be raised to some extent in order to minimise work on No. 2 Pond dam, and we agree that saving the maximum number of trees on this dam is a high priority. We therefore are keen that the Mixed Pond dam should ONLY BE RAISED BY 1 metre. This is shown in Options M & N on Atkins Modelled Options flowchart, but with the comment “Requires amendment to be feasible”.</p> <p>We ask that this feasible study should be done and reported on.</p>

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(Note Query numbers are derived from the Log of Questions and Answers on Hampstead Heath Ponds Project)

Source	Query Number	Query	Design Team Response
Jane Shallice, Ladies Pond on Shortlist Options Report 21 Aug 2013	147	<p>More on de-silting</p> <ul style="list-style-type: none"> Plans which show the detailed proposals, including the materials that are to be used. Cross sections : <ul style="list-style-type: none"> The longitudinal section through the pond, dam, meadow, stock pond, boating pond and men's pond. Cross section down the middle of the access lane down to the dam and changing rooms. Cross section through our meadow, the pond and the meadow to the West. Detailed cross sections through the different conditions around the edge of the pond i.e. through the dam, the spillway, the West side, the North side and the East side. Visualisations of the proposals from the path, the dam, the spillway, the lifeguards' lookout, the changing rooms, the water, and the meadow. 	<p>Information on the scope of de-silting that can be carried out to the Ladies Pond will be dependent on the results of bathymetric surveys which are ongoing. These will allow estimates of the quantities of silt on the pond bed. This information will be combined with an assessment of the treatment required to the silt if it is to be moved elsewhere on the Heath.</p> <p>Cross sections through the changing rooms and more detailed drawings will be worked up during the detailed design phase.</p> <p>The architect is currently working up outline design proposals for consideration and will be able to provide more detail on the proposed changing room construction.</p> <p>The environmental works are summarised in the Preferred Options report. The detail of these works will be developed in the next stage of design. The current proposals are to allow a public consultation which encompass the principle of minimising the impact on the Heath by focusing intervention in one main area (i.e. Model Boating).</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	148	<p>The public have been invited to comment on this complex and detailed report, so there needs to be guidance on the key issues where comments are most sought. As this document may be read as a 'stand alone' report by the public, we consider that Section 2 'Brief Summary' is too condensed and does not provide a logical justification for the works, particularly for persons who have not read the preceding documents. In particular, the phrase 'Essentially, more storage is needed' is not a logical conclusion of what goes before in this section. Also, the primary objective of the project to prevent dam break is not stated, and the phrase '...to improve the resilience of the dams.....' is obscure to the uninformed. An additional two or three sentences might help considerably.</p>	<p>There will be a similar section summarising the problem definition in the forthcoming Preferred Options Report, where these comments can be addressed.</p> <p>This section of the report will include an explanation of 1) how increasing storage in one pond reduces the flow discharging from the next pond, and 2) how the "resilience of the dams" refers to the ability of the dams to withstand the erosive impact of floodwaters overtopping the dam crests and flowing down the downstream slope.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	149	<p>6, 8 and 9. We are somewhat bemused by the plethora of 'Design Principles', and fear that the general public will receive a confused message. We note the 4 principles on page 6, 3rd column, which are then supplemented by 2 more in column 4. These are then supplemented by a further 6 on page 8, column 3, and then on page 9 there are a further 3 'key objectives'. We suggest that it would be helpful to state one clear set of aims, consistent with duties under legislation.</p>	<p>This is noted and a clearer set of objectives, design principles and philosophy is set out in the Preferred Options report as suggested.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	150	<p>We note that the design team/Dr Hughes has said that some damage can be accepted. We also note that ICE 'Floods and Reservoir Safety' Table 1 recommends that spillways for Category A dams be designed for 1:10,000, with the remainder of the shorter duration and rarer surplus PMF spilling over the crest if overtopping is tolerable.</p> <p>We recognise that PMF spillways are a prudent design principle that would also avoid intrusive works to reinforce our existing and sensitive dams to take overtopping. However, if PMF overtopping could be tolerated on two dams, we suggest this could reduce dam raising by approx 1m, being the depth of spillways below the crest. We will address this in detail when we review options, specifically for the Model Boating pond, and the Mixed Bathing pond.</p>	<p>The reference to Table 1 of 'Floods and Reservoir Safety' is correct and its recommendations do inform our design principles. However, the decision on whether overtopping is tolerable or not depends on several factors including the nature of vegetation on the dam crest and downstream slope, and the depth and speed of flow over the dam crest and downstream slope. For example, the Panel Engineer has said that he would not accept overtopping of the dam at Hampstead No.2 pond because the plane trees would cause eddying and turbulence which would increase the erosion of the dam during overtopping. The dams which would be more resilient to overtopping are those which have a uniform grassy slope with no woody / bushy vegetation. This description would largely apply to the causeway dam at Mixed Bathing Pond, for example, but not to the dam at Model Boating Pond, which has several large trees on the downstream slope of the dam itself, or most of the other dams.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	151	9, 25, 47 Please explain, if all the PMF is routed through spillways and does not overtop the crest, why crest restoration is required on many dams, with possible impact on crest vegetation, as their crests will normally be above water level. This query applies to Stock, Ladies, Bird, Vale and Viaduct ponds.	<p>At Stock, Ladies, Vale of Health and Viaduct Ponds, crest restoration is proposed for the low spots (which tend to be in the middle of the dam) to bring the crest to uniform level so that the spillway can be located away from the middle, and also so that the weir level of the spillway can be kept above typical water level. We can therefore reduce tree loss on the dam (by locating the spillway away from the most valuable trees) and also have a normally dry spillway which can be lined with grass that can blend in with the surroundings.</p> <p>At Bird Sanctuary pond, the crest restoration is intended to fill in low spots so that if there is some overtopping in small floods, the risk of the flow concentrating into a narrow cut in the dam is reduced. In larger floods, water will be backing up on both sides of Bird Sanctuary dam, so it will become submerged.</p> <p>The crest restoration at Bird Sanctuary dam is relatively minor with only an 80mm increase required at the low spots, this could be achieved with resurfacing of the crest road without affecting the vegetation on either side.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	152	9, 25, 47 Please clarify, as most existing dams will currently overtop in PMF, if the proposed spillway depth is say approx 1m and some dams have crest raising/restoration less than this, does this mean that these modified dams will store less water than the current existing dams?	<p>Generally the crest restoration proposed for upstream dams allows the spillway weir level to be above the typical water level in the pond upstream and as close as possible to the existing ground level. However, this is not always possible, so to minimise raising works at these ponds, there is a slight reduction in storage capacity at some ponds. This is more than compensated for by the raising of dams (or building a new one) downstream, and this is why the whole chain of ponds should be considered as a system, where the raising of a dam in the middle of a chain can reduce the works required both upstream and downstream.</p> <p>Depths of proposed spillways have been shown on the options flowcharts in the Preferred Options Report.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	153	10 Highgate chain flowchart: Please explain:- <ul style="list-style-type: none"> why are spillway widths on the Boating Pond identical for options 3, 4 and 6, rather than being tailored for the different surplus floods? Are they oversized for the higher dams? We note [p21] that spillway size is a key consideration, as vegetation clearance will be needed, hence we urge that these be the minimum size possible 	<p>Currently, the peak water levels in Options 3, 4 and 6 are only around 300mm below the dam crest level during a PMF, which suggests that there is little scope for spillways to be made narrower without losing the freeboard required by the Panel Engineer to allow for wave surcharge. However, it may be possible to reduce the spillway size by adding another pipe through the dam. Refinements to the spillway size such as these will be tested using the model at the beginning of the outline design stage.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	154	<ul style="list-style-type: none"> Men's and Highgate 1 spillways – why are these identical for all options, irrespective of the height of the Boating pond dam? 	<p>For the shortlist options report, spillway widths on the last 2 Highgate chain ponds were kept the same when modelling the Highgate chain options so that the degree of raising at each pond could be quantified and compared. This was intended to demonstrate the principle of trade-offs, so we could define the consequences of varying amounts of raising of the dam at Model Boating Pond.</p> <p>Further refinements will be carried out to investigate possibilities of reducing spillway size.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	155	<ul style="list-style-type: none"> Option 5 shows a 2.0m raising on Highgate 1, but only a 1.5m raising on the Men's pond. Both these raisings may require an earth dam to be built inside the ponds, [page 33], which may have a major impact on screening vegetation and trees on Highgate 1. Could you please test this option with a max 1.25m raising at Highgate 1 [ie. with a wall], to determine the amount of dam raising then needed on the Men's pond dam? 	<p>Option 5 has now been discounted due to the impact on screening vegetation mentioned.</p> <p>Option 6 has shown that when there is a 1.25m raising at Highgate No.1 Pond dam, 1.0m is required at Men's Pond dam, but only if there is a raising of 2.5m at Model Boating Pond.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	156	9, 10, 25 We note, re 'standard of protection', that the return period.....that causes overtopping of the last dam in the existing scenario is compared with the flood event that causes the proposed spillway in each option to start to spill water. Despite major attenuation on each chain, the standard of protection and peak velocities appear from the flowcharts to remain virtually unchanged, without any improvement. To assess this, please supply the current and proposed rate of flow versus time graphs [hydrographs] for all options for the bottom 2 ponds, the Mixed Bathing Pond and the Boating pond , and also for all the ponds if possible.	The options flowchart in the Shortlist Options report had a slight error in the boxes stating standard of protection, in that all of them should have stated ' at least 1 in 50 year flood'. (At the time, only the PMF and a 1 in 50 year flood had been run through the options models). Since then, the models for Options 3, 3a, 4 and 6 (with 2.5m – 3.0m raising at Model Boating Pond) have been modelled with higher return period floods in order to find out the actual range of standards of protection. In all these 4 options, the spillway did not operate for floods up to and including a 1 in 1000 year flood, indicating that the standard of protection given by the last dam is better than existing, due to the net increase in storage in the pond chain. Hydrographs showing outflows from the Highgate No.1 Pond for the next larger floods (1:10,000 year and PMF) are included in the Preferred Options Report to allow comparison between existing scenario and one option for each chain.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	157	12 Hampstead Chain Flowchart. Please explain:- <ul style="list-style-type: none"> The chart shows Vale pond crest restoration as 0.2m max, whereas the text [p47] states 0.6m max. Please clarify The chart shows Viaduct pond crest restoration as 0.5m, whereas the text [p47] states 0.18m max. Please clarify	The text in the report is correct, the proposed crest restoration is 0.6m at Vale of Health and 0.2m (0.18 m rounded up) at Viaduct. This has been corrected on the options flowcharts presented on 14 th September and appears in the Preferred Options Report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	158	The Flowchart shows the Catchpit with three different options of pipe size through the same 5.6m high dam. Please explain the effect of these different options re timing, duration, velocity and total volume of flood water on the downstream dams. We do not understand the benefits of these different options	The different size of pipes in the dam were tested after it was found in an earlier iteration that a 7m high dam with a 600mm pipe through it would only impound 5.6m of water. Smaller pipes were then tried, to see if the volume of stored water could be maximized. While it would be possible to calculate all the exact data requested, the key variable for comparison between options was the water level downstream in Hampstead No.2 pond, when the dam was combined with differing spillway / culvert sizes at that pond. The key benefit of having smaller pipes was thought to be that the increased stored volume would reduce water levels downstream. However, reducing the pipe diameter did not have as much of an impact on downstream ponds as the amount of raising modelled at Mixed Bathing Pond.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	159	<ul style="list-style-type: none"> We much welcome the presentation of so many different options, but are puzzled at some of the figures presented. We would appreciate clarification. For example, referring to the spillway/culvert options for Hampstead No 2 pond:- why is Option J spillway significantly larger than Option H [where both have 1.5m raising of the Mixed Pond]?	In Option H the proposed Catchpit dam had a larger pipe (600mm) than in Option J (400mm), and the peak water levels were different (being higher in Option H), which means it is not always easy to compare like for like. The options flowchart for the Hampstead chain did contain a lot of information so it was decided not to include spillway depths and modelled water levels. However, spillway depths will be shown in the Preferred Options Report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	160	why is Option N spillway almost the same size as Option C [which has much less stored water]?	There is an error in the text in the flowchart, the open channel spillway in Option N is actually modelled at 14.3m wide at the base, so is slightly wider than in the 11.9m wide spillway in Option C. Currently these options have been discounted in favour of those with box culvert spillways at Hampstead No.2 pond.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	161	why are the cross sectional spillway areas [calculated up to crest level] significantly greater than the cross sectional areas of the culverts, when comparing pairs for the same flows? Spillway areas vary from 1.5x to 3.1x larger in area than the equivalent culverts. Surely spillway flow would be smoother and more efficient than culvert flow which could be turbulent, which could be expected to make spillway area less than culvert area?	<p>The flowchart does not show peak water levels and depths / invert levels, so it is not possible to make like for like comparisons on cross sectional areas of flow.</p> <p>Box culverts have been considered for Hampstead No.2 pond in order to reduce the width of spillways and therefore minimize tree loss.</p> <p>The flow rate over spillways is proportional to the driving head raised to the power of 1.5 and linearly proportional to the width. This means the head has a much greater influence on the flow rate than the width. In order to minimise the width of the box culverts, a greater head is applied to get the flow through the culvert.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	162	why is there this variation in the ratio of spillway areas to the equivalent culvert areas? Surely there should be the same ratio throughout? For example, the spillway area in Option L is 1.5x the area of the equivalent culverts in Option K, whereas the spillway area in Option J is 3.1x the area of the culverts in Option I. Is spillway J twice the size needed?	<p>The flowchart does not show peak water levels and depths / invert levels, so it is not possible to make like for like comparisons. The process of developing models was not based on ratios but on adjusting the spillway weir level and width of each option until the peak water level was below the minimum existing crest level.</p> <p>See also the comment above regarding the influences of head and width on flow rates.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	163	14, 22 We note in all cases it is assumed that water levels remain as today. We endorse this principle generally, as agreed at the 13 July workshop, as lowering could affect ecology and visual appearance. However, we query if a single exception might be made for the Boating Pond , as lowering the water level may enable the proposed dam to be reduced in height. We discuss this in detail later	<p>This is technically feasible, but there was a general consensus within the feedback from the early consultations that no typical (existing) water levels should be changed. It was also discussed at the 2nd PPSG workshop and most stakeholders were against lowering the water level.</p> <p>The recent silt testing has suggested that there could be up to 2.2m of silt in Model Boating Pond, and so the reduction in the depth of clear water could have a negative effect on fish populations which would need to be assessed by specialists.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	164	26 Viewpoint 6, 3m raising, still shows the canopy of a tree that would be removed with this option. There are similar instances in several photo visualisations. We urge for accurate imagery in the next report	This is noted, and the visualization will be corrected for the next report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	165	31 We note that most of the advantages and disadvantages quoted for Option 3 are changes that are irrelevant to dam height, and apply therefore to all the options, not just to Option 3.	This point is made on page 34 of the Short Options Report and so the differences in advantages are given when discussing the next option.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	166	HIGHGATE CHAIN In assessing these options, we have considered the following key principles:- Store/attenuate as much of the PMF as possible at the Boating pond, but minimise landscape impact. This implies Option 3 [3.0m raising], but we have reservations, and suggestions as below. We would like to limit the apparent height to approx 1.5m	<p>We note that the impact on landscape at Model Boating Pond is significant, but it is related to the need to source fill material as close as possible to the pond, in order to minimise the need for imported fill to be transported through residential areas around the Heath.</p> <p>The modelling of options has shown that a lower raising height at Model Boating Pond would have the consequence of a larger new embankment at Highgate No.1 Pond, thus spreading the area of major works and the impact on other ponds.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	167	On Highgate 1, minimise any loss of trees and vegetation that screen the Heath from residential buildings, particularly Brookfield Mansions and the intrusive white blocks of West Hill Court [see comment on page 31]. Page 34 indicates that a 0.5m or 1.25m dam raising on Highgate 1 could be accommodated with a wall on the crest which would have less impact on the vegetation than an earth dam. However, this is partly contradicted by page 33, which implies that an earth dam might have to be built for the 1.25m dam raising, and any higher raising. This therefore implies Option 3, or perhaps Option 6, but we have queries.	In both the Preferred Options it is proposed that a wall be built at Highgate No. 1 pond.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	168	<p>1. Carry out the minimum possible work on all other dams</p> <p>We detail these principles on the following review of the proposals for each pond, based on Option 3 stored volume, but with a Boat Pond dam raising of much less than 3m if our suggestions are incorporated:-</p> <p><u>Highgate Chain – pond by pond review</u></p> <p><u>Spillways generally</u></p> <p>Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where 'natural' spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p>	<p>We are not yet in a position to release outline design drawings, which are programmed to be developed in October. We can summarise the spillway location position as follows:</p> <p>Stock Pond: at the west end of the dam, to be shown in a new visualization. Ladies Bathing Pond: at the western half of the dam as mentioned in the Shortlist Option report.</p> <p>Model Boating Pond: at the west abutment of the new/existing dams. Men's Bathing Pond: at the west end of the dam, at the gap in trees where there is an existing grassy slope.</p> <p>Highgate No.1 Pond: partly on the west end of the dam, partly on the natural ground, as described on page 30.</p> <p>In terms of the location, these can be discussed in detail with the topographical surveys and tree survey information.</p> <p>We have tried to locate spillways in such a way as to minimize tree loss, using the methodologies described above, but due to the constraints of the existing ground levels and the locations of the most valuable trees it is not always possible to completely avoid the dams.</p> <p>It would be necessary to clear trees from the spillways where they are on the dam, since damage to any trees on the dams would not be acceptable, since trees in flow cause high turbulence immediately downstream of the tree with deep erosion. Trees can fall over due the downstream erosion and leave a significant void in the embankment where the root ball has been pulled out.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	169	2. Stock Pond – crest restore 0.5m to 1.0m We presume that this height of dam raising is principally to allow a spillway to be inserted into the crest without unduly lowering the normal water level, rather than for crest restoration. Please clarify.	The level of crest restoration is intended to allow a new spillway and overflow pipe to be installed while keeping the spillway above typical water level.
	170	We would prefer timber facing to the proposed retaining wall which we consider more visually appropriate than brick. There could be planting in front as screening. English Heritage screened the raised Wood Pond dam like this, which seems visually acceptable. This remark also applies to the proposed walls at the Men’s Pond and Highgate No 1.	The preference for timber cladding has been noted and this was shown on the proposed walls in the new set of visualizations at the September 14 th workshop.
	171	We note that two [pond side?] trees may be lost in building the retaining wall [page 38] and query if this can be avoided through design	We have since relocated the spillway to the west side, so the tree loss only applies to a small cluster of trees with trunk diameters of less than 100mm.
	172	As the proposed spillway is to be reinforced, with topsoil and grass cover over, could there be some bushes or shrubs on its downstream slope?	As a general rule, the Panel Engineer has specified that planting of bushes or shrubs would only be acceptable on the upstream slope of any dam, and not within the spillway since this would affect the flow.
	173	Is it intended that this pond be dredged as part of the works [p44], as there is deep silt in this pond?	Stock Pond is one of the highest priority ponds in terms of plans for de-silting. The amount of desilting on this and other ponds will depend on the volume of silt, to be confirmed by bathymetric surveys, and the results of silt testing which is being carried out, since these both have a bearing on costs.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	174	Ladies Bathing Pond – crest restore by 0.2m Please detail the position of the spillway, with any tree loss.	At the western half of the dam as mentioned in the Shortlist Option report. Tree loss to be confirmed once the results of the latest topographical survey are received as they will then be combined with the tree survey.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	175	Bird Sanctuary Pond – crest restore by 0.1m Please clarify if there will be any tree loss when carrying out the crest restoration. If so, we query why any work needs to be carried out. This dam is the most robust on the Heath, there is a tarmac road on the crest which significantly will protect from any erosion, and under flood conditions the dam will probably be overwhelmed by rising water in the Boat pond before formation of any small gullies	No tree loss due to crest restoration work is anticipated at Bird Sanctuary Pond. The restoration work would be confined to the width of the existing road surface.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	176	<p>Model Boating Pond – raise dam to store equivalent volume of water of a 3.0m raising</p> <p>It appears desirable to store approx 106,000 cu m or more if possible behind this dam, as in Option 3 which has 3m dam raising. However, we consider that this extra height could severely impact on the landscape, and suggest that the raising ideally be limited to an apparent 1.5m, whilst still storing this volume of water. We suggest that this might be achieved by the following three measures:-</p> <p>1. Design the spillway to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest. This might reduce the raising by approx 1.1m, being the height of the spillway. Please clarify and confirm</p> <p>The old and new dams would then have to be protected from erosion from the overtopping PMF, and the need for this will depend on the rate of flow and duration, hence please supply the hydrograph.</p> <p>The new raised earth dam could have all slopes and the crest easily protected with reinforced grass [plastic Enkamat or similar] installed during construction and this would present a similar surface to that proposed for Option 3, ie. uniform grass, with possibly a berm/path and some bushes or shrubs on the upstream face to soften the appearance.</p> <p>The crest/cycle track on the existing dam is already in hard tarmac construction, but this could be re-laid in harder construction to ensure that it would not be eroded or undermined. It will then form a berm on the downstream slope,</p>	<p>Reducing the upper crest of the raising dam by 1.1m would effectively reduce storage capacity since the peak water levels are 0.7m above the spillway crest during the PMF event, because the spillway causes the water to back up behind it (the throttling effect). This would represent a loss of storage capacity of at least 17,300m³ based on an estimate using the surface areas of Bird and Model ponds (likely to be more since the areas increase with height). This loss of storage capacity would have consequences on the works required on downstream ponds to achieve no net increase in flooding downstream.</p>
	177	<p>The downstream slope of the existing dam into the Men's Pond is broadly uniform grass with some specimen trees which are to be retained. If the hydrograph indicates that this downstream slope needs to be protected, then reinforced grass could be laid on it and around the trees without significantly altering the appearance. We accept that this may not provide the same protection as on a new dam, but suggest that it should be adequate, taking into account the fully protected crest, and the massive thickness of the combined existing and new dams. There could perhaps be some surface damage but no structural damage, and we understand that some damage can be accepted.</p>	<p>The Panel Engineer would not accept overtopping of the main dam due to the trees on the downstream slope which are to be retained. These trees would cause eddying and turbulence which would increase the erosion of the dam during overtopping.</p> <p>The kind of damage that would be accepted would be minor wear and tear of turf which could be replaced after a flood event. Erosion of channels around trees, or trees being pushed over and removing the root ball from the dam, would not be acceptable.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	178	<p>Lower the water level in the pond by say, 0.5m max, and hence trim further height off the raised dam.</p> <p>As stated above, we absolutely agree that water levels should remain unchanged on all other ponds, due to the adverse effect on ecology and visual aspects. However, we suggest that the Boating pond is a special case. It is an artificial looking pond, of no significant ecological value. To construct the new dam, we believe that the pond may have to be completely drained with areas dredged for the new dam, and the two small reed beds and other planting will not survive. It is also proposed to cut back the west slopes significantly into the rising land, to win fill and create a more natural edge. Whilst this work is being carried out, it would be extremely simple to dredge the pond deeper and lower the water level permanently without reducing the surface area of the pond. We suggest this be limited to say 0.5m max. We accept that disposal of silt, particularly if contaminated, may be a problem, but significant quantities may have to be disposed anyway, even if the water level is not reduced. The design of the dam and west slopes can easily be adjusted for a lower water level. However, this could leave the untouched east and north edges higher above and slightly more remote from the water. We therefore suggest that the existing east and north perimeter path could be re-constructed to the same height above the lowered water level as now. Alternatively, these paths could remain as now, but a new stepped water's edge could be formed advanced into the pond, broadly as on page 16, but with a walkway just above water level. Some marginal plants could be added if required to soften and conceal the walkway, but full access would still exist for model boats. We suggest that this could further 'naturalise' the pond attractively. A similar suggestion was also made at the Stakeholders workshop on 16 July 2013 [p45].</p>	<p>As mentioned above, it is unlikely that other stakeholders will make this exception. While it is technically feasible to increase storage capacity by lowering the overflow level, there would be stakeholders who would not like the visual impact of exposing 0.5m of the sheet piles for the whole perimeter, or the loss of access for model boaters.</p> <p>Dredging the pond is unlikely to be simple considering the quantities involved, the costs and the amount of plant movements. Currently the cost estimate only includes an allowance for 20% of the pond area to be dredged (to allow construction of the new bund), but increasing this to 100% would significantly increase costs. The issue of where to locate the removed silt is already associated with high risks and unknowns.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	179	<p>The additional area of the pond, formed by excavating the west bank, may allow the raised dam to be trimmed further in height. We await calculations on this with interest [page 31]. However, we are very concerned at the possible visual impact of extending the pond width by up to 70m, which we understand may be mainly at the north end. This would double the width of the pond. We are also concerned at the proposed steepening of the west bank slopes from 1:13 to 1:5, which could look very artificial. We are also concerned at any tree loss that would be caused by this widening, please clarify.</p>	<p>We have modelled a variation of one of the Highgate chain Options with the additional storage volume achieved from the excavations above water level, but it made very little difference to flood levels downstream (around 20 – 30mm). The primary reason for the widening is therefore to provide material without importing large quantities through residential areas.</p> <p>The current design for the west bank slope has a maximum slope of 1:8, where the existing slope is around 1:10.</p> <p>Tree loss due to the excavation will be avoided by working around the trees, leaving the group of lime trees as an island, and having the widest excavation at the area of open grassland towards the north west.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	180	<p>This major widening of the pond is not reflected in the plan-diagram on page 41. If this enlarged width is proposed mainly to win earth for the dam construction, rather than import earth, we strongly suggest that serious consideration be given to the option of digging deeper into the pond, rather than making it wider. Also, if suitable and unobtrusive locations can be found for borrow pits to obtain fill for the dam, these may possibly be backfilled with unsuitable soil and silt if ponds are de-silted, rather than transport off-site.</p> <p>In summary, we hope that these three measures will enable the apparent dam raising to be limited to approx. 1.5m, whilst still storing the same volume of water as Option 3. Because the footprint of the dam would be reduced, we hope that both mature willows at the west end just north of the ancient oak could then be retained. Please also advise if the large and the medium hornbeams at the west end of the causeway can be retained.</p> <p>We are concerned at suggested tree loss for the proposed spillway works on the downstream slope of the existing dam [p28/29]. It is essential that a detailed plan be provided showing tree loss. P29 states that a low earth bund would train the [water] flow away from the dam and therefore avoid the need to line[reinforce] a wider area or cut into the ground to form a spillway chute. Excellent! However, we therefore feel that there should be no need to touch any trees on this spillway route, and we contest that two London planes have to be felled to form this corridor for the lower spillway.</p>	<p>A visualization of the pond widening has since been presented on the 14th September workshop and will be included in the next report.</p> <p>Digging deeper into the pond is less viable because of the layer of silt in the pond, recently estimated to be up to 2.2m deep in places.</p> <p>The dredged silt will not be suitable for use in dam construction, and it would take some months to dry out material obtained from the hard bed below the silt. This material would need to be temporarily stored on site which could be unsightly. Dredging will also not provide any more floodwater storage capacity. The City of London are working with Atkins to identify borrow pit locations but suitable locations are limited.</p> <p>None of the hornbeams on the dam would be affected. Currently the only tree that has been identified for removal is a willow, which is north of the dam (between the upper and lower paths). Some discussion using maps and photos would be needed to confirm whether this willow is one of the two referred to.</p> <p>A detailed plan showing tree loss can be provided in the near future once all the new topographical survey information is combined with the tree survey information and the outline designs. This is likely to be during the outline design phase, programmed for October / early November.</p>
	181	<p>Men’s Swimming Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable, screened with marginal vegetation.</p> <p>We request a plan showing the layout of the proposed spillway, and then have a joint review on site. We are surprised at the large width [25m/43m]. However, if it is sited partly on the west bank, by the rangers’ bothy, we believe that it could follow a natural slope over shallow ground down to the next pond and no reshaping of the ground would be needed. As this natural route completely avoids the dam toe, no reinforcement of the spillway is needed, except at the dam crest and spillway mitres. Also, no trees, bushes or fences need be removed on this route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway as proposed.</p>	<p>This preference has been noted and incorporated into the updated visualizations shown at the 14th September workshop. We are not yet able to issue detailed plans of spillways but may be able to discuss the outline sketches to be tabled at offline meetings.</p> <p>For information on spillway location please see the Preferred Options Report. The reinforcement of any slope would have minimal visual impact since whatever reinforcement material is used there will be turf and grass covering it.</p> <p>The proposed spillway level at this pond in Option 4 is 68.91mAOD. The ground levels between the dam and the path running NW – SE past the pond are up to 68.97mAOD so the natural ground is not as shallow as is required and would not be a natural route for water to flow down without some excavation of the area. Such an excavation would require tree loss which is opposed by the Mens Bathing Pond Association.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	182	<p>Highgate No 1 Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable. We urge that this wall be hand constructed so that there is no tree loss on the crest or dam slopes which would expose West Hill Court and Brookfield Mansions from the Heath. As the wall is on the crest with a sloping upstream face, we urge that it be concealed with vegetation and shrubs on both sides.</p> <p>We are greatly surprised that the spillway is proposed to be 60m/74m long, and ask that calculations be provided to substantiate this extraordinary width. This spillway [p30] would be partly on the west end of the dam and partly along the natural ground to the west of the dam. At this position two large trees [including a very large horse chestnut adjacent to the path,] and a smaller lime and two alders would be felled. There is also a veteran oak adjacent, about which the report is silent [except for mention on page 33].</p> <p>We consider this tree loss to be unacceptable, and query if fewer trees would be lost if the raised dam is continued round the waters edge almost to the dog swimming area. The west bank from this point northwards would then form a 'natural' spillway which could flood across the path to the low lying area to the west, and then fill up before overflowing south through a natural depression broadly along the line of the existing footpath. As most of this natural route, which is further to the west than proposed in the report, would avoid the dam toe, then little or no reinforcing may be required. It may also slightly reduce any impact of the flood to Brookfield Mansions.</p> <p>We request a plan showing the layout of the proposed spillway with trees that would be lost, and a detailed level survey and plan of our alternative proposal above. There should then be a joint review on site. On these plans, please indicate the general direction this overtopping surface water will take after leaving the dam.</p> <p>Please clarify what is intended by - new spillway could be planted as a bioswale feature [p43]</p>	<p>This preference has been noted.</p> <p>No tree loss is anticipated along the dam crest due to constructing the raising walls in options 3 and 6.</p> <p>Some planting of bushes / shrubs is possible on the upstream face.</p> <p>The spillway width was tested in the hydraulic model so there are no calculations as such, although the inputs to the model (the hydrology used to calculate the inflows, and the dimensions used for the design spillway) are auditable.</p> <p>The spillway width and depth could be refined at the next design stage and there may be scope for reduction.</p> <p>The current spillway route avoids the veteran oak.</p> <p>The natural ground described in this proposal is higher than the spillway level (eg in Option 4) and would require excavation. While the ground appears to be lower at the path near the west end of the dam, it is close to the minimum existing ground level of the crest of the dam. A copy of the topographical survey can be sent to the H&HS to allow a review of these levels.</p> <p>The spillway location and tree loss plans will be made available at outline design stage (October). Topographical survey information on tree locations is expected soon and this will be combined with the tree survey to allow a more detailed assessment of tree loss.</p> <p>It is suggested that there would be planting at the pond and upstream face of the dam near the spillway out of Highgate No.1 Pond, in order to screen the feature. It may be possible to add some more planting into the spillway channel when it is sufficiently beyond the downstream toe of the dam, but this will depend on the specific alignment over / around the dam.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	183	<p>Environmental Management Options [p44/45]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p>	<p>Discussions on site can be arranged.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	184	<p>CONSIDERATION OF OPTIONS – HAMPSTEAD CHAIN (see particularly pages 11-12, 47-61)</p> <p>Key Principles and Selected Options</p> <p>In assessing these options, we have considered the following key principles:-</p> <ol style="list-style-type: none"> 1. To minimize tree loss on Hampstead No 2 pond 2. To attenuate/store more flood water than proposed in the report, provided that this would reduce the tree loss on Hampstead No 2. We particularly query if more storage is possible at the Catchpit, the Mixed pond, and at Hampstead No 2 3. To minimize the visual impact of the works at all ponds 	<p>Slightly more storage may be achievable at the proposed Catchpit dam by raising the spillway level by around 50mm (the current overtopping depth), or more if the pipe through the dam is reduced again from 300mm to 250mm. The only way to store significantly more than this would be to have an automated valve or penstock system which would close the pipe going through the dam. However, the City of London prefer not to rely on any automated / mechanical systems. In terms of passive systems, a further refinement could be achieved with a hydrobrake, which is a vortex shape within the pipe (with no moving parts), that can maximise the storage. This could be investigated at outline or detailed design stage.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	185	<p><u>Hampstead Chain – pond by pond review</u></p> <p><u>Spillways generally</u></p> <p>Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where ‘natural’ spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p>	<p>For information on spillway location please see the Preferred Options Report. Tree loss plans will be made available at outline design stage (October). Topographical survey information on tree locations is expected soon and this will be combined with the tree survey to allow a more detailed assessment of tree loss.</p> <p>The damage to trees during a flood is not so much of an issue as the damage to dam material or spillway that might be caused by a tree overturning during a flood, and this is the damage that would not be acceptable.</p> <p>Please also see answer to query 168.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	186	<p><u>Vale of Health Pond – crest restoration 0.2m max [or 0.6m?]</u></p> <p>It has been stated that this pond has never overflowed and is spring fed with a small catchment area. The irregular tarmac crest has not been noted as of any concern. We therefore query why crest restoration is needed, with possible impact on crest trees</p> <p>Please clarify if use of a pipe larger than 500mm would avoid the use of a spillway with consequent tree loss. We would prefer this</p> <p>Please clarify proposed spillway and pipe discharge routes re the large sequoia tree, and detail any tree loss.</p>	<p>The Vale of Health pond dam has been considered in the context of its place in a chain of ponds. If it were to fail, the stored volume released (estimated at 17,800m³ at crest level) would be too much for the downstream dams to store (even in the proposed design options), causing overtopping at the 3 downstream dams and the associated risk of erosion and further failure. The return period of overtopping is estimated at between a 1 in 100 and 1 in 1,000 years, and the risk of failure due to overtopping is therefore too high to be acceptable.</p> <p>While the proposed 3rd overflow pipe could not be larger than 500mm without increasing the raising of the dam crest, it is possible to model the effects of adding a 4th pipe in terms of a possible reduction of the open channel spillway size.</p> <p>For information on spillway location please see the Preferred Options Report.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	187	<p><u>Viaduct Pond – crest restoration 0.5m [or 0.18m?]</u></p> <p>Please clarify spillway route and tree loss</p>	<p>For information on spillway location please see the Preferred Options Report.</p> <p>The tree loss can’t be confirmed until we combine the topographical survey information on tree locations with the tree survey.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	188	<p>Catchpit – suggest 5.8m dam</p> <p>We note that a 5.6m dam is proposed because the 7.2m dam reached a max water level only 160mm higher than with the 5.6m dam. Why not increase the proposed dam to 5.8m, in order to store the absolute maximum volume of flood? The Flowchart [p12] indicates the value of more storage, when one compares the 4.4m and 5.6m dams.</p> <p>We have considered the two positions suggested for the dam – a) a sinuous curve on the S side of the valley, or b) moving the dam c.25m back upstream. Before giving a view, it is essential that detailed plans of these options be provided, showing trees that would be lost. We would then like again to view these options on site, as option b) was not considered at the last site visit.</p> <p>We initially favour Option a), but only if it can be designed not to endanger the two hybrid black poplars and hornbeams. This option would hold more flood water than option b).</p> <p>If Option b) is constructed, we presume the oak that would be lost is just inside the Catchpit fence. However, it is essential that a mature oak at the top of the west slope near the Catchpit be retained, as this should significantly screen the new works from Pryors Field. Many willows on the Catchpit boundary on the east side may be lost, - there should be replacement planting on the dam toe.</p> <p>We note on p49 that an advantage of Option b) appears to be that the Catchpit infrastructure could be rebuilt and improved, with potential for creation of a wetland habitat upstream. If this is desirable, we suggest that it could be carried out irrespective of the position of the new dam</p> <p>Option b) on the north side will store less water than option a). Please re-calculate storage volumes, and indicate what adjustments should be made to this and other dam heights to compensate.</p> <p>As this dam is a 'dry' dam, we presume that shrubs and bushes can be planted on the slopes. Please confirm. If the slopes are in woodland, then we would want bushes for screening. If the slope faces grassland, then we wish to review on site</p>	<p>It is possible to increase the height of the dam to retain the extra 40mm which is the current modelled height of overtopping over the spillway.</p> <p>The possible dam positions will be redrawn on the finalised topographical survey and tree survey plan when this is available and a more detailed assessment of tree loss will then be possible.</p> <p>We will soon be able to confirm if a sinuous route avoiding these particular trees is possible. If not, the position of the dam further upstream (over the current location of the catchpit) will be modelled. However, it is not anticipated that the reduction in storage capacity will be significant, so the tree loss and quantities are likely to be the determining criteria when deciding on the exact dam location.</p> <p>Some replacement planting will be possible on the upstream toe of the dam, away from the central core.</p> <p>This point is noted, although there may be cost considerations if the catchpit is removed while being outside of a dam footprint.</p> <p>We will check the impact on storage volumes at outline design stage, although it is not thought that the impact of moving the dam upstream will be great.</p> <p>The Panel Engineer has advised that some planting is allowable on the lower part of the upstream slope of the dam, in the form of bushes and shrubs with gaps between to allow inspection of the surface condition. Both slopes would face woodland.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	189	<p>Mixed Bathing Pond Options K, I and M indicate that two plane trees may be lost on Hampstead 2 Pond dam. If this loss could be reduced to only one tree by increasing the flood storage at the Mixed Pond more than proposed, then we would support this option. This short dam is already an artificial looking causeway with steep descents onto it at both ends, and raising it significantly should be simple. However, the key issues to consider include:-</p> <ul style="list-style-type: none"> pedestrians on the causeway should still be able to view the water on this pond and Hampstead No 2 pond at the same time, which implies raising the crest road to enable one to look north over the crest of the new dam which would be built within the Mixed Pond, similarly to the proposed Boat Pond dam loss of the glimpse of water of the Mixed Pond when viewed from Hampstead No 2 Pond causeway. However, this glimpse will be lost if the dam is raised less than 1/2m, so a greater raising would not affect this aspect. The effect of the raised dam when viewed from the swimming enclosure, although we presume it could have some shrubs, and a wildflower seed mix. We note from the Flowchart [p12] that 1.5m raising is suggested without qualification, but a 2.0m raising is not preferred by some stakeholders. <p>Ultimately, the amount the dam is raised may be a balance between saving one plane trees on Hampstead No 2 and the feelings of the swimmers re a raised dam to the south. To make this decision, we need information on how more water storage at the Mixed Pond might influence loss of plane trees on No 2 dam.</p> <p>However, assuming the spillway is designed for PMF [as on the Highgate chain], then if the spillway is re-designed to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest, this might reduce the raising by approx 1m, being the height of the spillway. Please refer to our comments re the Boating Pond, clarify and confirm.</p> <p>If this option is selected, then the whole dam may have to be reinforced to take overtopping. This should be very simple, as the slopes are short, and the existing downstream slope is already uniform grass and has no trees along its critical length. Also, this dam is the second most robust dam on the Heath [after the Bird Sanctuary dam]. This option may therefore enable more water to be stored without further raising the dam</p> <p>Will the pond be dredged, as it is very shallow, particularly along the whole of the west bank?</p>	<p>In any configuration of a 2m raising, the causeway road surface would be raised, so that pedestrians will have a clear view of the ponds on both sides.</p> <p>This is noted.</p> <p>This appears to be the key issue for many stakeholders and we are looking at different designs for raising the dam 2m, eg with a 1m high wall above 1m of earth embankment above the existing causeway level. We are aiming to include some cross section sketches of these options in the next report.</p> <p>The options flow chart can be amended to state that 2 trees are expected to be lost at Hampstead No.2 in Option M, but 1 plane tree would be lost in Option P, the new option introduced at the 14th September workshop.</p> <p>There is scope to widen the proposed spillway at Mixed Bathing Pond, which may allow the upper raised crest either side to be lowered. However, the spillway crest level is currently only 300mm below the upper crest level, so the net reduction in the upper raised section could only be between 0 and 300mm.</p> <p>Agreed that most of the downstream slope could be reinforced, except for the two mature trees at the west end (on the dam itself) and the large veteran oak at the east end which would be affected.</p> <p>There are discussions about the possibility of dredging the upstream end. The pond is one of the highest priority ponds for de-silting.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	190	<p>Hampstead No 2 Pond</p> <p>1. Options K, I and M indicate that two plane trees may be lost on this dam. If this loss could be reduced to only one tree by increasing the flood storage at this pond, then we would support this option, but as a last resort only if necessary, after our other suggestions have been adopted.</p> <p>We note that Haycock proposed to raise the crest by 1.0m, and Colvin and Moggridge, Landscape Architects, suggested in Nov 2010 that one could replace the existing fence [posts 900mm high] with a buttressed wall 1m high. This will raise the level of the dam with minimum impact on tree roots. Access could be provided to the fishermen's path at the waters edge. This option might cause flood water to enter the lowest part of the gardens of some houses in South Hill Park, but if so, this would be briefly during exceptionally rare extreme flood events, and the houses should not be affected. This suggestion would require very careful landscaping so as not to be intrusive when viewed from the north. The path may have to be raised, and the wall may need to be screened with vegetation on the north side. In order to assess this option, please provide details on whether storage at this pond would be beneficial.</p> <p>2. We have considered the options of spillways versus culverts. Please provide details of your investigation of the possibility of splitting up the spillways to run between the trees. However, we initially favour culverts, to be sited as far west as possible.</p> <p>3. Your View Point 3 [page 52] shows two trees would be lost. If the tree on the east is removed, then the Royal Free Hospital will become visible through the gap when viewed from the west end of the Mixed Pond causeway, much further west than View Point 4 which is from the east end of the causeway. However, if only the tree on the west is removed, then the hospital will not be visible as the gap will be screened by trees overhanging the west bank of Hampstead No 2 pond. We therefore urge that only the west tree be removed.</p> <p>4. We therefore query if the wide but shallow box culvert could be constructed with a taper in plan to form a narrow waist but deeper section as it passes between the trees so that only the west tree need be removed.</p> <p>5. We also hope that more storage at the Catchpit, Mixed Pond and Hampstead No 2 pond, when combined, might result in the reduction of the number of 3m wide culvert to two, which presumably will have a width of 6.5m. If so, we suggest that only one plane need be lost, as they are at 8m centres</p> <p>6. If two trees will still be lost with shallow culverts, we query if a letterbox drop culvert, with a low level thrust bored or tunnelled culvert could be constructed below the tree roots, to save one or both of the trees proposed for felling with shallow culverts</p> <p>7. We note suggestion for an island [p58]. We would like to meet on site to discuss details and particularly the size of any proposals</p>	<p>A new option, Option P, has been introduced to investigate whether a small amount of raising at Hampstead No.2 can reduce the width of the box culvert spillway in order to reduce the plane tree loss down to 1 (when combined with a 2m raising at Mixed Bathing Pond). The dam crest could be raised by 0.5m by a short wall situated above the sheet piles on the upstream face. The top of this wall is below the highest part of the dam at the eastern abutment, but we will check that the threshold levels of the houses to the east are not below this level.</p> <p>The modelling of the option indicated that the PMF peak water levels were below the raised crest wall level, so this option is now on the shortlist.</p> <p>Option P has been presented at the 14th September workshop and will be described further in the next report.</p> <p>The open channel spillways were modelled extensively, but they were either too wide (if trees are cleared) or would spread the risk of damage to more trees even if none are felled, by overloading the structural roots with soil or reinforcement materials. Agreed that the ideal location of the culvert spillway would be at the west end of the dam.</p> <p>Agreed that if 1 tree should be removed then the western tree would be the better one.</p> <p>The narrowest point in the culvert would constrain the flow so would cause water to back up more upstream in the pond. At outline design stage we will look at more ways to reduce the culvert width, including the maximizing of storage at Catchpit dam as described above.</p> <p>This scenario has been modelled as the new Option P, which has been found to work with a 5m wide x 400mm high box culvert.</p> <p>The Panel Engineer has expressed concerns that a thrust bored culvert could cause damage to the dam by creating preferential flow paths around the outside of the tunnel. The dam crest level is around 500mm above typical water level so any pipe would be small and would have to drop very sharply to get below the tree roots.</p> <p>A site meeting can be arranged.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	191	<p>Hampstead No 1 Pond</p> <p>We presume the outflow will be sited at the extreme east end of the dam. If so, then this should be concealed from the footpath on the south by the belt of trees and shrubs at the dam toe, which widens out at the east end. We would therefore prefer a spillway which should be less intrusive when viewed from upstream. However, we suggest that this should be made as narrow as possible, and query if the side slopes could be made steeper, as access to the crest is private</p> <p>We note suggestion for an island [p59]. We would like to meet on site to discuss details and particularly the size of any proposals.</p> <p>Environmental Management Options [p60/61]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p>	<p>This is correct. The preferred option at Hampstead No.1 pond is a narrow box culvert which we believe could be screened by locating it at the east end of the dam.</p> <p>A site meeting with our environmental and dam engineers can be arranged.</p>
Michael Hammerson, Highgate Society on Shortlist Options Report 26 Aug 2013	192	<p>Western "roadway". The pathway/road along the western side of the boating pond is one of the Heath's major thoroughfares, for people and Heath vehicles. It is far from clear how it will be reconfigured and what will be its subsequent relationship with any new edge to the pond. Drawings are required.</p>	<p>Visualisations were presented at the Stakeholder Workshop on the 14th September for consideration.</p>

Source	Query Number	Query	Design Team Response
Marc Hutchinson, Highgate Men's Pond Association on Shortlist Options Report 27 Aug 2013	193	We have assumed – but ask for this to be confirmed – that this raised path will not go up and over or around the crescent-shaped westward continuation of the raised BP dam.	Re-routed path routes have not yet been confirmed and can be discussed as part of the ongoing non-statutory consultation.
	194	Men's Bathing Pond 1. Is the proposed spillway on the dam of the MP to be a hard spillway on which trees cannot grow?	The spillway will not be a hard surface but lined with topsoil and grass. Some planting can be considered for the parts of the spillway which are beyond the downstream toe of the dams, but trees will not be planted on spillways generally.
	195	2. Is it the case that a broader spillway on the Men's Pond would result in a lesser raised dam on the Men's Pond while retaining the existing trees?	No, it is the other way round. The lesser the raising, the wider the spillway would have to be, because increasing storage capacity reduces the outflow to be routed through a spillway and so the spillway can be reduced.
	196	We would like to see a plan and picture showing the returns on the east and west of the MP dam as well as the full "brick" wall. Why is brick chosen? To conceal concrete?	The details of the returns of the raising wall on the Men's Pond dam will be developed in the outline design phase. The cladding of the wall would be to conceal a concrete core, but can be any material eg timber, subject to agreement with the City of London and stakeholders.
	197	On page 29 of the Report there is a reference to the dam slope needing to be 1:12. We do not understand the need for this in the absence of an accessible path to the top of the dam.	The 1:12 slope would be for the side slopes of the spillway along the crest line of the dam. There is a path on the crest, but not a formalised one, so it may be possible to justify a steeper slope.
	198	Will it be necessary to close the MP facility in order to construct the proposed spillway and/or raise the MP dam? If so, why?	The proposed works to the dam at the Men's Pond would not require lowering of the water level, so it may be possible to keep part or all of the pond open during works, but this will be confirmed once construction phasing is planned by the appointed constructors.
	199	Regardless of the actual works at the MP, is it intended, in any circumstances, to use the MP facility as an engineering compound for the storage of plant or material?	This has not been planned, with other locations elsewhere on the Heath being considered for site compounds.
	200	We still consider that insufficient thought has been given to the construction of a side channel which, making the best use of the natural contours of the Heath, would carry the excess water down the side of No. 1 and No. 2 Ponds rather than through them. The channels could be where the existing north/south paths are (and these could remain in use as paths) and creation of the channels would not involve the felling of trees. We anticipate they might be approximately 60 metres wide but would not need to be excavated as channels. Rather a reinforced bund could be constructed on the pond side of the channel with the natural slope of Parliament Hill providing the "bund" on the east side. Drains on either side of the path could deal with mild flooding. The reinforced bund would prevent the water in the channel from flowing over and into the pond.	The proposal of a dry diversion channel and reinforced bund has been considered in detail in the Preferred Options Report.
Rob Mitchell, EGOVRA and Brookfield on Shortlist Options Report 27 Aug 2013	201	The Report specifies that "Less severe floods have also been used to assess the system response to ensure that the options for passing the PMF do not exacerbate the flows downstream during lesser floods." We would like to see the results of this work as it may go some way to satisfy us that these options do not result in worse floods arising in lower return periods than at present. Intuitively the increased storage in the pond system should reduce the potential of flooding, however, the design team have not been able to confirm this for us.	The standard of protection would be increased on Highgate Chain to at least a 1:1,000 year flood event (both preferred options). Options for the Hampstead Chain either maintain the standard of protection at minimum 1:1,000 year event (Option M) or increase it to at least 1:10,000 year (Option P).

Source	Query Number	Query	Design Team Response
Fitzroy Park RA	202	Actual data for expected attenuation down the chain, presented as %age of PMF, and other 1:1000 or 1:5000 year floods, is critical in justifying these significant works.	<p>Hydrographs for Highgate No.1 Pond have been included in the Preferred Options Report to illustrate this attenuation. These hydrographs show the difference between the existing peak outflows from the last pond and the outflows from the last pond spillway in one of the preferred options (Option 4). This option would achieve a reduction in outflows in a 1:10,000 year flood and a PMF flood. All of the floodwater in a 1:1,000 year flood is attenuated (or stored) within the pond system in Options 4 and 6, so the spillway would not operate. The 1:5,000 year flood has not been calculated.</p> <p>Information on the reduction in volumes being discharged from the last pond (in the 1:10,000 year and PMF events) will follow separately.</p>
Prem Holdaway	203	Nowhere is the current outflow of both number one ponds quoted. Each pond needs to be quoted individually.	<p>The capacity of the existing 0.46m diameter overflow pipe at Highgate No.1 Pond has been calculated at 0.9m³/s. The outflow in the existing scenario peaks at over 17m³/s (in a 1:10,000 year event) and 38m³/s in a PMF event, which means that the overflow pipe would be insufficient and floodwater would be back up and flow over the dam.</p> <p>At Hampstead No.1 Pond, the capacity of the existing 0.31m diameter overflow pipe at Hampstead No.1 Pond is 0.48m³/s. The PMF event outflow is around 8m³/s which again means that the dam would be overtopped.</p>
	204	Nowhere is the maximum outflow of both number one ponds quoted. Again each pond needs to be quoted individually. All options so far seem to be only designed for storing water.	<p>The above overflow capacities are effectively the maximum outflow of the No.1 Ponds.</p> <p>Temporary additional water storage is required to cope with the design flood. The proposals also include crest restoration, new spillways etc. If the additional storage was not included additional engineering works would be required at all ponds in the chain. Without adding storage capacity to some ponds in the chain, the spillways would have to be much larger and would require removal of many more trees.</p>
	205	What happens if there is another 1 in 10,000 year storm, the day after. Where is that water going to go?	<p>The spillways in the preferred options would be overtopped if a second large flood occurred, since the floodwater stored during the first flood would take some days to drain away into the sewer system. However, in the existing scenario, more water would overtop the dams in both the first and second flood.</p>
	206	What are the options for designing the outflow of each pond to its eventual target. The River Thames. So that no additional water is stored.	<p>This option would involve many very large diameter pipes running through central London so it unlikely to be feasible.</p>
David Lewis, Protect Our Ponds on Shortlist Options Report 19 Aug 2013	207	Water Quality Is this water quality standard compulsory? Is it possible to obtain an exemption?	<p>EU bathing directives are compulsory if bathing ponds are to be used as such.</p>

Source	Query Number	Query	Design Team Response
Ken Blyth on Shortlist Options Report 27 Aug 2013	208	I am puzzled by the statement in the section of the Summary about Assessment of Design Flood that, although the data from the Hampstead Scientific Society “provided a useful record of rainfall over about 100 years....it is not suitable to provide design rainfall depths for the 1 in 1000 period events up to the PMF needed for this study i.e. up to the 10,000 year flood, as this would involve significant extrapolation beyond the useful range of the rainfall data”. This does not make clear why the Hampstead data are considered useless for statistical purposes, nor what data extending over <u>more</u> than 100 years have in fact been used. It is not clear either why data from other parts of England (or elsewhere in the UK - and Europe) are thought relevant to Hampstead Heath. The report blinds by mathematical formulae and does not say enough about the data that are fed into them.	<p>See methodology in Problem Definition Report.</p> <p>The statement points to the fact that statistically, the HHSS rainfall record is too short to give a reliable estimate of large rainfall events on its own. The FEH DDF curves are available for the UK which allows for statistically reliable estimates of rainfall for large events as it is based on data from more than one rain gauge. Hampstead Heath Scientific Society rainfall gauge is listed as one of the rain gauges used in the FEH DDF rainfall model (HHSS data from 1933-1995 is used). The DDF curves we used, are therefore likely to incorporate HHSS rainfall observations, complemented by other rain gauges to provide a more statistically reliable estimate of rainfall. With regard to data used in the analysis, the FEH manuals, CDs and reports set out all data used and all underlying methodologies applied, in a very transparent manner. The reader is referred to the FEH manuals for further information.</p> <p>Our assessment has applied the Defra, Flood and reservoir safety Revised guidance for panel engineers to calculate the hydrological inflows to the Hampstead Heath ponds. This includes the Flood Studies Report (FSR) and Flood Estimation Handbook (FEH) methodologies for deriving flood event rainfall hyetographs and flow hydrographs. The FSR and FEH manuals set out the data used in both developing and applying the methodologies.</p>

Source	Query Number	Query	Design Team Response
West Hill Court RA on Shortlist Options Report 27 Aug 2013	209	We would like to know whether there has been a study of previous flooding in the area? We appreciate that this will not help predict the future, but it may inform solutions. We understand, for instance that inadequate drainage at lower levels was an important factor in the 1975 floods.	<p>Previous studies used in the Atkins work:</p> <ul style="list-style-type: none"> Hydrological and Water Quality Investigation and Modelling of the Hampstead Heath Lake Chains and Associated Catchments, Haycock Associates Limited, 2006; Hydrology Improvements Detailed Evaluation Process (HiDEP): Hydrology and Structure Hydraulics, Haycock Associates Limited, 2010; Hampstead Heath Dam 3D Topographic Survey, Plowman Craven, 2010; Haycock Hampstead Heath Stella model, 2010; and Hampstead Heath Reservoirs On-Site Emergency Response Plan for Reservoir Dam Incidents. City of London, November 2012. <p>We have not modelled previous flood events on the Heath as part of our study as, there is very little calibration data for previous other than whether dams overtopped or not. Also, the focus of our work was on deriving events of different return periods to assess the overtopping risk of the dams under these types of events. We have undertaken a review of other studies which have investigated previous flood events.</p>
	210	We are also concerned that there may not be adequate collaboration between the agencies responsible for flood issues. Could it be that stronger joint work between The City of London, Thames Water and Camden Council might enable a modification of the works?	<p>Thames Water are not responsible for the safety of the dams or for the water normally stored in the dams that could be breached. Their sewer systems are only designed for small flood events up to around a 1:75 year return period event. Standard guidance on dam safety requires that dams can safely pass floodwater from a PMF, with spillways able to pass the floodwater from a 1:10,000 year event, so the existing sewer system cannot accommodate these kinds of floods. There is no opportunity to provide sufficient storage of the excess floodwater downstream of the ponds in Camden.</p>
		The City's intention appears to be simply to increase the height of the dams so far that much more water is stored and there is less risk of overspill. Our residents have raised a number of questions in this respect:	
	211	1. How much is 'high enough'?	1. Storage capacity has been added to some of the dams until the design flood (the PMF) is safely passed without overtopping the dam crest as this could cause dam failure.
	212	2. What is a 'safe volume' of water to store?	2. A safe volume would be the amount that leaves a small enough excess floodwater that can be passed through the spillway.
	213	3. Is it not the case that increasing the height of the dam means that if the dam did breach, the volume of water released would be larger and cause more damage?	3. By improving the safety of the dams with adequate spillways and extra storage capacity, the possibility of the dams breaching is much reduced. Ground investigation early next year will provide information to allow the analysis of the stability of dams when loaded with higher water levels. Any issues will be remedied in the detailed design of the safety works.
	214	4. Given that nobody could guarantee the rainfall in a 1 in 10,000 disaster, should not the priority be to manage the water that would, or does, spill over? In some other areas we gather that there are now 'sumps', dedicated wetlands or flood plains to absorb extra water in exactly the way that people in the past managed variations in weather. There is some recognition of this in the report with the use of spillways etc - could not more use of these systems be made on the Heath? Creating more wetlands has improved the situation in many areas of Sussex, protected houses, crops and livestock from serious flooding and had the added bonus of improving the range of wildlife and plants in the areas affected.	4. The principles that decide which aspect is the highest priority are constrained by law and standard industry guidance (see the problem definition section in the Shortlist Options report). In the 1:10,000 year event, it is estimated that around 107,000m³ of excess floodwater will overtop the dam at Highgate No. Pond in the first 14 hours. This is too much volume to be stored in the Dukes Field area of the Heath, as it would require a new reservoir with twice the capacity of Highgate No.1 Pond. It is therefore more feasible to design the existing dam to pass water safely without collapse. Overtopping could still occur but will not result in dam failure.

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Hampstead Heath Ponds Project

LOG OF QUERIES AND ANSWERS ON HAMPSTEAD HEATH PONDS PROJECT

25th October 2013



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Log of Queries and Answers on Hampstead Heath Ponds Project

The Log of Questions and Answers on the Hampstead Heath Ponds Project includes a schedule of all external consultation on the Ponds Project from January 2011 and all queries from engagement with the Ponds Project Stakeholder Group (PPSG) and the wider public since October. The log is a ‘live’ document that is regularly updated and includes responses to queries by the design team.

Schedule of External consultation on Hampstead Heath Ponds Project

Date	Event
17 Jan 2011	Meeting between officers, Hampstead Heath Consultative Committee (HHCC), Nick Haycock, Andy Hughes and Heath & Hampstead Society, to discuss the project and the issues arising
19 Jan 2011	Meeting between officers, Nick Haycock and swimming groups to discuss the project and the issues arising
20 Jan 2011	E-bulletin update on the project published on the website
30 Jan 2011	Dams and Ponds page created on City of London website
8 Mar 2011	Swimmers Forum. Project discussed.
12 Mar 2011	HHCC walk including talk at Education Centre on hydrology by Nick Haycock
2 Apr 2011	Workshop for residents, members of interest and user groups of the Heath and staff. Gave detailed information on the areas that could be affected by a flood and initial concept designs
20 Apr 2011	Briefing delivered to Camden Council
21 Apr 2011	Heath & Hampstead Society regular quarterly walk- project discussed
26 Apr 2011	Water quality seminar attended by swimming groups, staff, Nick Haycock, HHCC, Management Committee, residents associations and anglers
1 May 2011	E-bulletin update on the project published on the website
9 May 2011	Report presented to Hampstead Heath Consultative Committee
23 May 2011	Evaluation report presented to Hampstead Heath, Highgate Wood and Queens Park Management Committee
7 Jun 2011	Swimmers Forum. Update on project given.
11 Jul 2011	HHCC – update in Matters Arising
5 Jul 2011	Site visit to ponds by Court of Common Council
14 Jul 2011	Evaluation report considered by the Court of Common Council
25 Jul 2011	Short update in Matters arising at Management Committee
1 Aug 2011	Meeting between officers, HHCC, Nick Haycock, Andy Hughes, Heath & Hampstead Society and swimmers to discuss further option following further assessment by Haycock and Hughes
26 Sep 2011	Update report presented to Hampstead Heath, Highgate Wood and Queen’s Park Management Committee
19 Oct 2011	Swimming Forum. Project discussed
5 Nov 2011	HHCC walk – verbal update given
7 Nov 2011	Update report presented to HHCC
11 Nov 2011	Visit to a similar dam at Tilgate Park in Crawley by staff and members of Heath & Hampstead Society
28 Nov 2011	Hampstead Heath, Highgate Wood and Queens Park Management Committee. Mentioned in minutes approval.
18 Jan 2012	Heath & Hampstead Society regular quarterly walk. Members given a brief update on project and introduced to Communications Officer
18 Jan 2012	Swimming Forum. Members given an update on project

Date	Event
23 Jan 2012	Update report presented to Hampstead Heath, Highgate Wood and Queen's Park Management Committee
26 Jan 2012	Heath & Hampstead Society (Tony Hillier and Jeremy Wright) briefed on procurement process by officers and involvement in it
2 Feb 2012	Camden New Journal print story with update on project
2 Feb 2012	Ham & High print story about project
6 Mar 2012	Ladies bathing pond improvement meeting. Wider project discussed as part of the context for the improvement works
10 Mar 2012	HHCC walk. Brief update given on the project
12 Mar 2012	Update report presented to HHCC
14 Mar 2012	Jeremy Wright of Heath & Hampstead Society looks at documents at Heathfield House
15 Mar 2012	Meeting with Sally Gimson, ward councillor, and Paul Maskell to discuss project
4 Apr 2012	Jeremy Wright from Heath & Hampstead Society looks at documents at Heathfield House
18 Apr 2012	Swimmers' Forum – Ponds Project Stakeholder Group (PPSG) discussed and Communications Strategy shared with group
23 Apr 2012	Leaflet explaining why the work is necessary is distributed to 60,000 residents around the Heath and to visitors on the Heath
8 May 2012	Mixed bathing pond improvement meeting
21 May 2012	Report on Communications Strategy presented to the Hampstead Heath, Highgate Wood and Queens Park Management Committee.
22 May 2012	Presentation and site visit given to members of Camden Council Environment Scrutiny Panel
7 July 2012	HHCC walk – presentation on project
9 July 2012	Hampstead Heath Consultative Committee. Communications strategy and Terms of Reference of Stakeholders discussed as well as tender report
16 July 2012	Inaugural meeting of PPSG
18 July 2012	Swimmers forum. Members given an update on the project.
23 July 2012	Hampstead Heath Management Committee. An update report on the progress and procurement structure given to members.
9 Aug 2012	Ham & High –Chairman's column focuses on project
30 Aug 2012	PPSG attend presentations by two prospective candidates for the role of Strategic Landscape Architect.
14 Sep2012	First pop-up consultation. These consist of two members of staff going out on Heath for a two hour session, providing information as well as canvassing opinion on the project.
1 Oct 2012	PPSG
6 Oct 2012	Walk with PPSG – Highgate Chain. Members of the PPSG taken on a walk down the chain, stopping to discuss the key issues.
8 Oct 2012	Swimming forum. Members given an update on the project.
10 Oct 2012	Pop-up consultation
18 Oct 2012	Camden New Journal briefed on project and prints update
27 Oct 2012	Pop-up consultation

Date	Event
29 Oct 2012	PPSG
30 Oct 2012	Pop-up consultation
6 Nov 2012	Pop-up consultation
6 Nov 2012	News release announcing appointment of Strategic Landscape Architect and providing information on PPSG as well as appointment of Atkins
8 Nov 2012	Ham & High – Chairman's column focusses on project
20 Nov 2012	Dr Andy Hughes briefs PPSG's Chairman, Deputy Chairman and Heath & Hampstead Society's representative on scope of fundamental review and indicative timescales of project
24 Nov 2012	Walk with PPSG – Hampstead Chain. Members of the PPSG taken on a walk down the chain, stopping to discuss the key issues.
26 Nov 2012	Update report presented to Hampstead Heath, Highgate Wood and Queens Park Management Committee.
28 Nov 2012	Design Review Method Statement, drafted by Atkins is released to PPSG for their comments
30 Nov 2012	Pop-up consultation
3 Dec 2012	PPSG – discussion on Design Review Method Statement
17 Dec 2012	Journalist briefing with Ham and High and News release with update on consultation opportunities throughout the project
19 Dec 2012	Pop-up consultation
20 Dec 2012	Ham & High piece profiling Strategic Landscape Architect
10 Jan 2013	PPSG workshop -Peter Wilder takes PPSG on virtual tour of the ponds looking at each site and noting threats and opportunities.
14 Jan 2013	Walk of Highgate Chain with residents from Brookfield Mansions and others who could not attend original walk.
14 Jan 2013	PPSG – follow up on 10 Jan workshop
14 Jan 2013	News release inviting views from public, covered in Ham & High
17 Jan 2013	Pop-up consultation
17 Jan 2013	Draft Critical Review by Peter Wilder, issued to PPSG for their comment
18 Jan 2013	Staff workshop which follows the same format as Peter Wilders.
26 Jan 2013	Posters put up on Heath inviting people to give their views
28 Jan 2013	Hampstead Heath Management Committee
28 Jan 2013	Simon Lee meets with Oak Village Residents Association to discuss issues relating to flooding.
31 Jan 2013	Adverts in Ham & High and Camden New Journal inviting people to give their views
31 Jan 2013	PPSG – special meeting to talk about programme.
7 Feb 2013	Camden New Journal print an update on project talking about 'landscape-led' approach
11 Feb 2013	PPSG – review of critical review
18 Feb 2013	Special meeting of PPSG to talk about communications
26 Feb 2013	Swimming Facilities Forum. Members given a briefing on project
7 Mar 2013	Pop-up consultation
11 Mar 2013	Adam Leys, a resident from Kentish Town given briefing on project

Date	Event
14 Mar 2013	Ham & High and CNJ run stories on results of Design Flood Assessment and the fact it will result in less intrusive work on the Heath.
15 Mar 2013	Walk of chain of ponds with members from Highgate Neighbourhood Forum
18 Mar 2013	Andy Hughes meets with residents from Oak Village and Elaine Grove
18 Mar 2013	PPSG – Andy Hughes presents the results of the Design Flood Assessment
20 Mar 2013	Simon Lee gives presentation on project to Highgate Area Action Group as part of Camden's consultation on Flood Strategy
21 Mar 2013	Pop-up consultation
22 Mar 2013	Meeting with officers from CoL and Hampstead heath Anglers Society
22 Mar 2013	Workshop with young people at Queen's Crescent Community Centre
27 Mar 2013	Pop-up consultation
8 April 2013	Special meeting of the HHCC – Andy Hughes presents results of Design Flood Assessment
9 April 2013	Visit to Abberton Reservoir with members of the Stakeholder Group
10 April 2013	Posters updated at Parliament Hill and Golders Hill Park
12 April 2013	Pop-up consultation. Around 40 people spoken to, approximately half were aware of project.
15 April 2013	PPSG – members of the design team give a presentation on the matrix and its function
19 April 2013	Meeting to discuss outstanding queries on Design Flood Assessment – attended by Andy Hughes, Mike Woolgar, Tony Bruggemann, Margareta Ayoung, Peter Snowdon, Ivan O'Toole, Richard Chamberlain, Charles Leonard, Karen Beare, Jeremy Wright, Jennifer Wood
24 April 2013	Pop-up consultation. Spoke to around 100 people, half of whom were aware of the project
25 April 2013	Tom Marshall, journalist at Ham & High is given a briefing on project
30 April 2013	Walk of Highgate Chain with Adam Leys and Caroline Hill, Chair of the Kentish Town Neighbourhood Forum
2 May 2013	Chairman's Column in Ham & High with update on project
9 May 2013	Sign erected on Pond Box and on causeway between Mixed Pond and Hampstead No. 2.
9 May 2013	Report on Design Flood Assessment taken to Hampstead Heath, Highgate Wood and Queens Park Management Committee.
13 May 2013	PPSG Meeting
18 May 2013	PPSG workshop on unconstrained list
21 May 2013	MP Mark Fields is briefed on project and taken on site
29 May 2013	Pop-up consultation
3 June 2013	New Ponds Project leaflet produced
5 June 2013	Staff workshop – unconstrained list
7 June 2013	Pop-up consultation
7 June 2013	Constrained Options Report published and distributed to PPSG
10 June 2013	Briefing and press release to Ham & High
12 June 2013	Pop-up consultation
13 June 2013	First eNewsletter distributed to 900 email addresses, with details of Constrained Options Report

Date	Event
17 June 2013	PPSG walk and meeting to discuss outstanding queries on unconstrained list
27 June 2013	Pop-up consultation
30 June 2013	Pop-up consultation – City of London Festival
2 July 2013	Pop-up consultation (with Atkins)
8 July 2013	HHCC – Update report and unconstrained options presented
9 July 2013	PPSG (Jeremy Wright, Susan Rose and Marc Hutchinson)meet with Atkins in Epsom to discuss – Kenwood, QRA, hydrology
12 July 2013	Staff forum – discuss opportunities
13 July 2013	PPSG workshop – shortlist of options
16 July 2013	Pop-up consultation
22 July 2013	Hampstead Heath Management Committee – update report
22 July 2013	PPSG – meeting – continuation of discussion on shorter-list of options
25 July 2013	Staff workshop – shorter-list of options
26 July 2013	Pop-up consultation
5 Aug 2013	Shortlist Options Report published and distributed to PPSG and to wider public with newsletter.
6 Aug 2013	Pop-up consultation
9 Aug 2013	Hampstead Heath Anglers Society briefed as part of a regular meeting.
14 Aug 2013	Brookfield Mansions and EGOVRA residents meet with Atkins to discuss issues relating to Highgate No. 1 Pond.
11 Sep 2013	Evening Standard run story based on QRA
11 Sep 2013	ITV news covers Ponds Project
11 Sep 2013	Walk with West Hill Court residents (Jennifer Wood and Simon Lee)
14 Sep 2013	PPSG workshop – preferred options
18 Sep 2013	Pop-up consultation
18 Sep 2013	Email to all staff
18 Sep 2013	Legal meeting between City and H&HS
20 Sep 2013	H&HS visit to Atkins to deal with outstanding queries to Shortlist Options Report (Jeremy Wright)
27 Sep 2013	PPSG meeting with Atkins to discuss QRA
27 Sep 2013	Pop-up consultation
27 Sept 2013	Highgate Men's Pond Association meet with Atkins to deal with outstanding queries to Shortlist Options Report
30 Sep 2013	PPSG meeting
3 Oct 2013	Pop-up consultation
9 Oct 2013	Pop-up consultation
14 Oct 2013	PPSG meeting
23 Oct 2013	Pop-up consultation
25 Oct 2013	West Hill Court Residents meeting

Hampstead Heath Ponds Project – Schedule of Question and Answers

Source	Query Number	Query	Design Team Response
Charles Leonard, EGOVRA Via email 23 October 2012	1	Please would the CoL clarify what the legal situation is regarding - its own duties and responsibilities to mitigate and/or prevent downstream flooding to us neighbours including how this impacts upon the Design process - and also whether the CoL would be liable for damage caused should this occur?	The City of London presented a Position Statement in response to the questions raised by EGOVRA this was issued on the 28th November 2012. This is appended to this Schedule.
	2	It would also be very helpful if your lawyers would clarify what the responsibilities are of the other main players in this scenario (eg Camden and Thames Water) and how and what the CoL is doing to liaise with them in protecting us against flooding from over-topping.	See Position Statement.
	3	4. Taking the lead - Involving others such as Camden and Thames Water now - and in the Fundamental Review and Design process In the meeting of 16th July 2012 I asked if the CoL were involving Camden and/or Thames Water but there was no actual answer. The minutes simply say that I asked about Camden (not Thames Water) and that 'This can be considered by the SG' but so far nothing has happened that I am aware of. I am a little concerned that there is not much follow up from issues raised at our meetings	See Position Statement.
	4	I am not a lawyer nor an engineer but it seems obvious to me that this represents a tremendous opportunity for the CoL, Camden and Thames Water (who I believe are the main players in this issue) to evolve and implement a scheme that minimises the risk of downstream flooding if they work together from the start. At present, it seems there is very little 'liaison' between the three parties - unless there is more going on that we don't know about.	See Position Statement.
	5	5. Peter Wilder's brief and scope Please would you clarify if these issues of 'over-topping' and 'downstream flooding' fall into the scope of Peter Wilder's brief? I would obviously hope they do!	The Strategic Landscape Architect shall act as a representative of both the City and the Stakeholder groups, championing the landscape and environmental aspects contributing with imagination and knowledge to the design thinking and challenging any emerging engineering solutions that fail to respect these aspects
	6	6. The post 1975 flood works I'd also be grateful for any information you have about the works that were done to mitigate/prevent a repeat of the flooding following the floods in 1975? I'm particularly interested in the large underground storage tunnel that I gather was built. I have always understood this was to protect us from future flooding somehow and would appreciate information about its purpose, size, through-put capacity and its location including entrances and exits and whether it discharges into the normal sewer system or some other tunnel.	A plan was produced by Thames Water at its presentation to Stakeholders on the 14th January 2013 showing the flood relief system. The City of London Corporation issued a diagrammatic representation of the pipe network from the ponds to EGOVRA on the 24th May 2013 (appended to this schedule).
	7	7. The water release valve to Highgate Pond No 1 I'd also be grateful for any information you can give me about the capacity of the valve system you showed us that releases water from Highgate Pond No 1? I think you said that this valve system releases water into an underground sewer pipe belonging to Thames Water (is that right?). I am interested in how much water this can take off the Heath when required including how much 'spare capacity' to Highgate Pond No 1 could be created in a given timescale, etc.	See plan appended to this schedule. The capacity of the 350mm diameter scour pipe is likely to be less than 1m³/s and so it will take many hours more to empty this pipe into the sewer system (if this was theoretically allowed) than the time to peak of the flood from a 1:10,000 year storm event (around 3 hours). Thames Water's sewer systems are only designed for small flood events up to around a 1:75 year return period event. Standard guidance on dam safety requires that dams can safely pass floodwater from a PMF, with spillways able to pass the floodwater from a 1:10,000 year event, so the existing sewer system cannot accommodate these kinds of floods.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Design Review Method Statement 10 December 12	8	Section 1: It would be helpful if the Project Stages in the Instruction to Tender could be defined	This information will follow when the programme is circulated (separate document)
	9	Section 1: Two options only are proposed for detailed modelling. We suggest that the number of limited final options remains open until possibilities become clearer	We will involve the stakeholders throughout the options process, so the logic we use in moving from the long unconstrained list to the final shortlist will be clear. The final options themselves may have sub-options. Since limited opportunity is expected for significant works at most of the ponds, there will have to be flexibility in the two detailed options. This flexibility is likely to be provided by these suboptions at a limited number of locations.
	10	Section 2.1.3: Please explain why both cascades are to be integrated into a single model, rather than being considered separately. These cascades are largely separate except for downstream consequences in the improbable event of dam collapse simultaneously in both chains	We will be running the two cascades as separate models when assessing the effects of large flood events, identifying spillway capacity etc. During a PMF event, it is possible that both chains would be subjected to the PMF (considering the short distance between the two chains), so failure in both chains is credible. The two cascade models will therefore be joined at the last stage of dam-breach modelling, so that we can simultaneously test the scenario of dam collapses on both chains.
	11	Section 2.2.1: The Strategic Landscape Architect is likely to have a significant contribution in this options phase but is not mentioned	Agreed, text will be added to this effect.
	12	Section 2.2.1: We support avoiding works at most sensitive areas, but suggest that it is too soon to propose any specific intentions, (eg. to avoid work at the Bird Sanctuary Pond and perhaps concentrate works at the Model Boating Pond), until views are obtained from all interested organisations.	Agreed. We felt that an early reassurance on the minimisation of works to the more sensitive areas such as the Bird Sanctuary would help gain confidence from the stakeholders.
	13	Section 2.2.2: We welcome the comment from Mike Woolgar on 3 December that this does not necessarily imply that a progressive collapse of every dam in both chains will be assumed to occur near simultaneously, as taken by Nick Haycock	As stated in version 3, we are proposing to model progressive collapse scenarios. The additional reference could be that "We will use the model to estimate the overall time frame of the progressive collapse scenario in each chain". Dam breach is unlikely to occur at the same time on two dams in one chain. However, as mentioned above, it is credible that two sets of progressive collapses could occur simultaneously in a PMF event, given the proximity of the two chains.
	14	Section 4: We would appreciate a likely date for issue of the Communications Strategy and programme, as we suggest it is urgent to raise awareness with the general public, and well before the public consultation proposed in 2.2.4, 4)	Communications Strategy issued to PPSG February 2013
	15	Section 5: In the Planning Strategy, please also set out all documents required for planning application and other permissions.	Stage C – This information will be presented to stakeholder group at a later stage.
	16	Project Programme: If likely dates for all the proposed reports and milestones are shown, this will greatly help stakeholders and other to plan referral discussions within their organisations. Early issue of this programme would be helpful.	Programme Circulated end of 2012
	17	Appendix A2, 4.5: We note the Panel Engineer's comment re spillway capacities. Please clarify what return periods will be used for overflows and spillways. We submit that a simple graph showing flood precipitation x frequency (return period) would aid understanding by the stakeholders	This is mentioned earlier in line 4.2. The reservoirs will be assessed following ICE guidelines in Floods & Reservoir Safety, which require the spillway of a Category A dam to safely pass a 1:10,000 year flood (with the rest of the PMF flow safely passing over the crest). The Panel Engineer might consider a proposed spillway with 1:1000 year capacity, but the dam crest must safely pass the rest of the PMF flow. A graph of flood precipitation vs return period is not yet available but could be provided at a later date following the completion of the hydrological review.
	18	Appendix A2: Page 4 of HHS proposals is missing	Fixed in the final document.

Source	Query Number	Query	Design Team Response
Harriet King, Brookfield Mansions on Design review Method Statement 20 December 2012	19	Appendix A 7.2 We're not clear what 'safe' discharge is. Is this discharge that can be accommodated in the existing sewers? If not, clear information should be provided that will enable residents to assess their exposure to flood risk and insurers to determine the cost of the risk. This should, in turn, encourage flood risk mitigation by all parties, particularly as the insurance industry plays a vital role in funding the rebuilding, repair or replacement of damaged homes, infrastructure etc.	This was an issue raised by the Heath & Hampstead Society in relation to the Design Methodology. The City of London's responsibilities are set out in the Position Statement appended to this schedule.
	20	We have a concern as to how the works will be carried out and should like a description of possible access routes for vehicles and storage of materials together with an assessment of probable disruption to be included in evaluation of the options.	This will form part of the development of preferred options and will be an important consideration by the construction contractor. Representatives of the Stakeholder group have been involved in the selection of the preferred contractor.
Karen Beare, Fitzroy Park RA on Design Flood Assessment 20 March 2013	21	Can we have more specific detail of exactly how much local data was integrated into the Atkins macro model for calculating the quantum? What local weighting did they integrate into to this new calculation?	"Local" data was integrated as follows: For the estimation of the percentage run-off the soils map for Hampstead Heath was used to adjust the Standard Percentage Run-off which was provided by the automated routine with the FEH CD ROM. The HHSS rainfall record was analysed and it was demonstrated that it was statistically inconsistent with the information from the FEH. This is to be expected as it is statistically unreliable to apply data from a single rain gauge and with a short record length in comparison with the events being predicted (See Figures 4-4 and 4-5 in the main report).
Karen Beare, Fitzroy Park RA on Design Flood Assessment 20 March 2013	22	Prof Hughes said pathways plus a bit extra either side was assumed as hard landscaping. This is very vague. We need more detail.	See page 27 of the Design Flood Assessment report – a width of 10m was adopted.
Karen Beare, Fitzroy Park RA on Design Flood Assessment 20 March 2013	23	With regard to rainfall, Prof Hughes talked about using weather stats from around the country yet his colleague (sitting to the side) talked about a Met Office determination methodology. Which one is it?	When estimating events with return periods i.e. 5, 20, 50, 100, 1,000 and 10,000 years, the national rainfall records are used on a statistical basis. For estimation of the PMF, the Probable Maximum Precipitation (PMP) is required. The PMP is derived in a deterministic manner (based on an estimation of the maximum volume of rainfall theoretically possible, using atmospheric physics) and the FSR report includes maps of PMP which were prepared by the Met Office.
Karen Beare, Fitzroy Park RA on Design Flood Assessment 20 March 2013	24	Atkins implied their computer software was far superior / sophisticated to Haycock's version? I cannot find in the report a definitive explanation of the key differences between them. Can this be provided.	Atkins used computer software which is widely used within industry to extent that it can be considered to be industry "standard" software. The Atkins' hydraulic modelling incorporated 2 dimensional modelling of the land around the ponds linked to a 1 dimensional representation of the ponds and overflow arrangements. In the 1 dimensional model, the ponds are represented by mathematical expressions of the relationship between water level and pond surface area, and the overflows by a mathematical expression for the relationship between the water the level and discharge (flow) out of the pond. The 2 dimensional model allows better representation of the topography around the ponds by breaking the area up into a series of interlinked discrete elements. The software solves the equations for fluid flow within the elements as well as across the boundaries between elements thereby showing the spatial variation of the flow around the ponds. Haycock by contrast used only 1 dimensional modelling techniques. The software they used is not widely used in industry in the UK and we have not carried out a detailed appraisal of the software. The Atkins modelling was more sophisticated in that it also modelled the areas around the ponds.

Source	Query Number	Query	Design Team Response
Karen Beare, Fitzroy Park RA on Design Flood Assessment 20 March 2013	25	Who wrote 'Floods and Reservoir Safety – 3 rd Edition'?	Floods and Reservoir, 3 rd Edition, was published by the Institution of Civil Engineers in 1996.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	26	Percentage Run-off: Atkins has made two apparently reasonable simplifications. They have assumed that there is an even distribution of the path network across the Heath. However there appears to be less paths (and hence less compaction) on the higher Heath. Also, they have applied an average SPR value of 53% to all catchments, rather than use a specific lower SPR on the upper more permeable soils. Might these simplifications result in the calculated run-off into the upper more sensitive ponds being too high, leading to too much work on these ponds? Should the total run-off be adjusted to discharge less into the upper ponds and more into the lower ponds?	The FEH guidance on run-off estimation for the PMF states that when the SPR estimate is less than 53%, the SPR should be set at 53%. On basis of this advice, the SPR was not varied between the higher and lower Heath.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	27	Upstream Spills: The original Table 1-4, Pond Storage Capacity, [Table 5-7 is identical], states in column 3 excludes spills from the upstream pond. A revised Table was issued on 21.3.2013 with altered % storage figures in the last column. Column 3 heading now reads including spills from the upstream pond. Should the data in the 3rd column [Total PMF volume...] be altered to show increased inflow?	The Table has been revised the report reissued.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	28	Section 4.6 indicates that inflow hydrographs were calculated for each pond's individual catchment. It is not clear if the following sections and tables include or exclude upstream spills. Please therefore confirm from Section 4.6 onwards, whether or not upstream spills have been included, and if not, please provide amended Tables including upstream spills where appropriate.	The hydrographs presented are for the whole upstream catchment generated by the hydrological model. These hydrographs have been routed through the hydraulic model and it is this that provides the spills from upstream reservoirs. These spills are therefore not included in the tables showing hydrographs. The tables have not been updated to include the spill inflows as they are complex and difficult to incorporate. It has been done for the PMF and updated PMF peak inflows are provided.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	29	Flood Estimates Table 1-1, [Table 4-7 is identical]: This table compares Atkins maximum flows for different storms at every pond with Haycock's flows, which have been extracted from his Table 7, p.43. Are these two tables directly comparable? For example, Haycock states that these flows will be attenuated by the lake chain and these values thus represent the boundary conditions of the lake model. Please therefore clarify this aspect, particularly for upstream inflows and whether current attenuation has been allowed in this and other relevant tables.	The Tables are directly comparable. As per the response above, both tables contain the peak of the hydrographs calculated from the respective hydrological models and they are therefore directly comparable.
	30	Quantified Risk Assessment: Atkins has confirmed in Appendix A of their Design Review Method Statement and separately that they will carry out a QRA of the current dam situation. When will this be carried out? We urge that it be as soon as the design flood has been agreed.	The Quantitative Risk Assessment will be carried out but we expect that lives will still be at risk in the urban area downstream of the Heath.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	31	Precipitation / Design Rainfall Depths: Please explain how PMP and 1:10,000 rainfall depths and durations were calculated. Was 1:10,000 rainfall derived from PMP [or vice versa]?	The 10,000 year rainfall depth was determined from the FEH statistical rainfall data. The PMP was determined from the PMP maps provided in the FSR and is deterministic, not statistical.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	32	Are the PMP and 1:10,000 rainfall depths and durations proposed for design 235mm over 9.5 hours and c.141mm over 1.9 hours respectively? (If so, the PMP/1:10,000 ratio is presumably c. 1.67?). If not, please state.	There is no predetermined ratio between the PMP and 10,000 rainfall depths. As noted above, the PMP was derived using deterministic methods whereas the 10,000 year value is derived statistically.
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	33	Haycock used 270mm and 135mm respectively, both over 4.4 hours. This presumably gives a much slacker PMP than Haycock, but a much more intense 1:10,000 storm, which may be the main influence on dam design. Please explain why then so much difference from Haycock in depths and durations, and why the Atkins durations of 9.5 hours and 1.9 hours are so different	Atkins extracted rainfall depths from the FSR for the PMF and the 10,000 year events (all other events used the FEH rainfall). We do not know where Haycock's rainfall depths come from, but based on their assumed 4.4 hour storm, if they had used FSR rainfall (as per the guidance) the rainfall depth should have been around 164mm (see our table 4.4). Furthermore, it would appear that Haycock based their PMP value on double the 10,000 year value (wherever that came from) which is wrong. Atkins' storm durations were optimised to determine the critical storm duration for each event, whereas Haycock choose a fixed 4.4 hour duration, which is not a correct approach.

Source	Query Number	Query	Design Team Response
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	34	<p>Maximum Flood Estimates: Haycock used the approximate rapid assessment PMP/1:10,000 rainfall ratio of 2.0. From this he derived flood estimates at both Highgate No 1 and Hampstead No 1 which both had a PMF/1:10,000 ratio also of 2.0. These are shown in Tables 1-1 / 4-7, i.e. both his input rainfall and his outflow flood ratios on the bottom ponds are the same.</p> <p>In contrast, Atkins’ more detailed calculations of rainfall inputs result in flows at both bottom dams with a PMF/1:10,000 ratio of 2.12 and 2.22 respectively, which are greater than Haycock’s 2.0. Why are Atkins outflow ratios not both of the order of 1.67?</p>	<p>The ratio of 2 from the rapid assessment was intended to be applied to Peak Flows derived from the rapid method, not rainfall depths. The ratio is used only with the rapid assessment and the rapid assessment is not appropriate for design.</p> <p>The ratio of 10,000 year rainfall and PMP depths should not be expected to be the same and ratio of the peak flows.</p> <p>This is because the relationship between rainfall depth and flow is not linear and we should not expect the ratios between the 10,000 and PMP rainfall to be the same as the ratio between the 10,000 flow and the PMF.</p>
Jeremy Wright H&HS, on Design Flood Assessment 25 March 2013	35	<p>Overtopping, and Dam Stability and Spillway Protection: Table 5-13 gives shows maximum depth of overtopping. Atkins Conclusions and Recommendations, p.45, state that Reservoir routing resulted in generally lower overtopping depths than those predicted by Haycock. Haycock’s PMF overtopping depths are shown in his Tables 16 and 33. These show that Atkins statement is correct for all the Hampstead chain and for the Ladies Bathing dam. However, for the other 5 dams on the Highgate chain, Atkins overtopping PMF depths are all higher than Haycock’s. How, therefore, is it that Atkins has these higher overtopping depths, bearing in mind that Atkins PMP (if this is 235mm) is only 87% of Haycock’s, and is spread over a duration of over twice as long?</p>	<p>Tables 16 and 33 from the Haycock Report refer to the 10,000 year flood. Tables 17 and 34 from the Haycock report are for the PMF and these show that the Atkins statement is correct.</p>
Peter Wilder, Strategic Landscape Architect on Design Flood Assessment 22 March 2013	36	<p>The calculations for Stock Pond seemed to attribute the entire catchment north of Stock Pond to that pond alone and do not take into account any attenuation or holding back that the two Kenwood Ponds offer.</p> <p>Therefore, although we do not expect to carry out works on these ponds we still need Atkins to provide the attenuation capacity and take into account the effect of these ponds when assessing Stock Pond, otherwise the measures required at Stock Pond look disproportionate to the scale of the problem. This is fundamental to Atkins Problem Definition document.</p>	<p>The temporary storage capacity of the Kenwood Ponds was judged to be negligible.</p> <p>The Kenwood Ponds have been modelled to assess how much water they would store during the PMF event and it was found that they would provide negligible storage so the effect of them would be insignificant. When storage in the Kenwood Ponds is taken into account, the depth of overtopping at stock Pond changed by 10mm to 20mm, thus showing that the influence of the Kenwood Ponds is negligible.</p>

Source	Query Number	Query	Design Team Response
Harriet King, Brookfield Mansions on Design Flood Assessment 27 March 2013	37	Although the primary objective of the work to be undertaken by City of London is to prevent dam failure whilst preserving the character and quality of Hampstead Heath, the secondary objective must be to lessen the quantity of surface water arising from overtopping, spillways and drains onto the Heath and subsequently into surrounding residential areas. While we welcome your assurance that the situation will not be made worse we would wish assurances that all flood waters are managed and controlled into the drainage and storm water systems in such a manner that it minimized any risk to life and property. The results from the investigation as shown in your report should be considered in conjunction with the capacity of the drains and sewers to cope with any water arising. All parties should be able to easily understand and to compare what the effect of future proposals may be with the existing situation, particularly where the residential areas affected by surface water from the Heath are likely to be affected.	Camden Council are the Lead Local Flood Authority and have statutory responsibilities in terms of surface water flooding. The City of London Corporation has a duty to ensure the safety of the dams, and works are necessary to ensure that the Probable Maximum Flood is safely passed through the catchment. Dr Hughes (the Panel Engineer) has advised that the proposed works on the Heath will not increase surface water flooding.
	38	We understand that Dr. Hughes and CoL will liaise with Camden (as lead authority), TWA, EA and DEFRA and provide them with up to date information. We should like to know how and with whom this information will be shared.	The City of London Corporation has shared the current Design Flood Assessment with Camden Council and Thames Water Authority and put this report on the City's website.
	39	Clear information should be made available that will enable residents to assess their exposure to flood risk and insurers to determine the cost of the risk.	Flood maps are available on the City of London Corporation and Environment Agency websites. We are unable to comment on insurers' requirements.
	40	Camden have said that they may have access to government funding if flooding is likely to occur in an event of 1:75 or less. TWA have a statutory obligation (I believe) to drain surface water arising from a 1:30 event. We should like confirmation in the light of the new calculations that anticipated volumes, speed and location of surface water arising from all events, including 1:30 and 1:75 events, be made available to statutory authorities.	The City of London Corporation will continue to liaise with the responsible statutory authorities
	41	We should like consistent and reliable information made available on the size, location and connections of drains and sewers, both for surface, foul (combined sewers) and storm water.	Thames Water Authority holds information on the surface water sewer system. The City of London Corporation has provided all of the information that has been made available to it.
	42	The figures given for the Hampstead chain indicate that the capacity of the Hampstead chain to cope with major events is better than that of the Highgate chain. A dry reservoir which will further mitigate downstream flooding is being considered to improve the capacity of the Hampstead chain. We wish to be assured that similar measures be considered for the Highgate chain.	The issue of attenuating water is a key component in both chains of ponds. All options will be considered.
Harriet King, Brookfield Mansions on Design Flood Assessment 27 March 2013	43	Table Page 8: Why are the 1:100 peak flows for the Highgate chain the only ones that Atkins have estimated to be greater than Haycock?	We have used the FEH rainfall-runoff model to calculate all hydrographs below the 10,000 year hydrograph. Haycock calculated the 100 year peak flow using an empirical formula to calculate QMean (mean annual flood), and combined this with the old FSR regional flood frequency curve. This approach used by Haycock was superseded in 1999 by the FEH and will give very different results to the FEH rainfall-runoff approach.
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	44	We now hope to persuade the authorities (including Camden, Thames Water, the Environment Agency, DEFRA, etc) to go the vital step further and investigate and include in their designs works that will improve our situation at least in line with the predicted increase in frequency and intensity of rainfall storm events. We understand from Dr Hughes and Simon Lee that should funds become available, such mitigation factors can be investigated and implemented as part of the main Works by CoL - there is still time but it is tight apparently. To do such works on the Heath would be hugely more cost-effective than trying to achieve the same result by works off the Heath. Has the CoL asked Atkins to investigate and cost 'on the Heath' mitigation measures?	Camden Council are the Lead Local Flood Authority and have statutory responsibilities in terms of surface water flooding. Camden Council are undertaking studies to model surface water flooding in parts of Camden where flooding has previously occurred. The City of London Corporation has not been provided with the outcome of any of these studies. Also please see Position Statement issued on 28/11/12, appended to this Schedule.
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	45	At what storm event do the two chains start overtopping currently? In particular, with reference to Table 5-12, are you able to give us more precise estimates of when Highgate No 1 pond starts overtopping? Will the Works change this?	See Table 5 – 12 in main report. All Atkins can say at this stage is that the works will not make the situation worse than they are now.

Source	Query Number	Query	Design Team Response
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	46	At what storm event level will surplus water passing through Hampstead No 1 pond cause flooding to our community? We appreciate that this may be beyond the scope of this report but any figures, estimations, indications or even explanations of 'how to asses this' would be most helpful.	In the existing scenario, a flood of return period greater than 1:1,000 years would cause overtopping of the dam at Hampstead No.1 Pond. In the current preferred options, this standard of protection is either matched (Option M) or exceeded (Option P).
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	47	Will Atkins make all relevant information freely available to other authorities (such as Camden Council and Thames Water) so that they can include such information in their flood alleviation designs?	Work produced by Atkins is the property of the City of London. The City of London Corporation has shared the current Design Flood Assessment with Camden Council and Thames Water Authority and put this report on the City's website.
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	48	We are still unsure about the run-off calculations. The gully down the side of our path (to the East of the Lido) is constantly full to overflowing with water. Often, even in light rainfall, the path itself has water flowing down it especially at the top (near the Depot) and stepping off the path means stepping into sodden, soggy mud. Instinct says that therefore any storm event rainfall would simply have to run off the surface of the Heath since the ground is already 'full'. We find it hard to understand how it is that in a 1 in 100 year storm event that 47% of the rainfall would soak into the ground...	While some parts of the Heath will have high runoff rates, many of the vegetated areas and areas away from compacted footpaths will allow rainfall to infiltrate. It is also a function of the ability of the underlying soil to accept and transmit rainfall, and according to the soil maps for the heath, the composition of soil does allow for infiltration on some parts of the Heath.
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	49	May we have the equivalent figures for storm events smaller than 1:100, say 1:10, 1:20, 1:30, 1:50 and 1:75 ? Mark Dickinson of Thames Water told us that Ofwat will only allow them to upgrade areas who are at risk from a 1:10 storm event and can only upgrade them to a 1:30 level. Thus, as per our point 7 above, such information would be very useful.	Atkins output is the property of the City of London. The City of London Corporation has shared the current Design Flood Assessment with Camden Council and Thames Water Authority and put this report on the City's website. The City of London Corporation can be required to carry out works to ensure that the risk of failure of the dams on its statutory reservoirs due to overtopping is "virtually eliminated". The Design Standards therefore require modelling of extreme rainfall events rather than more frequent rainfall events.
Charles Leonard, ECOVRA on Design Flood Assessment 28 March 2013	50	Are there any discussions being had with Camden Council and/or Thames Water about where the rainfall water that 'passes through' Highgate No 1 pond and Hampstead No 1 pond will enter their drainage systems?	The City of London Corporation has a duty to ensure the safety of the dams, and works are necessary to ensure that the Probable Maximum Flood is safely passed through the catchments.
Charles Leonard, EGOVRA on Design Flood Assessment 28 March 2013	51	What is the capacity of the Emergency Valve system on Highgate No 1? Is this system being retained for operational use? Do any of the figures in the report reflect how much this reduces eg overspill for different rainfall storm events?	This has not been evaluated; the valve is a draw down mechanism enabling maintenance works and currently emergency drawdown of water. It is too early to say whether this will be retained. Please also see answer to query 79.
Charles Leonard, EGOVRA on Design Flood Assessment 28 March 2013	52	May we have any information Atkins has about the pipeworks underneath and around the Heath (in our area), including information about the Flood Alleviation Tunnels? We (and others) have asked CoL and Thames Water for such information without success. We have various 'maps' that conflicting and very limited information.	The attached plan shows the location of outflow and drawdown valves associated with Heath ponds and the Thames Water Authority 'Flood Alleviation Tunnels'.

Source	Query Number	Query	Design Team Response
Colin Gregory, Garden Suburb Residents Association on Design Flood Assessment 4 April 2013	53	My understanding is that the risk to be addressed is that of a dam failing and causing damage to property (other than the City's), injury or loss of life. Although Rylands v Fletcher liability is strict, the risk cannot realistically be reduced to zero. What has to be decided is what works are necessary to reduce the risk of a dam failing in the event of a specified level of rainfall to an acceptably low level. Is that correct?	The current guidance for reservoir safety standards in Floods and Reservoir Safety, 3rd Edition, published by the Institution of Civil Engineers in 1996. Table 1 in this document provides the dam categories and the design flood inflow.
	54	Although there is a lot in the paper about overtopping and volumes and speeds of flood water, not much detail is provided on the risk of dam failure. On page 53 (page 43 of the paper) it's stated that "standard guidance suggests that the dam slopes would need reinforcement to prevent erosion which could lead to a breach of the dam". My understanding is that the City is not liable if water passes over the dams without a breach, even if flooding occurs lower down (indeed this is what the works are designed to achieve) but most of the risks addressed are about overtopping. I think we need more information about the "standard guidance" referred to and evidence about the likelihood of breach.	The approach is consequence based and so the categorisation is based on the potential effect of a dam breach i.e. it considers the consequences of a dam breach, and does not assess the probability of failure of the dam.
	55	<p>The conclusion says that "to reduce the risk of breaching, improvements will need to be made to some of the dams". This doesn't say anything about what an acceptable reduced level of risk would be. It appears that the risk to be guarded against is the risk of breach in the event of a "probable maximum flood" (occurring less than once in 10,000 years).</p> <p>I think we need more information about what the current risk of breach is (as opposed to overtopping) and what the aim is in terms of the reduced level of risk, including the reason for selecting "probable maximum flood" as the event to be guarded against.</p>	<p>Where a breach could endanger lives in a community, the dam is Category A and the design flood is the Probable Maximum Flood.</p> <p>Risk is the product of the probability of failure and the consequence of failure. We will be carrying out a Quantitative Risk Assessment (QRA) as part of this project and this should provide an understanding of the overall risk of failure of the embankments.</p> <p>It should also be noted that the velocities given in the report are based on a smooth uniform slope and do not take into account the localised effects of trees, fence posts, small changes in slopes all of which contribute significant concentrations of high velocity flow. These concentrations will exacerbate erosion damage which could lead to a breach.</p>
David Lewis, Protect Our Ponds on Design Flood Assessment 8 April 2013	56	Work is still required as all of the ponds can overtop even in smaller rainfall events. With earth dams (such as those on the Heath) overtopping can cause erosion and potentially lead to dam failure. "Can" is the operative word. We are back with the original disaster movie scenario.	Overtopping can cause failure and has caused failure on the Heath and in other places. The predicted return period for overtopping, the depth and velocities are such that most ponds will suffer significant damage and could fail in their current state.
David Lewis, Protect Our Ponds on Design Flood Assessment 8 April 2013	57	<p>Even more sinister is the statement (from the recent memo by Atkins to the City of London referring to the spread sheet matrix of opinions on the plans):</p> <p>It should be noted that where a particular option has been flagged as red, i.e. the option has been identified as likely to result in significant negative effects on any particular discipline, or will not be supported by a particular stakeholder group, this does not necessarily preclude that particular engineering option for inclusion in the scheme. It seems pointless having this elaborate consultation if the designer reserves the right to ignore significant comments made by stakeholders and others. If this actually happens, the whole process will have been a sham. Remember that the (now much criticised) designs in the Haycock Report were made by Atkins (not Haycock), a fact that has somehow escaped comment recently.</p>	<p>It would not be precluded from the scheme provided that appropriate environmental mitigation and/or enhancement measures can be implemented on the advice of the relevant technical specialist.</p> <p>Stakeholder comments will be taken into account.</p> <p>The designs in the Haycock Report were by Haycock and NOT Atkins.</p>
Susan Rose, Highgate Society on Design Flood Assessment 9 April 2013	58	Have the same calculations re. flow rates, velocity etc. been done for the Kenwood ponds as for the Heath ponds? What are the figures? How does this information impact on the measures needed to protect the Heath dams? In the events of a Kenwood pond dam overtopping or collapsing would English Heritage be liable under Rylands and Fletcher?	<p>Explicit calculations for the Kenwood ponds have not been carried out as these ponds are not the responsibility of the City of London. Their catchments have been taken into account in estimating the flows into the other ponds on the Highgate Chain.</p> <p>If the dams collapsed, then English Heritage would be liable under Rylands and Fletcher but not if there was no collapse.</p>
Susan Rose, Highgate Society on Design Flood Assessment 9 April 2013	59	In the events of a Kenwood pond dam overtopping or collapsing would EH be liable under Rylands and Fletcher?	<p>English Heritage would be liable under Rylands and Fletcher if the dams collapsed, but not if the dams overtopped without collapsing.</p> <p>It is not appropriate for the City of London Corporation to comment on the potential liability of other organisations. Any concerns regarding the Kenwood ponds should be addressed to English Heritage.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	60	<p><u>Rainfall Run-off from the Urban Fraction of the Highgate Catchment</u>: Section 4.3 states that the urban areas adjacent to the pond chain will be included for flow estimation.</p> <p>Section 4.4 states that 61.5% of 'urban' areas is assumed to be impervious. This may be appropriate for high density housing in much of London, but we suggest that it is not appropriate for the catchments of the Highgate slopes. Figure 4-2 shows that Highgate Ponds 1 to 5 all have catchments that lie outside the Heath. The Bird Sanctuary Pond has a very large area and the Ladies Bathing Pond and Model Boating Pond also have sizeable areas, external to the Heath. These areas, such as Fitzroy Park and Highfields Grove are not typically urban and heavily built up, but generally are isolated dwellings in very large gardens. We suggest that a much lower percentage be assumed as impervious.</p>	<p>We cannot change the percentage that FEH assumes in its equation for urban area adjustment.</p> <p>Please also see answer to query 78.</p>
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	61	<p><u>Overall Rainfall Run-off Percentages</u>: Haycock used 80% to 90%. Atkins has reduced this to 76% for PMF. Both Binnie in 1987 and Black & Veatch in 2007, both highly respected dam engineers, used 27%. There is judgement in selecting an appropriate run-off. Should not Atkins percentage be significantly lower than 76%? Please clarify in detail.</p>	<p>There appears to be a difference in the terminology used by previous consultants who have undertaken flood estimation for the heath. We have reviewed the Binnie and Partner's 1987 hand calculations and computer print outs of their FSR model. Their 1987 model print outs show that they used an SPR value of 47% which resulted in PR values of 53.5% and 69.64% for the 10,000year and the PMF respectively.</p> <p>The reference to the 27% is from a table in the Haycock's report, which is given for Highgate 1 pond for the 10,000 year event. The 27% seems to be referring to the percentage of the 10,000 year volume that outflows from the pond (after it has been routed through the pond, presumably through a hydraulic model) compared to the rainfall volume in (this appears to be the gross rainfall depth and not the net rainfall after the percentage runoff (PR as we understand it for the FEH/FSRR-R model) is applied). So we are not comparing like for like with respect to the 27%.</p> <p>We believe that the 80-90% that Haycock have been talking about is comparable (in terms of what is meant by it) with our 76% and BBV's 69.64% and is the % of rainfall that is converted to runoff into the reservoir (i.e. only in the hydrological model). However the 27% value attributed to BBV is the percentage of outflow from Highgate 1 compared to the total gross rainfall volume for the pond and is not comparable to the SPR and PR we have been discussing. The Binnie SPR value of 47% is very similar to the adjusted value of 46% we got for our SPR before increasing it to 53% to account for summer drying and compaction, and these values resulted in PR of 76% for Atkins and 69.64% for Binnie for the PMF respectively.</p>
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	62	<p><u>Release of Water from the Ponds</u>: We understand from the City's Position Statement on Discharge of Water, November 2012, that the City is not liable for downstream consequences for additional flood water that safely overtops a dam. However, if there is an escape or a deliberate release of stored water, then liability under Rylands and Fletcher may apply. It may be necessary to open the valve on the outlet pipe of a pond for two reasons: in an emergency to lower rapidly the water level to prevent a dam breach; and also more routinely to release attenuated (stored) water after it has been held back behind higher dams during an extreme storm, to provide storage capacity for a future storm.</p>	<p>Not in Atkins scope of work.</p> <p>If water is deliberately released and it causes damage downstream, then there would be liability under Rylands and Fletcher.</p>
	63	<p>What is the maximum rate of release from both Highgate and Hampstead No 1 ponds that will not incur liability under Rylands and Fletcher? If stored water is deliberately released from raised dams at upper ponds which then overtops the bottom ponds, what liability, if any, then applies?</p>	<p>This would need to be determined on a case by case basis.</p>
	64	<p>Has the City sought or received technical or legal advice on how it should exercise a choice between releasing water to prevent dam breach and not doing so?</p>	<p>Please see Position Statement.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	65	<p><u>Natural Spillways:</u> Dr Hughes has stated that it is essential for the dams to be designed with spillways to take flood flow safely without significant erosion to the dam slopes, and that these may have to be in reinforced construction to minimise damage. He has indicated that 3 phase spillways may be considered (hard, soft with reinforced grass, and some crest overtopping), all sited on the dam and discharging down the downstream slope. We have suggested that an alternative concept of 'natural spillways' could be far preferable. These could be designed for extreme floods to discharge as overbank flows out of the sides of some reservoirs, and then flow through scrub, trees and fences, all left untouched, on a natural route to the lower pond which leaves the dam slopes, toe and mitres untouched. This would be similar to the way the spillway on the Model Boating pond discharges at present. Because natural ground slopes are shallow and the route avoids the dam structure, no surface reinforcement would be necessary, the existing landscape could remain untouched, and reinforced spillways may not be needed on the dam itself.</p> <p>Figure 5-2 clearly shows this side overbank possibility on the Highgate chain. Highgate Nos 2, 3 and 5 ponds appear easily suitable, and the other ponds may be able to use this principle with some ground re-shaping. Will Atkins investigate this in preference to reinforced spillways sited on the dams?</p>	While the natural spillway concept might appear feasible, flow through scrub, trees and fencing causes increased erosion on the downstream side of the these features. These would tend cause further flow concentrations with enhanced erosion which could channel water back towards the dam mitres and cause damage in this location. Moreover, there could be backward erosion until the contents of the pond and cause increased damage downstream. It is more reliable to provide a soft engineered spillway to control the flow in a more reliable manner.
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	66	<p><u>Overtopping Data:</u> detailed queries:-</p> <ul style="list-style-type: none"> - 1:5 year overtopping depth for Model Boating Pond seems odd. Please confirm. - why is the overtopping depth increase between 1:1,000 to 1:10,000 years so small generally in comparison with the increases between all other events? <p>will Atkins provide graphs of overtopping velocity x time for all overtopping heights shown?</p>	<p>Table 5-8 shows a negative overtopping depth which means that the pond does not overtop.</p> <p>Because between the 1,000 year and 10,000 year floods we change from the FEH to FSR rainfall and there is little difference between the 1,000 year and the 10,000 year rainfall depths, hence similar for the overtopping depths</p> <p>We have not produced such charts as they would be misleading because they would be based on a uniform smooth surface and the localized influences of fences, trees and slope irregularities and concentrated flows at low points on the crest would be not be accounted for.</p>
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	67	<u>Dam Breach Scenario and Quantified Risk Assessment:</u> Dr Hughes, Atkins Design Review Method Statement, and the City of London's report to the Consultative Committee on 8 April all state that the next steps should be to define the potential design options. We disagree and urge that a Tier 3 QRA be immediately carried out. Dr Hughes has previously advocated the use of QRA to inform the design process, and we understand that a dam breach analysis is required under the Reservoir Act 1975. We urge that this should include the probability of dam failure. We therefore request that a QRA be carried out before potential design options are developed. (This qualifies our query of 25 March). When will this be available?	The breach modelling is in progress and the inundation areas are required to assess the population at risk and therefore to attempt a Tier 3 Quantitative Risk Assessment is premature. Moreover, from our experience QRA is unlikely to make a difference as to whether or not works are required because the probability of failure and the likely population at risk are too high in this case.
Jeremy Wright, H&HS on Design Flood Assessment 10 April 2013	68	<u>Legal Issues:</u> Atkins Design Review Method Statement November 2012 states that Dr Hughes has written to the Government asking for a hierarchy of Acts, i.e. Acts promoting Reservoir Safety (i.e. human life) vs 1871 Hampstead Heath Acts ensuring future of the Heath. At the Consultative Committee meeting on 8 April 2013, Dr Hughes stated that he had not received a reply, even after a further request to the Minister, but he would show the response to us if received. We have previously stated that we consider it essential that the designers, and the community have a clear brief on all legal issues before design proceeds, and this issue remains outstanding. May we be given copies of all correspondence by Dr Hughes with the Government and its agencies on this issue?	<p>The issue that is trying to be resolved is reservoir safety legislation works being delayed by other legislation. Resolution of this issue will not make any difference to need for works required on the Heath.</p> <p>Dr Hughes's communications with the Minister are personal and will not be made available.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	69	Is calculated percentage run-off into the upper and more sensitive ponds too high?	Margaretta Ayoung described percentage run-off and how it had been calculated. AH said Atkins must follow best practice methodology and think of the next Inspecting Engineer – they must be happy with his estimates and must be able to reproduce them in the future. They would follow best practice and take into account local conditions.
Karen Beare at Design Flood Assessment meeting on 19 April 2013	70	How have Atkins taken into account local conditions?	Margaretta Ayoung showed on the slides the different catchment areas and how they are cumulative as you go down the chain. She said the Flood Estimation Handbook (FEH) has a high level of detail. The FEH provides depth/frequency curve and it includes rain gauges over a wide area. The point of using a large data set, as included in the FEH information, is it is much more statistically reliable.

Source	Query Number	Query	Design Team Response
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	71	How detailed is the FEH and are slopes taken into account?	<p>Data is provided for half km squares and yes slopes are taken into account.</p> <p>Margaretta Ayoung went on to explain the difference between the Standard Percentage Runoff (SPR) and the Percentage Runoff (PR). The SPR is the runoff associated with the 29 soil types included in the FEH data base. The PR is the estimate of the runoff that would be expected to occur in the field and is calculated by adjusting the SPR by two dynamic factors (copies of pages 26-27 of the Assessment of Design Flood Report were handed out). MA explained that the FEH provides for 29 different soil types (using the UK Hydrology of Soil Type (HOST) values) representing all of the different soil types found in the UK.</p> <p>MA said 30.97% is the default SPR for Hampstead which is based on the two main soil types that occur in the Heath. The FEH default SPR was adjusted to the local conditions on the Heath by taking account of the area (plus 10m buffer) of footpaths that Haycock assessed as being heavily compacted. This adjusted SPR was carried through to the PR calculation.</p>
Karen Beare at Design Flood Assessment meeting on 19 April 2013	72	Does it included the overlay of geology?	<p>The FEH soil type data base takes into account the geology of the area.</p> <p>MA said a width of 10 m was added on either side of the footpaths to allow for additional soil compaction on either side of the footpaths. – this was then used to adjust the 30.97% to get 46%. This derived value, 46%, was then increased to a value of 53% as is recommended by the FEH for catchments prone to drying and compaction.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	73	Should an adjustment for compaction be made to upper catchment, which potentially have fewer footpaths?	<p>Margaretta Ayoung showed the results of sensitivity analyses, which showed that any resulting difference in overtopping depth is not significant.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	74	Can stakeholders have a detailed explanation of the method of calculating 1:10,000 and PMP flows and the peak storm durations?	<p>Answer: MA said the Probable Maximum Precipitation (PMP) was estimated by the Meteorological Office and is based on the physics of the atmosphere – it is an estimate of the maximum amount of water the atmosphere can hold. This exercise was carried out by the Met Office over the whole country and a series of maps for the whole country is included in the Flood Studies Report. The 10,000 year rainfall is based on a statistical examination of rain gauge data for the whole country. For any catchment that you choose you can obtain the 10,000 year rainfall information from the Flood Studies Report. KB asked what weighting was given to local data and if climate change was taken into account.</p> <p>MA said climate change was not taken into account as these are already extreme events.</p>

Source	Query Number	Query	Design Team Response
Charles Leonard at Design Flood Assessment meeting on 19 April 2013	75	What about the EU directive?	<p>MA said EU flood directive is for floods of a smaller return period and the PMF is a flood so extreme that it does not have an adjustment for climate change as is required by the EU directive for smaller floods.</p> <p>MA said that there was only 100 years of local rainfall data which is too short a record length to use in deriving the extreme floods required for this project. She stated that a common rule of thumb is that the return period which can be reliably derived from a dataset of N years in length, is N/2. Hence for Hampstead Heath the HHSS rainfall data could also be used to reliably derive rainfall depths of up to the 1 in 50 year rainfall. When asked why the HHSS data was not used to provide the rainfall depth up to the 1 in 50 year rainfall, she said the local HHSS 1 in 50 year rainfall depth agrees with the FEH 1 in 50 year rainfall depth for the 24 hours duration storm, so the local data would not make a meaningful difference for these short return period floods. In addition, the HHSS rainfall data is daily total rainfall and the flood estimation for Hampstead Heath requires sub-daily data (because the critical storm durations are of a few hours rather than days), so the HHSS data set could not be used in any case on its own.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	76	Surprised that the PMF/1:10,000 ratio at the bottom dams results in ratios of 2.12 and 2.22, bearing in mind that ratios on some dams in other parts of the country can be much lower, e.g. Tilgate Dam PMF is only 1.14x10,000 year flood. Why does the Heath have what appears to be an unusually high ratio?	<p>MA and AH explained that there is no fixed ratio between the 10,000 year PMF peak flow. The ratio is a function of the physical characteristics of a given catchment. Floods and Reservoir Safety provides approximate guidance and suggests a ratio of 2 which is close to ratio Atkins obtained on the Heath.</p> <p>AH added that the floods at Tilgate would be influenced by the presence of the M23 and the reservoir chain is much smaller than on the Heath. AH confirmed that he is happy with the ratio for Hampstead Heath.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	77	What detailed work has been carried out by Atkins to demonstrate that flows into the Stock Pond are not over-estimated? Please give details of the modelling done on the Kenwood Ponds	<p>Answer: AH said the Kenwood ponds had been modelled to assess how much water they would store during the PMF event and it was found they would provide negligible storage so the effect of them would be insignificant.</p> <p>AH said output from the modelling of these ponds could be shown to the stakeholder group.</p> <p>MA showed a table of results which showed that when the storage of the Kenwood Ponds is taken into account, the depth of overtopping at Stock Pond changed by 10mm to 20mm, thus showing that the influence of the Kenwood Ponds is negligible.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	78	H&HS believe the run-off taken for the Highgate slopes is far too high and account needs to be taken of the fact that much of the area described as urban is in fact of rural character (large gardens) that would absorb much of the water. Also asked why the urban catchment percentage for the Bird Sanctuary is higher than Hampstead No. 1 pond.	MA responded that the catchment areas used to derive the floods are cumulative so that urban extent values were for the cumulative catchments and not the intermediate catchments which JW was describing. This is why the urban extent value generally increases as you go down chain. Gardens have been taken into account as FEH urban extent value is comprised of values for urban as well as suburban grid cells based on a half a kilometre square resolution. FEH therefore preserves the green areas within each 0.5 kilometre square cell if the cell is not 100% covered by urban landuse and treats urban and suburban differently. In addition, the urban extent has been updated using OS mapping and there is a facility to update urban extent to take account for urbanisation since urban extent was derived.

Source	Query Number	Query	Design Team Response
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	79	Stakeholders would like further details on the rate of release from the scour pipe of Highgate No. 1 Pond.	<p>Answer: AH said the estimated rate of release from this pipe is 10 litres per second and it would take 15 hours to get the water level down 0.4m. The PMF flood peaks at 32000 litres per second.</p> <p>CL asked if the scour pipe would be removed as Simon Lee had indicated it might not form part of the final design.</p> <p>AH said he had no intention of getting rid of the scour valves, as there was no reason to do so and they are useful for normal circumstances. CL asked how often the valves had been used to release water downstream. AH said he was not sure – anecdotally he had heard they had been used a couple of times in the past.</p> <p>PS said the City would probably not have that information but he had also heard anecdotally they had been used a few times.</p> <p>AH said he opens the valves every six months when he inspects the dams.</p>
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	80	H&HS said Atkins have rejected spillways which would follow small natural “valleys” on the sides of some of the ponds, and asks why?	AH said nothing had been rejected as the project was not in the design stage. The decision on what sort of spillways has still to be made.
Charles Leonard at Design Flood Assessment meeting on 19 April 2013	81	Do Thames Water/ Camden Council / Atkins /City of London all mean the same when they talk about different event sizes e.g. 1 in 20, 1 in 50 etc.	Yes they should all mean the same thing
Charles Leonard at Design Flood Assessment meeting on 19 April 2013	82	Can the runoff data for other rainfall event sizes be given to stakeholders?	Yes, Atkins provided the runoff data (in a hydrograph) for a 1 in 5, 1 in 20, 1 in 50 and 1 in 100 year events for each pond on 23 May 2013
Harriet King 19 April 2013	83	Is the overflow pipe at Highgate No. 1 significant?	AH said Highgate No. 1 has an overflow and a drain pipe at a lower level (which release water at 10 litres per second. AH said the overflow is at high level and is running all the time.
Karen Beare at Design Flood Assessment meeting on 19 April 2013	84	There is confusion about other large rainfall events that had happened on Hampstead, i.e. 1975 event, 2002 event, 2010 event. Could Atkins work out how much rain had fallen during these large events so it can be communicated to stakeholders and the wider public what has been happening on the Heath.	Atkins to estimated the return period of these storms and shared the data on 23 May.
Charles Leonard at Design Flood Assessment meeting on 19 April 2013	85	What is the capacity of the emergency valve system on Highgate No. 1 pond?	The capacity of this pipe requires calculation but as it is only 350mm in diameter it is unlikely to be more than 1m ³ /s.

Source	Query Number	Query	Design Team Response
Charles Leonard at Design Flood Assessment meeting on 19 April 2013	86	Stakeholders would like verification that situation downstream will not be made worse following the work.	AH described that any work they do will help the situation downstream as they will be creating more storage area for water further up the chain so it will be released downstream in a controlled manner less than the natural peak rate. This is true for all sizes of storms, including the smaller storm events and not just the ones that threaten dam failure and that this could be verified through the hydraulic model. Additional Note October 2013: This verification has since been done, and it has been shown that the frequency of flooding downstream will be reduced as a consequence of these works.
Jeremy Wright at Design Flood Assessment meeting on 19 April 2013	87	In the area above Stock Pond the terrain appeared to be favourable to the temporary storage of runoff. Has been taken into account?	Localised micro-topography does not have a significant influence on flood estimates, particularly for the longer return periods and PMF.
Ian Harrison 19 April 2013	88	Questioned whether the catchment boundaries shown in Figures 4-2 and 4-3 have been drawn correctly as visual observations on the ground suggested more water would flow to Vale of Health Pond and less to Catch Pit than suggested by the boundary shown on Figure 4-3?	MA replied that because the flood estimates have been based on cumulative catchment area above each pond, these variations in the catchment boundaries would have an insignificant effect on the flood estimates. Moreover, that in the context of the size of the catchment area as a whole, the suggested boundary variations would have negligible effect on the estimated flood flow.
Jeremy Wright H&HS on Constrained Options report 25 June 2013	89	We agree with the principle of attenuation if this will reduce or avoid the need for work on sensitive ponds. However, for comparison purposes we would like to see visual images of the option of spillways on both chains without any increased attenuation.	To pass the PMF and achieve the Design Principles raising of dams is necessary.
Jeremy Wright H&HS on Constrained Options report 25 June 2013	90	We agree that the Catchpit seems to be the least visible location on the Hampstead chain for raising/creating a dam, and appreciated the indication on site of the possible extent of 4m, 5.2m and 7m earth mounds. In order to assess which might be the most appropriate, we ask that computer generated images of the 'trade-off' comparisons be prepared of the different works that might be needed on the downstream dams with each of the suggested Catchpit mound heights, and with some spreading of attenuation throughout the chain. We also particularly request information on how the mature trees in the Catchpit valley will be preserved.	This issue was considered as part of the Shortlist report and July workshop of PPSG where trade-offs between dam raising and spillways were modelled. The actual location of the Catchpit dam requires detailed topographic and tree surveys that are currently being commissioned.
Jeremy Wright H&HS on Constrained Options report 25 June 2013	91	We are concerned that the large quantity of earth to form the Catchpit mound may require a large and intrusive borrow pit, if obtained on site. We request that this be investigated urgently, and different options for obtaining this earth be provided.	Depending upon the silt surveys it might be possible to dewater the silt and reuse to fill potential borrow pits. Analysis of the silt is being undertaken.
Jeremy Wright H&HS on Constrained Options report 25 June 2013	92	We agree that the Boat Pond seems to be the most appropriate site for attenuation on the Highgate chain as it is the least natural looking pond. However, we have mixed views, and some of us have concerns that the dam raised by as much as 3m would be much too high, as shown to us on site. In order to help us to judge, we ask that computer generated images of the 'trade-off' comparisons be prepared of the different works that might be needed on the downstream dams and the Boat pond, with the Boat pond dam raised by say 1m, 2m and 3m, and with some spreading of attenuation throughout the chain. We need this to establish exactly what relevant reduction of work would result on the rest of the chain in relation to those options.	This issue was considered as part of the Shortlist report and July workshop of PPSG where trade-offs between dam raising and spillways were modelled.
Jeremy Wright, H&HS on Constrained Options report 25 June 2013	93	We would appreciate receiving indicative (quantified) hydrographs for the 'trade-off' comparisons for both chains	Hydrographs for the two Highgate chain options (4 and 6) for the Highgate No.1 and Model Boating Ponds are appended to the Preferred Options Report. Hydrographs for the Hampstead chain options will follow.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Constrained Options report 25 June 2013	94	In order to be able to consider the impacts of various proposals, we urge that construction management planning be urgently addressed	Early contractor involvement is seen as an integral part of the design solution, particularly the development of the CMP. Stakeholders have formed part of the team selecting the preferred construction contractor.
Rachel Douglas, Mixed Pond Association on Constrained Options Report 25 June 2013	95	The Catchpit embankment/barrier, whether sited as proposed on 17.6.13, or, as also suggested, even closer to the pond, will substantially change the appearance of the North end of the Pond, since a structure of that size in that position will be visible even if and when dense vegetation is re-established. This will undoubtedly be disliked by many Pond users. Details of exact positioning, replanting and so on will be crucial to mitigate the expected antagonism the proposition of so large a barrier is bound to produce.	It is recognized that location of this new embankment will need to be carefully modelled to minimize its visual intrusion. Both topographic and tree surveys are currently being undertaken to enable analysis of where this new embankment might best be located.
Rachel Douglas, Mixed Pond Association on Constrained Options Report 25 June 2013	96	The wilderness in the valley upstream from the Mixed Pond adds to the charm of the Pond environment and is also very much valued by general Heath users as well as swimmers. We are therefore concerned that when the work is over there should be a viable plan to enable similar dense vegetation to be re-established. This may require fencing off the damaged areas until such time as the vegetation is dense enough to deter mass access and to ensure people keep to paths. Such plans must be made clear before the proposal goes out for public consultation.	The City Corporation is proposing to have a Term Maintenance Plan to ensure that the scheme is adequately maintained, ensuring the Heath's natural aspect is retained.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	97	We need to see a precise correlation between the size of the raised BP dam and the consequent increased spillway engineering works for the MP, including regarding the loss of trees, change in or loss of vegetation, and change in the appearance of the vegetation. And the engineering works need to be explicitly linked to the waterflow statistics.	Options modelling so far has been intended to show the size of raising works at ponds downstream of Model Boating Pond and to allow like-for-like comparison (of the effects of varying the raising of Model Boating Pond) the spillway size at Men's Bathing Pond was kept the same. However, refinements on the size of the spillway can be carried out in the outline design stage and will use new topographical survey information to do this.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	98	What is the proposed size of the "new pipe to pass through raised part of dam" on BP?	This has not yet been modelled. It is likely to be a refinement to one of the preferred options.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	99	Have Atkins seriously considered the scale and impact of constructing the BP dam raised by 3m? If it is 3m x 15m triangular section x 120m long (say), it would require 2700 m3 of soil brought in. If a dumper truck carries 10m3 , it would need 270 loads through Camden, up or down West Hill and along Millfield Lane. Is this environmentally acceptable? Could the existing BP dam withstand this punishment? Is the intention to avoid this large-scale bringing in of soil by excavating and extending the west side of the BP? In other words, does the 3m dam necessarily entail this extension (regardless of the latter's visual impact)?	In the Preferred Option scheme the 3m height option of raising Boating pond dam has been discounted. CoL are working with Atkins to identify borrow pit locations to provide material for the dam, this would reduce movements of materials for dam construction. In addition, depending on silt surveys it may be possible to dewater the silt and re-use it to fill potential borrow pits. Analysis of silt is being undertaken.
	100	We understand "a reinforced spillway" (as distinct from "a spillway") cannot have trees on it, but it can have grass and vegetation. Is this correct? We need to see exactly, if the BP dam was raised 1.5 to 2m only, which trees would have to be removed from the "chosen area" of the MP dam.	This is correct. A tree loss plan will be provided soon after the new topographical information is combined with the tree survey info and the outline design. Currently it is estimated that one less tree will be affected in a 2.0m raising option than in the 2.5m or 3.0m raising options.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	101	We need to see more details about the size and number of the pipes and spillways proposed. The Report does not make this clear.	More information about provisional spillway depths and locations is given in the Preferred Options Report.

Source	Query Number	Query	Design Team Response
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	102	We need specificity on which trees have to be felled and what vegetation can remain or be planted in relation to each option.	See above response (to query 100) about the tree loss plan to be produced at outline design stage.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	103	What is the current position with the reported leaks on the MP dam? Have they been plugged, and what is/was their significance for the Project?	The leaks will be investigated further and remedial works to stop the leaks will be designed as part of the project. These works will be quantified after ground investigation into the dam material and analysis of the dam's stability.
Marc Hutchinson, Highgate Men's Bathing Pond on Constrained Options Report 27 June 2013	104	We are unclear (i) how the percentage estimates of water attenuation for the various options have been calculated, and (ii) how these are linked to the estimated volumes of run-off based on revised (i.e. post-Haylock) absorption calculations.	<p>Assuming the query relates to Constrained options report p39 "BJ said by raising 3m, it could create 106,000m³ storage- almost 50% of the designed flood."</p> <p>This statement was made before the detailed modelling of the options was finalised and was therefore intended to be indicative only.</p> <p>Inflow volumes to any given pond can be calculated as the sum of the inflow volume from: Direct rainfall falling on the pond; Runoff from the surrounding land; Inflow from the upstream pond pipe; and Inflow over the upstream pond dam crest; These inflow volumes can be calculated for the existing situation and for the modeled options.</p> <p>Storage capacities of each pond are calculated as the volume of water which can be stored between the Top Water Level (defined as the pipe invert level) and the dam crest level. This is therefore the volume of water than can be stored in the pond without the dam crest overtopping.</p> <p>The percentage of water that can be attenuated is therefore the storage capacity above TWL as a percentage of the total pond inflow.</p>
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	105	The 'constrained options' comprise a limited version of the unconstrained options. Nearly all 'opportunities' for Highgate No 1 summarised in the Critical Review have disappeared. Why have these been set aside?	Enlarging the pond area would result in tree and shrub loss and an impact on visual amenity and character of pond and setting of Heath.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	106	The potential for raising the Stock Pond dam to provide additional storage was considered and supported as an option at the workshop. The impact on trees can be mitigated by using a wall construction on the downstream face. Why has this option been set aside?	Further modelling revealed that the benefit of providing additional attenuation at Stock Pond was very small (of the order of 20 -30mm drop in peak water levels for an extra 0.5m raising at Stock Pond on top of the 0.5m being considered.)

Source	Query Number	Query	Design Team Response
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	107	At what event will the spillway proposed to the west of Highgate No1 dam come into use?	In both the Preferred Options for Highgate chain of ponds the Highgate No. 1 spillway will not operate until a 1:1000 event. Currently the ponds overtop in an uncontrolled manner in a 1:100 year event.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	108	What is the planned total PMF volume and available storage for Highgate No1 pond, subsequent to the Hampstead Heath Pond Project?	In Option 4, Highgate No1 pond has a storage capacity of 43,356m ³ between the pipe invert level and the dam crest level. The PMF inflow volume to Highgate No1 pond in Option 4 is 215,687m ³ .
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	109	What is the current maximum flow discharge capacity of the pipes that drain Highgate No1 pond?	<p>The capacity of the existing 0.46m diameter overflow pipe at Highgate No.1 Pond has been calculated at between 0.5 and 0.9m³/s. The outflow in the existing scenario peaks at over 17m³/s (in a 1:10,000 year event) and 38m³/s in a PMF event, which means that the overflow pipe would be insufficient and floodwater would be back up and flow over the dam.</p> <p>The capacity of the 350mm diameter scour pipe is likely to be less than 1m³/s.</p>
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	110	Are CoL proposing continuing use of the scour pipe as an overflow?	No, the scour pipe is only for maintenance purposes. The City of London require consent from Thames Water to release water using the scour pipe.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	111	What is the volume of additional storage capacity that is being planned for in the Highgate Chain?	A total of 133,317m ³ of additional storage capacity is planned for the ponds in the Highgate chain under Option 4. This has been calculated as the sum total of the additional storage capacity provided at each of the six ponds between pipe invert level and dam crest level.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	112	Does 'Improve discharge capacity' mean 'increase the quantity of water that will/can be discharged in m3/ sec?	Yes, since the current discharge capacity of both the overflow pipes and the scour pipes are inadequate for dealing with flows in 1:10,000 year events on all the dams.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	113	How is the discharge of water from Highgate No1 pond to be managed? eg a) bigger drains b) catchpit/ dry reservoir or c) spillway	Water will pass through the chain of ponds and then pass downstream.
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	114	The following options have been discounted. Why? <div> a Dam raising: this should not be discounted at this pond. It has the lowest crest level above the outflow of any of the ponds on the health. b Piling the face, clearing downstream face and other options have also been discounted or reasons which are unclear. c Enlarging the pond has also been ruled out. Assuming this means increased potential to contain flood water in extreme events this is worth considering in conjunction with landscaping to the perimeter. </div>	<div> a. Would need to know which pond is being referred to here. b. Adding more sheet piling to the ponds would be unpopular in terms of its visual impact. "Clearing the downstream face" means removal of trees on all dams, which we are trying to avoid. c. Enlarging the pond is only being considered at Model Boating Pond in order to provide material to build a raising embankment. Enlarging does not significantly alter flood storage capacity by itself. </div>

Source	Query Number	Query	Design Team Response
Harriet King, Brookfield Mansions on Constrained Options Report 28 June 2013	115	Engineering options need to consider the management of flood waters beyond this dam and into the municipal drainage system. What works are being considered to protect residential properties by the creation of a dry reservoir area?	The dry reservoir would need to store approximately 107,000m ³ in a 1:10,000 year event. This is twice the capacity of Highgate No.1 Pond and this would not be achievable given the topography downstream of Highgate No.1.
Charles Leonard, EGOVRA on Constrained Options Report 28 June 2013	116	Would the CoL confirm that computer modelling of various alternatives will be provided and that this will be in a form that enables us to realistically understand the impact of raising one or more of the other dams in each chain - such as that of the Stock Pond in the Highgate chain? This is in reference to the parameters of the outflow of water from the ponds at the bottom of each chain and its management.	The options flowcharts in the Shortlist Options Report (and updated in the Preferred Options Report) were intended to illustrate the consequences and trade-offs of raising the last 3 dams in the Highgate chain. See also the hydrographs which are being appended to in the Preferred Options Report.
Charles Leonard, EGOVRA at Stakeholder meeting 22 July 2013	117	Can raising Stock Pond by 1 m be considered?	Further modelling revealed that the benefit of providing additional attenuation at Stock Pond was very small (of the order of 20 -30mm drop in peak water levels for an extra 0.5m raising at Stock Pond on top of the 0.5m being considered.)
Rob Mitchell, Brookfield Mansions 6 Aug 2013	118	What is the existing standard of protection for Highgate No1 Pond (HGNo1)? The Assessment of Flood Design specifies this falls between 50 and 100 years. Please provide this with greater accuracy.	The minimum crest level of Highgate No.1 pond has been amended in the model, and since it has slightly increased to 63.77mAOD, the 1 in 100 year return period event does not now cause overtopping. The peak water level in Highgate No.1 Pond during the 1 in 100 year event is 63.764m, so the Standard of Protection (SoP) is almost exactly 1 in 100 years.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	119	Does the determination of the standard of protection include the utilization of all pipes (Overflow Pipe and the Scour Pipe) leaving HGNo1?	<p>Overflow pipes are included in the model and were considered to be open and flowing during the model runs to determine Standard of Protection (SoP).</p> <p>The scour pipes were not included in the model as the valves on these are normally closed, so we have not modelled scour pipes (nor did Haycocks). Since scour pipes have to be opened by someone to be effective, we have to assume that they are not open or not available during an event.</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	120	What are the flood management procedures that have been used to manage the floodwaters of HGNo1 including both through existing drainage systems and any other means e.g. surface water?	This system is primarily associated with undertaking maintenance works, allowing with Thames Water consent water levels to be lowered. The lack of adequate spillway provision is a matter that the Ponds Project seeks to address allowing water to pass through the chain of ponds but "virtually eliminating" the risk of dam failure.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	121	Who owns or is responsible for each pipe leaving HGNo1 including their maintenance?	The City of London Corporation owns to the first point of communication with another drain.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	122	What is the existing height of the dam above the normal water level?	The minimum dam crest level at Highgate No 1 is 63.77mAD. The typical water level <i>[note 18th Oct – this should say Top Water Level]</i> is at the overflow invert level which is at 62.45mAD. The minimum height of the dam above overflow invert level is therefore 1.32m.

Source	Query Number	Query	Design Team Response																																																			
Rob Mitchell, Brookfield Mansions 6 Aug 2013	123	What are the dimensions, maximum discharge flow rate and volume of each pipe (Overflow and Scour Pipes) that leaves HGNo1?	The overflow pipe diameter is 0.31m. <i>[Note 18th Oct – this should say 460mm.]</i> The calculated stage (height) vs discharge relationship for the overflow pipe is tabulated below, with the maximum flow rate reaching 0.7m³/s. <i>[note 18th Oct – this maximum was for the highest pond water level that occurred in Option 3. For Options 4 and 6 where water levels reach higher than 64.44mAOD, up to 64.92m, the flow rate will increase slightly more, up to 0.8 m³/s. The table below is separately calculated stage-discharge relationship which was used in the hydraulic model so that it could interpolate the discharge in the overflow pipe for any water level in the pond. The table was calculated for higher levels but only the part of the table that covers levels up to 64.94m is given here, since this is the nearest value to the modelled peak water level of 64.93m which occurs in Options 4 and 6 in the PMF event.]</i> (The scour pipe has not been modelled, for the reasons given above in response to query 119).																																																			
			Flow m3/s	Stage (water level) mAOD	0	62.45	0.011	62.64	0.046	62.74	0.102	62.84	0.172	62.94	0.228	63.04	0.279	63.14	0.332	63.24	0.373	63.34	0.405	63.44	0.436	63.54	0.466	63.64	0.495	63.74	0.523	63.84	0.551	63.94	0.578	64.04	0.605	64.14	0.631	64.24	0.657	64.34	0.682	64.44	0.707	64.54	0.732	64.64	0.756	64.74	0.780	64.84	0.803	64.94
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Added 18th Oct

Source	Query Number	Query	Design Team Response
Rob Mitchell, Brookfield Mansions 6 Aug 2013	124	Please provide figures for the existing volume and discharge flow rates of water passing through the overflow pipe during 1) normal conditions (i.e. when there isn't any rain) and 2) storm events of 1 in 10, 20, 30 and 50 and at the point when overtopping begins? This is to establish the current conditions for comparison with the expected conditions after the proposed works have been completed.	In dry conditions, there is no flow through the overflow pipe, these dry conditions are reported to happen approximately 5 months in a year. The hydrology for the 1 in 10 year and 1 in 30 year flood events was not calculated, so the flows during the 1 in 20, 1 in 50, 1 in 100 and 1 in 1,000 year events have been given, to allow comparisons.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	125	Provide details of the existing total volume, peak discharge flow rate, depth of overtopping and overtopping duration in 50, 75 and 100 year storm events.	The dam is not overtopped in the 1 in 50 and 1 in 100 year return period events in the existing scenario.
			Therefore, to allow a meaningful comparison of existing and proposed scenarios, we ran the model for the 1 in 1000 year event, with results as follows:
			Total volume overtopping = 5,327m³ Peak discharge flow rate = 2.1m³/s. Max depth of overtopping = 0.11m Duration of overtopping = 1 hr 45 minutes.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	126	Provide a topographical map of HGNo1 identifying the location dimensions and design of the proposed spillway, the pond area that would be inundated by a flood prior to water coming down the spillway, where the spillway will discharge water and the expected direction of water flow off the City of London (CoL) property	We are aiming to provide a flood map based on LIDAR data in the near future. Please also see answer to query 229.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	127	Is it proposed that there will be any earthworks (bund or otherwise) to manage the direction and speed of water flow once it has come down the spillway?	Such earthworks are not currently part of the scheme, since there is no high ground downstream to tie into, so the discharged water would still circulate back to the low ground downstream of the dam. However, both the speed and the volume of the discharged water will be reduced by increasing storage in the pond chain system
Rob Mitchell, Brookfield Mansions 6 Aug 2013	128	Is it proposed to change the flood management procedures in future and if so why are these changes being introduced and what are the proposed new flood management procedures including through existing drainage and surface water systems? Is any consideration being given to a system that pre-empts periods of expected high rainfall by increasing the water discharged from the pond in advance of the storm?	The City of London Corporation has implemented an on-site emergency action plan. Camden Council has responsibility for the off-site emergency action plan.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	129	At what height above normal water level will the proposed spillway begin passing water?	The proposed spillway weir level is at 63.70m AOD, very close to the existing minimum crest level (63.77). Typical water level is 62.45mAOD so the water would have to rise 1.25m before it passes over the spillway weir. [Note 18th Oct – the spillway weir level of 63.70m mentioned here is only for Option 3, which has since been discounted. For Options 4 and 6, the current preferred options, the proposed spillway level is 64.45m AOD, greater than the existing dam crest level, so the water would have to rise 2.0m before the spillway operates.]

Source	Query Number	Query	Design Team Response
Rob Mitchell, Brookfield Mansions 6 Aug 2013	130	What are the proposed public facilities that are to be made available on HGNo1? Are there plans to introduce angling on this pond?	There are no proposals as part of the Ponds project regards future use of this pond for angling. The City have commenced discussions with the Hampstead Heath Angling Society on several issues relating to fishing on the ponds but these are at a very preliminary stage.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	131	What dam raising can be achieved on this pond without affecting the tree cover of the pond?	<p>The minimum raising of the dam is 0.5m in Option 3 (where Model Boating Pond dam is raised by 3m). This 0.5m raising could be achieved with a short wall situated on the dam crest so as to avoid the trees on the upstream and downstream slopes of the dam.</p> <p>The maximum raising at the dam would be 2.0m in Option 5 (where the raising of Model Boating Pond dam is only 1.0m). This would have to be achieved with an earth embankment built on the pond side, which would require removal of all the trees on the upstream face, and an unknown number of trees on the north-east bank as it would have to tie into higher ground. Partly for these reasons, the preferred option is Option 3 which minimizes the tree loss at Highgate No.1 Pond.</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	132	The Design Philosophy states "...the works to the ponds will not make the flooding situation downstream worse". Is this the case for all storm events and how will this be demonstrated/verified?	<p>This should be the case given the addition of storage. It is being verified using the modelling results.</p> <p>The shortlisted options have been checked to verify that the flow discharging from the proposed spillway at Highgate No.1 in the PMF event is less than the flow overtopping the bank in the existing scenario. Further checks have now been made on the volume being discharged (see response to question 13 below.) At the other end of the scale, no flood events up to and including the 1:100 year event cause the spillway to be overtopped, (which is the same as in the existing scenario), and peak water levels are lower.</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	133	It is proposed to "...improve the discharge capacity..." at HGNo1 pond. How is this to be achieved and why? Our concern is that surface water will be discharged sooner than is currently the case and at a faster rate.	<p>The proposed spillway will improve the control of discharges, ie the new spillway will have much more capacity than the existing overflow pipe, which is currently inadequate; this will mean the embankment will overtop less frequently. The discharge over the proposed spillway will not occur earlier than the discharge from overtopping of the existing bank, because the spillway weir level is approximately the same as the minimum existing bank level, and because more flood water will be stored at this pond and at the next two ponds upstream.</p> <p>We have checked that the rate of discharge from the proposed spillway would be less than the discharge of flow overtopping the embankment in the largest flood events, see below</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	134	Please provide us with a map of the drainage pipe system around the Heath and advise us how it is envisaged that water will drain through this system in different storm events.	<p>Currently we only have a services plan showing how the outlet pipes from Highgate No.1 ponds connect into the nearest surface water drains. Camden Council will have surface water drainage maps.</p> <p>However, the typical capacity of the surface water drains will be for around 1 in 30 year floods, so when floods larger than 1 in 100 occur and cause overtopping of the existing dam or the proposed spillway, the surface water drains will already be full. Therefore, we have not modelled how the discharges from dam overtopping would get into the drainage system, because we know that they wouldn't, in either the existing or proposed scenarios. Water overtopping the dam in large flood events would flow overland for considerable distances in either scenario.</p>

Source	Query Number	Query	Design Team Response
Rob Mitchell, Brookfield Mansions 6 Aug 2013	135	In the Assessment of Design Flood it anticipates 276,996 m3 total PMF volume entering the Highgate Chain and total available storage in the Highgate Chain of 42,518 m3. This means the Highgate Chain can only currently store 15% of the PMF. What is the proposed impact of the proposed scheme on the storage of the PMF in the Highgate Chain Ponds?	More of the PMF water will be stored in the proposed scheme.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	136	What is the impact of the scheme on the smaller storm events? The implication is that they will overtop less frequently as more storage exists in the system.	<p>In smaller storm events, ie up to and including the 1 in 100 year event, there would be no overtopping of the proposed spillway, just as the existing dam is not overtopped.</p> <p>In larger storm events, the increased storage upstream means that the peak water levels in Highgate No.1 pond would be lower than in the existing arrangement. Therefore, while the proposed spillway will still be operating in larger events, the spillway will be operating less frequently. For example, in Option 3, the 1 in 1000 year event does not cause the spillway to operate, whereas in the existing case it overtops the dam.</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	137	What is the impact of the scheme on the available storage in HGNo1?	Available storage will increase because in all options the dam crest level is raised.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	138	Please provide figures for the proposed total volume and peak discharge flow rates of water passing through the overflow pipe during 1) normal conditions (i.e. when there isn't any rain) and 2) storm events of 1 in 10, 20, 30 and 50 and at the point when overtopping begins? We want to be sure that Camden and Thames Water have sufficient information to calculate the impact of this extra water on their drains and sewers.	The overflow pipe volumes and discharges for the events modelled to date (1 in 20 and 1 in 50) were not available at the present time. However, since the peak discharge through the overflow pipe is dependent on the water level in the pond, and these water levels are less in all flood events in Option 3, we would expect the peak discharges through the overflow pipes to be less.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	139	Provide details of the proposed total volume, peak discharge flow rate, depth of overtopping and overtopping duration in 50, 75 and 100 year storm events.	<p>The model is showing that the proposed spillway at Highgate No.1 Pond will not operate in the 1 in 50 year or the 1:100 year return period events in Option 3 (which is the same as in the existing scenario).</p> <p>For a comparison with the existing scenario, we ran the 1:1000 year event in the Option 3 model, but this also did not cause flow in the spillway. The peak water level was 62.83m, so was 0.87m below the proposed spillway weir level, and 1.05m below the peak water level in the same flood event in the existing scenario.</p>
Rob Mitchell, Brookfield Mansions 6 Aug 2013	140	The positioning of the spillway and the nature of its discharge of water is a factor in determining liability if the water is caused to flow in a more concentrated form than it naturally would as the result of artificial alterations. Please advise us how this is being addressed?	The spillways are part of the reservoir structures and as such the City will be guided by the advice of the Panel Engineer.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	141	Please provide us with a copy of CoL emergency action plan.	Release of the emergency action plan has to be approved as it contains both private and security information of a confidential nature. We are working on production of a public version.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	142	Please advise us of CoL's legal responsibility to residents and properties on the Heath boundary with regard to the delivery of 1) surface water and 2) underground/piped water. Also, please clarify how the CoL's understanding of their responsibilities in this matter have changed, if at all, since the circulation to the WMSG of the "Position Statement on Discharge of Water (Overtopping of Ponds and Surface Water) from Hampstead Heath" on 28th November 2012.	The City of London's position hasn't changed from the Position Statement that has previously been issued and is appended to this document.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	143	Does the proposed scheme comply with the requirements anticipated under the 2010 Act? If not in what way does it not comply?	This project has to be approved by the City's retained Panel Engineer who has to be satisfied that the City has "virtually eliminated" the risk of dams failing.

Source	Query Number	Query	Design Team Response
Rob Mitchell, Brookfield Mansions 6 Aug 2013	144	What is the essence of the legal dispute between Hampstead and Highgate Society and CoL?	There is no legal dispute, the City of London Corporation is endeavouring to host a meeting between legal parties including the City's retained QC and the Society's retained QC to discuss legal aspects associated with the project.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	145	Please clarify what discussions have taken place with any concerned Authorities including Camden Council, Thames Water and Environment Agency.	The City of London Corporation has provided reports associated with the Ponds Project to the relevant authorities.
Rob Mitchell, Brookfield Mansions 6 Aug 2013	146	Does the scheme take into consideration the Preliminary Flood Risk Assessment prepared by Camden and Camden's study on surface water flooding?	It is recommended that residents liaise directly with Camden Council regarding their responsibilities.
Jane Shallice, Ladies Pond on Shortlist Options Report 21 Aug 2013	147	<p>More on de-silting</p> <ul style="list-style-type: none"> Plans which show the detailed proposals, including the materials that are to be used. Cross sections : <ul style="list-style-type: none"> The longitudinal section through the pond, dam, meadow, stock pond, boating pond and men's pond. Cross section down the middle of the access lane down to the dam and changing rooms. Cross section through our meadow, the pond and the meadow to the West. Detailed cross sections through the different conditions around the edge of the pond i.e. through the dam, the spillway, the West side, the North side and the East side. Visualisations of the proposals from the path, the dam, the spillway, the lifeguards' lookout, the changing rooms, the water, and the meadow. 	<p>Information on the scope of de-silting that can be carried out to the Ladies Pond will be dependent on the results of bathymetric surveys which are ongoing. These will allow estimates of the quantities of silt on the pond bed. This information will be combined with an assessment of the treatment required to the silt if it is to be moved elsewhere on the Heath.</p> <p>Cross sections through the changing rooms and more detailed drawings will be worked up during the detailed design phase.</p> <p>The architect is currently working up outline design proposals for consideration and will be able to provide more detail on the proposed changing room construction.</p> <p>The environmental works are summarised in the Preferred Options report. The detail of these works will be developed in the next stage of design. The current proposals are to allow a public consultation which encompass the principle of minimising the impact on the Heath by focusing intervention in one main area (i.e. Model Boating).</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	148	<p>The public have been invited to comment on this complex and detailed report, so there needs to be guidance on the key issues where comments are most sought. As this document may be read as a 'stand alone' report by the public, we consider that Section 2 'Brief Summary' is too condensed and does not provide a logical justification for the works, particularly for persons who have not read the preceding documents. In particular, the phrase 'Essentially, more storage is needed' is not a logical conclusion of what goes before in this section. Also, the primary objective of the project to prevent dam break is not stated, and the phrase '...to improve the resilience of the dams.....' is obscure to the uninformed. An additional two or three sentences might help considerably.</p>	<p>There will be a similar section summarising the problem definition in the forthcoming Preferred Options Report, where these comments can be addressed.</p> <p>This section of the report will include an explanation of 1) how increasing storage in one pond reduces the flow discharging from the next pond, and 2) how the "resilience of the dams" refers to the ability of the dams to withstand the erosive impact of floodwaters overtopping the dam crests and flowing down the downstream slope.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	149	<p>6, 8 and 9. We are somewhat bemused by the plethora of 'Design Principles', and fear that the general public will receive a confused message. We note the 4 principles on page 6, 3rd column, which are then supplemented by 2 more in column 4. These are then supplemented by a further 6 on page 8, column 3, and then on page 9 there are a further 3 'key objectives'. We suggest that it would be helpful to state one clear set of aims, consistent with duties under legislation.</p>	<p>This is noted and a clearer set of objectives, design principles and philosophy is set out in the Preferred Options report as suggested.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	150	We note that the design team/Dr Hughes has said that some damage can be accepted . We also note that ICE 'Floods and Reservoir Safety' Table 1 recommends that spillways for Category A dams be designed for 1:10,000, with the remainder of the shorter duration and rarer surplus PMF spilling over the crest if overtopping is tolerable. We recognise that PMF spillways are a prudent design principle that would also avoid intrusive works to reinforce our existing and sensitive dams to take overtopping. However, if PMF overtopping could be tolerated on two dams, we suggest this could reduce dam raising by approx 1m, being the depth of spillways below the crest. We will address this in detail when we review options, specifically for the Model Boating pond, and the Mixed Bathing pond.	The reference to Table 1 of 'Floods and Reservoir Safety' is correct and its recommendations do inform our design principles. However, the decision on whether overtopping is tolerable or not depends on several factors including the nature of vegetation on the dam crest and downstream slope, and the depth and speed of flow over the dam crest and downstream slope. For example, the Panel Engineer has said that he would not accept overtopping of the dam at Hampstead No.2 pond because the plane trees would cause eddying and turbulence which would increase the erosion of the dam during overtopping. The dams which would be more resilient to overtopping are those which have a uniform grassy slope with no woody / bushy vegetation. This description would largely apply to the causeway dam at Mixed Bathing Pond, for example, but not to the dam at Model Boating Pond, which has several large trees on the downstream slope of the dam itself, or most of the other dams.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	151	9, 25, 47 Please explain, if all the PMF is routed through spillways and does not overtop the crest, why crest restoration is required on many dams, with possible impact on crest vegetation, as their crests will normally be above water level. This query applies to Stock, Ladies, Bird, Vale and Viaduct ponds.	At Stock, Ladies, Vale of Health and Viaduct Ponds, crest restoration is proposed for the low spots (which tend to be in the middle of the dam) to bring the crest to uniform level so that the spillway can be located away from the middle, and also so that the weir level of the spillway can be kept above typical water level. We can therefore reduce tree loss on the dam (by locating the spillway away from the most valuable trees) and also have a normally dry spillway which can be lined with grass that can blend in with the surroundings. At Bird Sanctuary pond, the crest restoration is intended to fill in low spots so that if there is some overtopping in small floods, the risk of the flow concentrating into a narrow cut in the dam is reduced. In larger floods, water will be backing up on both sides of Bird Sanctuary dam, so it will become submerged. The crest restoration at Bird Sanctuary dam is relatively minor with only an 80mm increase required at the low spots, this could be achieved with resurfacing of the crest road without affecting the vegetation on either side.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	152	9, 25, 47 Please clarify, as most existing dams will currently overtop in PMF, if the proposed spillway depth is say approx 1m and some dams have crest raising/restoration less than this, does this mean that these modified dams will store less water than the current existing dams?	Generally the crest restoration proposed for upstream dams allows the spillway weir level to be above the typical water level in the pond upstream and as close as possible to the existing ground level. However, this is not always possible, so to minimise raising works at these ponds, there is a slight reduction in storage capacity at some ponds. This is more than compensated for by the raising of dams (or building a new one) downstream, and this is why the whole chain of ponds should be considered as a system, where the raising of a dam in the middle of a chain can reduce the works required both upstream and downstream. Depths of proposed spillways will be shown on the options flowcharts for the next report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	153	10 Highgate chain flowchart: Please explain:- <ul style="list-style-type: none"> why are spillway widths on the Boating Pond identical for options 3, 4 and 6, rather than being tailored for the different surplus floods? Are they oversized for the higher dams? We note [p21] that spillway size is a key consideration, as vegetation clearance will be needed, hence we urge that these be the minimum size possible 	Currently, the peak water levels in Options 3, 4 and 6 are only around 300mm below the dam crest level during a PMF, which suggests that there is little scope for spillways to be made narrower without losing the freeboard required by the Panel Engineer to allow for wave surcharge. However, it may be possible to reduce the spillway size by adding another pipe through the dam. Refinements to the spillway size such as these will be tested using the model at the beginning of the outline design stage.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	154	<ul style="list-style-type: none"> Men's and Highgate 1 spillways – why are these identical for all options, irrespective of the height of the Boating pond dam? 	<p>For the shortlist options report, spillway widths on the last 2 Highgate chain ponds were kept the same when modelling the Highgate chain options so that the degree of raising at each pond could be quantified and compared. This was intended to demonstrate the principle of trade-offs, so we could define the consequences of varying amounts of raising of the dam at Model Boating Pond.</p> <p>Further refinements will be carried out to investigate possibilities of reducing spillway size.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	155	<ul style="list-style-type: none"> Option 5 shows a 2.0m raising on Highgate 1, but only a 1.5m raising on the Men's pond. Both these raisings may require an earth dam to be built inside the ponds, [page 33], which may have a major impact on screening vegetation and trees on Highgate 1. Could you please test this option with a max 1.25m raising at Highgate 1 [ie. with a wall], to determine the amount of dam raising then needed on the Men's pond dam? 	<p>Option 5 has now been discounted due to the impact on screening vegetation mentioned.</p> <p>Option 6 has shown that when there is a 1.25m raising at Highgate No.1 Pond dam, 1.0m is required at Men's Pond dam, but only if there is a raising of 2.5m at Model Boating Pond.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	156	<p>9, 10, 25 We note, re 'standard of protection', that the return period.....that causes overtopping of the last dam in the existing scenario is compared with the flood event that causes the proposed spillway in each option to start to spill water. Despite major attenuation on each chain, the standard of protection and peak velocities appear from the flowcharts to remain virtually unchanged, without any improvement. To assess this, please supply the current and proposed rate of flow versus time graphs [hydrographs] for all options for the bottom 2 ponds, the Mixed Bathing Pond and the Boating pond, and also for all the ponds if possible.</p>	<p>The options flowchart in the Shortlist Options report had a slight error in the boxes stating standard of protection, in that all of them should have stated 'at least 1 in 50 year flood'. (At the time, only the PMF and a 1 in 50 year flood had been run through the options models). Since then, the models for Options 3, 3a, 4 and 6 (with 2.5m – 3.0m raising at Model Boating Pond) have been modelled with higher return period floods in order to find out the actual range of standards of protection. In all these 4 options, the spillway did not operate for floods up to and including a 1 in 1000 year flood, indicating that the standard of protection given by the last dam is better than existing, due to the net increase in storage in the pond chain.</p> <p>Hydrographs showing outflows from the Highgate No.1 Pond for the next larger floods (1:10,000 year and PMF) are included in the Preferred Options Report to allow comparison between existing scenario and one option for each chain.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	157	<p>12 Hampstead Chain Flowchart. Please explain:-</p> <ul style="list-style-type: none"> The chart shows Vale pond crest restoration as 0.2m max, whereas the text [p47] states 0.6m max. Please clarify <p>The chart shows Viaduct pond crest restoration as 0.5m, whereas the text [p47] states 0.18m max. Please clarify</p>	<p>The text in the report is correct, the proposed crest restoration is 0.6m at Vale of Health and 0.2m (0.18 m rounded up) at Viaduct.</p> <p>This has been corrected on the options flowcharts presented on 14th September and appears in the Preferred Options Report.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	158	<p>The Flowchart shows the Catchpit with three different options of pipe size through the same 5.6m high dam. Please explain the effect of these different options re timing, duration, velocity and total volume of flood water on the downstream dams. We do not understand the benefits of these different options</p>	<p>The different size of pipes in the dam were tested after it was found in an earlier iteration that a 7m high dam with a 600mm pipe through it would only impound 5.6m of water. Smaller pipes were then tried, to see if the volume of stored water could be maximized. While it would be possible to calculate all the exact data requested, the key variable for comparison between options was the water level downstream in Hampstead No.2 pond, when the dam was combined with differing spillway / culvert sizes at that pond. The key benefit of having smaller pipes was thought to be that the increased stored volume would reduce water levels downstream. However, reducing the pipe diameter did not have as much of an impact on downstream ponds as the amount of raising modelled at Mixed Bathing Pond.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	159	<ul style="list-style-type: none"> We much welcome the presentation of so many different options, but are puzzled at some of the figures presented. We would appreciate clarification. For example, referring to the spillway/culvert options for Hampstead No 2 pond:- why is Option J spillway significantly larger than Option H [where both have 1.5m raising of the Mixed Pond]? 	In Option H the proposed Catchpit dam had a larger pipe (600mm) than in Option J (400mm), and the peak water levels were different (being higher in Option H), which means it is not always easy to compare like for like. The options flowchart for the Hampstead chain did contain a lot of information so it was decided not to include spillway depths and modelled water levels. However, spillway depths will be shown in the Preferred Options Report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	160	why is Option N spillway almost the same size as Option C [which has much less stored water]?	There is an error in the text in the flowchart, the open channel spillway in Option N is actually modelled at 14.3m wide at the base, so is slightly wider than in the 11.9m wide spillway in Option C. Currently these options have been discounted in favour of those with box culvert spillways at Hampstead No.2 pond.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	161	why are the cross sectional spillway areas [calculated up to crest level] significantly greater than the cross sectional areas of the culverts, when comparing pairs for the same flows? Spillway areas vary from 1.5x to 3.1x larger in area than the equivalent culverts. Surely spillway flow would be smoother and more efficient than culvert flow which could be turbulent, which could be expected to make spillway area less than culvert area?	<p>The flowchart does not show peak water levels and depths / invert levels, so it is not possible to make like for like comparisons on cross sectional areas of flow.</p> <p>Box culverts have been considered for Hampstead No.2 pond in order to reduce the width of spillways and therefore minimize tree loss.</p> <p>The flow rate over spillways is proportional to the driving head raised to the power of 1.5 and linearly proportional to the width. This means the head has a much greater influence on the flow rate than the width. In order to minimise the width of the box culverts, a greater head is applied to get the flow through the culvert.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	162	why is there this variation in the ratio of spillway areas to the equivalent culvert areas? Surely there should be the same ratio throughout? For example, the spillway area in Option L is 1.5x the area of the equivalent culverts in Option K, whereas the spillway area in Option J is 3.1x the area of the culverts in Option I. Is spillway J twice the size needed?	<p>The flowchart does not show peak water levels and depths / invert levels, so it is not possible to make like for like comparisons. The process of developing models was not based on ratios but on adjusting the spillway weir level and width of each option until the peak water level was below the minimum existing crest level.</p> <p>See also the comment above regarding the influences of head and width on flow rates.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	163	14, 22 We note in all cases it is assumed that water levels remain as today. We endorse this principle generally, as agreed at the 13 July workshop, as lowering could affect ecology and visual appearance. However, we query if a single exception might be made for the Boating Pond , as lowering the water level may enable the proposed dam to be reduced in height. We discuss this in detail later	<p>This is technically feasible, but there was a general consensus within the feedback from the early consultations that no typical (existing) water levels should be changed. It was also discussed at the 2nd PPSG workshop and most stakeholders were against lowering the water level.</p> <p>The recent silt testing has suggested that there could be up to 2.2m of silt in Model Boating Pond, and so the reduction in the depth of clear water could have a negative effect on fish populations which would need to be assessed by specialists.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	164	26 Viewpoint 6, 3m raising, still shows the canopy of a tree that would be removed with this option. There are similar instances in several photo visualisations. We urge for accurate imagery in the next report	This is noted, and the visualization will be corrected for the next report.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	165	31 We note that most of the advantages and disadvantages quoted for Option 3 are changes that are irrelevant to dam height, and apply therefore to all the options, not just to Option 3.	This point is made on page 34 of the Shortlist Options Report and so the differences in advantages are given when discussing the next option.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	166	HIGHGATE CHAIN In assessing these options, we have considered the following key principles:- Store/attenuate as much of the PMF as possible at the Boating pond, but minimise landscape impact. This implies Option 3 [3.0m raising], but we have reservations, and suggestions as below. We would like to limit the apparent height to approx 1.5m	<p>We note that the impact on landscape at Model Boating Pond is significant, but it is related to the need to source fill material as close as possible to the pond, in order to minimise the need for imported fill to be transported through residential areas around the Heath.</p> <p>The modelling of options has shown that a lower raising height at Model Boating Pond would have the consequence of a larger new embankment at Highgate No.1 Pond, thus spreading the area of major works and the impact on other ponds.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	167	On Highgate 1, minimise any loss of trees and vegetation that screen the Heath from residential buildings, particularly Brookfield Mansions and the intrusive white blocks of West Hill Court [see comment on page 31]. Page 34 indicates that a 0.5m or 1.25m dam raising on Highgate 1 could be accommodated with a wall on the crest which would have less impact on the vegetation than an earth dam. However, this is partly contradicted by page 33, which implies that an earth dam might have to be built for the 1.25m dam raising, and any higher raising. This therefore implies Option 3, or perhaps Option 6, but we have queries.	<p>In both the Preferred Options it is proposed that a wall be built at Highgate No. 1 pond.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	168	1. Carry out the minimum possible work on all other dams We detail these principles on the following review of the proposals for each pond, based on Option 3 stored volume, but with a Boat Pond dam raising of much less than 3m if our suggestions are incorporated:- Highgate Chain – pond by pond review Spillways generally Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where ‘natural’ spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.	<p>We are not yet in a position to release outline design drawings, which are programmed to be developed in October. We can summarise the spillway location position as follows:</p> <p>Stock Pond: at the west end of the dam, to be shown in a new visualization. Ladies Bathing Pond: at the western half of the dam as mentioned in the Shortlist Option report.</p> <p>Model Boating Pond: at the west abutment of the new/existing dams. Men’s Bathing Pond: at the west end of the dam, at the gap in trees where there is an existing grassy slope.</p> <p>Highgate No.1 Pond: partly on the west end of the dam, partly on the natural ground, as described on page 30.</p> <p>In terms of the location, these can be discussed in detail with the topographical surveys and tree survey information.</p> <p>We have tried to locate spillways in such a way as to minimize tree loss, using the methodologies described above, but due to the constraints of the existing ground levels and the locations of the most valuable trees it is not always possible to completely avoid the dams.</p> <p>It would be necessary to clear trees from the spillways where they are on the dam, since damage to any trees on the dams would not be acceptable, since trees in flow cause high turbulence immediately downstream of the tree with deep erosion. Trees can fall over due the downstream erosion and leave a significant void in the embankment where the root ball has been pulled out.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	169	2. Stock Pond – crest restore 0.5m to 1.0m We presume that this height of dam raising is principally to allow a spillway to be inserted into the crest without unduly lowering the normal water level, rather than for crest restoration. Please clarify.	The level of crest restoration is intended to allow a new spillway and overflow pipe to be installed while keeping the spillway above typical water level.
	170	We would prefer timber facing to the proposed retaining wall which we consider more visually appropriate than brick. There could be planting in front as screening. English Heritage screened the raised Wood Pond dam like this, which seems visually acceptable. This remark also applies to the proposed walls at the Men's Pond and Highgate No 1.	The preference for timber cladding has been noted and this was shown on the proposed walls in the new set of visualizations at the September 14 th workshop.
	171	We note that two [pond side?] trees may be lost in building the retaining wall [page 38] and query if this can be avoided through design	We have since relocated the spillway to the west side, so the tree loss only applies to a small cluster of trees with trunk diameters of less than 100mm.
	172	As the proposed spillway is to be reinforced, with topsoil and grass cover over, could there be some bushes or shrubs on its downstream slope?	As a general rule, the Panel Engineer has specified that planting of bushes or shrubs would only be acceptable on the upstream slope of any dam, and not within the spillway since this would affect the flow.
	173	Is it intended that this pond be dredged as part of the works [p44], as there is deep silt in this pond?	Stock Pond is one of the highest priority ponds in terms of plans for de-silting. The amount of desilting on this and other ponds will depend on the volume of silt, to be confirmed by bathymetric surveys, and the results of silt testing which is being carried out, since these both have a bearing on costs.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	174	Ladies Bathing Pond – crest restore by 0.2m Please detail the position of the spillway, with any tree loss.	At the western half of the dam as mentioned in the Shortlist Option report. Tree loss to be confirmed once the results of the latest topographical survey are received as they will then be combined with the tree survey.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	175	Bird Sanctuary Pond – crest restore by 0.1m Please clarify if there will be any tree loss when carrying out the crest restoration. If so, we query why any work needs to be carried out. This dam is the most robust on the Heath, there is a tarmac road on the crest which significantly will protect from any erosion, and under flood conditions the dam will probably be overwhelmed by rising water in the Boat pond before formation of any small gullies	No tree loss due to crest restoration work is anticipated at Bird Sanctuary Pond. The restoration work would be confined to the width of the existing road surface.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	176	<p>Model Boating Pond – raise dam to store equivalent volume of water of a 3.0m raising</p> <p>It appears desirable to store approx 106,000 cu m or more if possible behind this dam, as in Option 3 which has 3m dam raising. However, we consider that this extra height could severely impact on the landscape, and suggest that the raising ideally be limited to an apparent 1.5m, whilst still storing this volume of water. We suggest that this might be achieved by the following three measures:-</p> <p>1. Design the spillway to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest. This might reduce the raising by approx 1.1m, being the height of the spillway. Please clarify and confirm</p> <p>The old and new dams would then have to be protected from erosion from the overtopping PMF, and the need for this will depend on the rate of flow and duration, hence please supply the hydrograph.</p> <p>The new raised earth dam could have all slopes and the crest easily protected with reinforced grass [plastic Enkamat or similar] installed during construction and this would present a similar surface to that proposed for Option 3, ie. uniform grass, with possibly a berm/path and some bushes or shrubs on the upstream face to soften the appearance.</p> <p>The crest/cycle track on the existing dam is already in hard tarmac construction, but this could be re-laid in harder construction to ensure that it would not be eroded or undermined. It will then form a berm on the downstream slope,</p>	<p>Reducing the upper crest of the raising dam by 1.1m would effectively reduce storage capacity since the peak water levels are 0.7m above the spillway crest during the PMF event, because the spillway causes the water to back up behind it (the throttling effect). This would represent a loss of storage capacity of at least 17,300m³ based on an estimate using the surface areas of Bird and Model ponds (likely to be more since the areas increase with height). This loss of storage capacity would have consequences on the works required on downstream ponds to achieve no net increase in flooding downstream.</p>
	177	<p>The downstream slope of the existing dam into the Men’s Pond is broadly uniform grass with some specimen trees which are to be retained. If the hydrograph indicates that this downstream slope needs to be protected, then reinforced grass could be laid on it and around the trees without significantly altering the appearance. We accept that this may not provide the same protection as on a new dam, but suggest that it should be adequate, taking into account the fully protected crest, and the massive thickness of the combined existing and new dams. There could perhaps be some surface damage but no structural damage, and we understand that some damage can be accepted.</p>	<p>The Panel Engineer would not accept overtopping of the main dam due to the trees on the downstream slope which are to be retained. These trees would cause eddying and turbulence which would increase the erosion of the dam during overtopping.</p> <p>The kind of damage that would be accepted would be minor wear and tear of turf which could be replaced after a flood event. Erosion of channels around trees, or trees being pushed over and removing the root ball from the dam, would not be acceptable.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	178	<p>Lower the water level in the pond by say, 0.5m max, and hence trim further height off the raised dam.</p> <p>As stated above, we absolutely agree that water levels should remain unchanged on all other ponds, due to the adverse effect on ecology and visual aspects. However, we suggest that the Boating pond is a special case. It is an artificial looking pond, of no significant ecological value. To construct the new dam, we believe that the pond may have to be completely drained with areas dredged for the new dam, and the two small reed beds and other planting will not survive. It is also proposed to cut back the west slopes significantly into the rising land, to win fill and create a more natural edge. Whilst this work is being carried out, it would be extremely simple to dredge the pond deeper and lower the water level permanently without reducing the surface area of the pond. We suggest this be limited to say 0.5m max. We accept that disposal of silt, particularly if contaminated, may be a problem, but significant quantities may have to be disposed anyway, even if the water level is not reduced. The design of the dam and west slopes can easily be adjusted for a lower water level. However, this could leave the untouched east and north edges higher above and slightly more remote from the water. We therefore suggest that the existing east and north perimeter path could be re-constructed to the same height above the lowered water level as now. Alternatively, these paths could remain as now, but a new stepped water’s edge could be formed advanced into the pond, broadly as on page 16, but with a walkway just above water level. Some marginal plants could be added if required to soften and conceal the walkway, but full access would still exist for model boats. We suggest that this could further ‘naturalise’ the pond attractively. A similar suggestion was also made at the Stakeholders workshop on 16 July 2013 [p45].</p>	<p>As mentioned above, it is unlikely that other stakeholders will make this exception. While it is technically feasible to increase storage capacity by lowering the overflow level, there would be stakeholders who would not like the visual impact of exposing 0.5m of the sheet piles for the whole perimeter, or the loss of access for model boaters.</p> <p>Dredging the pond is unlikely to be simple considering the quantities involved, the costs and the amount of plant movements. Currently the cost estimate only includes an allowance for 20% of the pond area to be dredged (to allow construction of the new bund), but increasing this to 100% would significantly increase costs. The issue of where to locate the removed silt is already associated with high risks and unknowns.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	179	The additional area of the pond, formed by excavating the west bank, may allow the raised dam to be trimmed further in height. We await calculations on this with interest [page 31]. However, we are very concerned at the possible visual impact of extending the pond width by up to 70m, which we understand may be mainly at the north end. This would double the width of the pond . We are also concerned at the proposed steepening of the west bank slopes from 1:13 to 1:5, which could look very artificial. We are also concerned at any tree loss that would be caused by this widening, please clarify.	<p>We have modelled a variation of one of the Highgate chain Options with the additional storage volume achieved from the excavations above water level, but it made very little difference to flood levels downstream (around 20 – 30mm). The primary reason for the widening is therefore to provide material without importing large quantities through residential areas.</p> <p>The current design for the west bank slope has a maximum slope of 1:8, where the existing slope is around 1:10.</p> <p>Tree loss due to the excavation will be avoided by working around the trees, leaving the group of lime trees as an island, and having the widest excavation at the area of open grassland towards the north west.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	180	<p>This major widening of the pond is not reflected in the plan-diagram on page 41. If this enlarged width is proposed mainly to win earth for the dam construction, rather than import earth, we strongly suggest that serious consideration be given to the option of digging deeper into the pond, rather than making it wider. Also, if suitable and unobtrusive locations can be found for borrow pits to obtain fill for the dam, these may possibly be backfilled with unsuitable soil and silt if ponds are de-silted, rather than transport off-site.</p> <p>In summary, we hope that these three measures will enable the apparent dam raising to be limited to approx. 1.5m, whilst still storing the same volume of water as Option 3. Because the footprint of the dam would be reduced, we hope that both mature willows at the west end just north of the ancient oak could then be retained. Please also advise if the large and the medium hornbeams at the west end of the causeway can be retained.</p> <p>We are concerned at suggested tree loss for the proposed spillway works on the downstream slope of the existing dam [p28/29]. It is essential that a detailed plan be provided showing tree loss. P29 states that a low earth bund would train the [water] flow away from the dam and therefore avoid the need to line[reinforce] a wider area or cut into the ground to form a spillway chute. Excellent! However, we therefore feel that there should be no need to touch any trees on this spillway route, and we contest that two London planes have to be felled to form this corridor for the lower spillway.</p>	<p>A visualization of the pond widening has since been presented on the 14th September workshop and will be included in the next report.</p> <p>Digging deeper into the pond is less viable because of the layer of silt in the pond, recently estimated to be up to 2.2m deep in places.</p> <p>The dredged silt will not be suitable for use in dam construction, and it would take some months to dry out material obtained from the hard bed below the silt. This material would need to be temporarily stored on site which could be unsightly. Dredging will also not provide any more floodwater storage capacity. The City of London are working with Atkins to identify borrow pit locations but suitable locations are limited.</p> <p>None of the hornbeams on the dam would be affected. Currently the only tree that has been identified for removal is a willow, which is north of the dam (between the upper and lower paths). Some discussion using maps and photos would be needed to confirm whether this willow is one of the two referred to.</p> <p>A detailed plan showing tree loss can be provided in the near future once all the new topographical survey information is combined with the tree survey information and the outline designs. This is likely to be during the outline design phase, programmed for October / early November.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	181	<p>Men's Swimming Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable, screened with marginal vegetation.</p> <p>We request a plan showing the layout of the proposed spillway, and then have a joint review on site. We are surprised at the large width [25m/43m]. However, if it is sited partly on the west bank, by the rangers' bothy, we believe that it could follow a natural slope over shallow ground down to the next pond and no reshaping of the ground would be needed. As this natural route completely avoids the dam toe, no reinforcement of the spillway is needed, except at the dam crest and spillway mitres. Also, no trees, bushes or fences need be removed on this route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway as proposed.</p>	<p>This preference has been noted and incorporated into the updated visualizations shown at the 14th September workshop. We are not yet able to issue detailed plans of spillways but may be able to discuss the outline sketches to be tabled at offline meetings.</p> <p>For information on spillway location please see the Preferred Options Report. The reinforcement of any slope would have minimal visual impact since whatever reinforcement material is used there will be turf and grass covering it.</p> <p>The proposed spillway level at this pond in Option 4 is 68.91mAOD. The ground levels between the dam and the path running NW – SE past the pond are up to 68.97mAOD so the natural ground is not as shallow as is required and would not be a natural route for water to flow down without some excavation of the area. Such an excavation would require tree loss which is opposed by the Mens Bathing Pond Association.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	182	<p>Highgate No 1 Pond – raise dam 0.5m</p> <p>We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable. We urge that this wall be hand constructed so that there is no tree loss on the crest or dam slopes which would expose West Hill Court and Brookfield Mansions from the Heath. As the wall is on the crest with a sloping upstream face, we urge that it be concealed with vegetation and shrubs on both sides.</p> <p>We are greatly surprised that the spillway is proposed to be 60m/74m long, and ask that calculations be provided to substantiate this extraordinary width. This spillway [p30] would be partly on the west end of the dam and partly along the natural ground to the west of the dam. At this position two large trees [including a very large horse chestnut adjacent to the path,] and a smaller lime and two alders would be felled. There is also a veteran oak adjacent, about which the report is silent [except for mention on page 33].</p> <p>We consider this tree loss to be unacceptable, and query if fewer trees would be lost if the raised dam is continued round the waters edge almost to the dog swimming area. The west bank from this point northwards would then form a 'natural' spillway which could flood across the path to the low lying area to the west, and then fill up before overflowing south through a natural depression broadly along the line of the existing footpath. As most of this natural route, which is further to the west than proposed in the report, would avoid the dam toe, then little or no reinforcing may be required. It may also slightly reduce any impact of the flood to Brookfield Mansions.</p> <p>We request a plan showing the layout of the proposed spillway with trees that would be lost, and a detailed level survey and plan of our alternative proposal above. There should then be a joint review on site. On these plans, please indicate the general direction this overtopping surface water will take after leaving the dam.</p> <p>Please clarify what is intended by - new spillway could be planted as a bioswale feature [p43]</p>	<p>This preference has been noted.</p> <p>No tree loss is anticipated along the dam crest due to constructing the raising walls in options 3 and 6.</p> <p>Some planting of bushes / shrubs is possible on the upstream face.</p> <p>The spillway width was tested in the hydraulic model so there are no calculations as such, although the inputs to the model (the hydrology used to calculate the inflows, and the dimensions used for the design spillway) are auditable.</p> <p>The spillway width and depth could be refined at the next design stage and there may be scope for reduction.</p> <p>The current spillway route avoids the veteran oak.</p> <p>The natural ground described in this proposal is higher than the spillway level (eg in Option 4) and would require excavation. While the ground appears to be lower at the path near the west end of the dam, it is close to the minimum existing ground level of the crest of the dam. A copy of the topographical survey can be sent to the H&HS to allow a review of these levels.</p> <p>The spillway location and tree loss plans will be made available at outline design stage (October). Topographical survey information on tree locations is expected soon and this will be combined with the tree survey to allow a more detailed assessment of tree loss.</p> <p>It is suggested that there would be planting at the pond and upstream face of the dam near the spillway out of Highgate No.1 Pond, in order to screen the feature. It may be possible to add some more planting into the spillway channel when it is sufficiently beyond the downstream toe of the dam, but this will depend on the specific alignment over / around the dam.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	183	<p>Environmental Management Options [p44/45]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p>	Discussions on site can be arranged.
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	184	<p>CONSIDERATION OF OPTIONS – HAMPSTEAD CHAIN</p> <p>(see particularly pages 11-12, 47-61)</p> <p>Key Principles and Selected Options</p> <p>In assessing these options, we have considered the following key principles:-</p> <ol style="list-style-type: none"> 1. To minimize tree loss on Hampstead No 2 pond 2. To attenuate/store more flood water than proposed in the report, provided that this would reduce the tree loss on Hampstead No 2. We particularly query if more storage is possible at the Catchpit, the Mixed pond, and at Hampstead No 2 3. To minimize the visual impact of the works at all ponds 	Slightly more storage may be achievable at the proposed Catchpit dam by raising the spillway level by around 50mm (the current overtopping depth), or more if the pipe through the dam is reduced again from 300mm to 250mm. The only way to store significantly more than this would be to have an automated valve or penstock system which would close the pipe going through the dam. However, the City of London prefer not to rely on any automated / mechanical systems. In terms of passive systems, a further refinement could be achieved with a hydrobrake, which is a vortex shape within the pipe (with no moving parts), that can maximise the storage. This could be investigated at outline or detailed design stage.

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	185	<p><u>Hampstead Chain – pond by pond review</u></p> <p><u>Spillways generally</u></p> <p>Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where 'natural' spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p>	<p>For information on spillway location please see the Preferred Options Report. Tree loss plans will be made available at outline design stage (October). Topographical survey information on tree locations is expected soon and this will be combined with the tree survey to allow a more detailed assessment of tree loss.</p> <p>The damage to trees during a flood is not so much of an issue as the damage to dam material or spillway that might be caused by a tree overturning during a flood, and this is the damage that would not be acceptable.</p> <p>Please also see answer to query 168.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	186	<p><u>Vale of Health Pond – crest restoration 0.2m max [or 0.6m?]</u></p> <p>It has been stated that this pond has never overflowed and is spring fed with a small catchment area. The irregular tarmac crest has not been noted as of any concern. We therefore query why crest restoration is needed, with possible impact on crest trees</p> <p>Please clarify if use of a pipe larger than 500mm would avoid the use of a spillway with consequent tree loss. We would prefer this</p> <p>Please clarify proposed spillway and pipe discharge routes re the large sequoia tree, and detail any tree loss.</p>	<p>The Vale of Health pond dam has been considered in the context of its place in a chain of ponds. If it were to fail, the stored volume released (estimated at 17,800m³ at crest level) would be too much for the downstream dams to store (even in the proposed design options), causing overtopping at the 3 downstream dams and the associated risk of erosion and further failure. The return period of overtopping is estimated at between a 1 in 100 and 1 in 1,000 years, and the risk of failure due to overtopping is therefore too high to be acceptable.</p> <p>While the proposed 3rd overflow pipe could not be larger than 500mm without increasing the raising of the dam crest, it is possible to model the effects of adding a 4th pipe in terms of a possible reduction of the open channel spillway size.</p> <p>For information on spillway location please see the Preferred Options Report.</p>
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	187	<p><u>Viaduct Pond – crest restoration 0.5m [or 0.18m?]</u></p> <p>Please clarify spillway route and tree loss</p>	<p>For information on spillway location please see the Preferred Options Report.</p> <p>The tree loss can't be confirmed until we combine the topographical survey information on tree locations with the tree survey.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	188	<p>Catchpit – suggest 5.8m dam</p> <p>We note that a 5.6m dam is proposed because the 7.2m dam reached a max water level only 160mm higher than with the 5.6m dam. Why not increase the proposed dam to 5.8m, in order to store the absolute maximum volume of flood? The Flowchart [p12] indicates the value of more storage, when one compares the 4.4m and 5.6m dams.</p> <p>We have considered the two positions suggested for the dam – a) a sinuous curve on the S side of the valley, or b) moving the dam c.25m back upstream. Before giving a view, it is essential that detailed plans of these options be provided, showing trees that would be lost. We would then like again to view these options on site, as option b) was not considered at the last site visit.</p> <p>We initially favour Option a), but only if it can be designed not to endanger the two hybrid black poplars and hornbeams. This option would hold more flood water than option b).</p> <p>If Option b) is constructed, we presume the oak that would be lost is just inside the Catchpit fence. However, it is essential that a mature oak at the top of the west slope near the Catchpit be retained, as this should significantly screen the new works from Pryors Field. Many willows on the Catchpit boundary on the east side may be lost, - there should be replacement planting on the dam toe.</p> <p>We note on p49 that an advantage of Option b) appears to be that the Catchpit infrastructure could be rebuilt and improved, with potential for creation of a wetland habitat upstream. If this is desirable, we suggest that it could be carried out irrespective of the position of the new dam</p> <p>Option b) on the north side will store less water than option a). Please re-calculate storage volumes, and indicate what adjustments should be made to this and other dam heights to compensate.</p> <p>As this dam is a 'dry' dam, we presume that shrubs and bushes can be planted on the slopes. Please confirm. If the slopes are in woodland, then we would want bushes for screening. If the slope faces grassland, then we wish to review on site</p>	<p>It is possible to increase the height of the dam to retain the extra 40mm which is the current modelled height of overtopping over the spillway.</p> <p>The possible dam positions will be redrawn on the finalised topographical survey and tree survey plan when this is available and a more detailed assessment of tree loss will then be possible.</p> <p>We will soon be able to confirm if a sinuous route avoiding these particular trees is possible. If not, the position of the dam further upstream (over the current location of the catchpit) will be modelled. However, it is not anticipated that the reduction in storage capacity will be significant, so the tree loss and quantities are likely to be the determining criteria when deciding on the exact dam location.</p> <p>Some replacement planting will be possible on the upstream toe of the dam, away from the central core.</p> <p>This point is noted, although there may be cost considerations if the catchpit is removed while being outside of a dam footprint.</p> <p>We will check the impact on storage volumes at outline design stage, although it is not thought that the impact of moving the dam upstream will be great.</p> <p>The Panel Engineer has advised that some planting is allowable on the lower part of the upstream slope of the dam, in the form of bushes and shrubs with gaps between to allow inspection of the surface condition. Both slopes would face woodland.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	189	<p>Mixed Bathing Pond Options K, I and M indicate that two plane trees may be lost on Hampstead 2 Pond dam. If this loss could be reduced to only one tree by increasing the flood storage at the Mixed Pond more than proposed, then we would support this option. This short dam is already an artificial looking causeway with steep descents onto it at both ends, and raising it significantly should be simple. However, the key issues to consider include:-</p> <ul style="list-style-type: none"> pedestrians on the causeway should still be able to view the water on this pond and Hampstead No 2 pond at the same time, which implies raising the crest road to enable one to look north over the crest of the new dam which would be built within the Mixed Pond, similarly to the proposed Boat Pond dam loss of the glimpse of water of the Mixed Pond when viewed from Hampstead No 2 Pond causeway. However, this glimpse will be lost if the dam is raised less than 1/2m, so a greater raising would not affect this aspect. The effect of the raised dam when viewed from the swimming enclosure, although we presume it could have some shrubs, and a wildflower seed mix. We note from the Flowchart [p12] that 1.5m raising is suggested without qualification, but a 2.0m raising is not preferred by some stakeholders. <p>Ultimately, the amount the dam is raised may be a balance between saving one plane trees on Hampstead No 2 and the feelings of the swimmers re a raised dam to the south. To make this decision, we need information on how more water storage at the Mixed Pond might influence loss of plane trees on No 2 dam.</p> <p>However, assuming the spillway is designed for PMF [as on the Highgate chain], then if the spillway is re-designed to discharge the 1:10,000 year flood only, with the surplus PMF water being allowed to overtop the crest, this might reduce the raising by approx 1m, being the height of the spillway. Please refer to our comments re the Boating Pond, clarify and confirm.</p> <p>If this option is selected, then the whole dam may have to be reinforced to take overtopping. This should be very simple, as the slopes are short, and the existing downstream slope is already uniform grass and has no trees along its critical length. Also, this dam is the second most robust dam on the Heath [after the Bird Sanctuary dam]. This option may therefore enable more water to be stored without further raising the dam</p> <p>Will the pond be dredged, as it is very shallow, particularly along the whole of the west bank?</p>	<p>In any configuration of a 2m raising, the causeway road surface would be raised, so that pedestrians will have a clear view of the ponds on both sides.</p> <p>This is noted.</p> <p>This appears to be the key issue for many stakeholders and we are looking at different designs for raising the dam 2m, eg with a 1m high wall above 1m of earth embankment above the existing causeway level. We are aiming to include some cross section sketches of these options in the next report.</p> <p>The options flow chart can be amended to state that 2 trees are expected to be lost at Hampstead No.2 in Option M, but 1 plane tree would be lost in Option P, the new option introduced at the 14th September workshop.</p> <p>There is scope to widen the proposed spillway at Mixed Bathing Pond, which may allow the upper raised crest either side to be lowered. However, the spillway crest level is currently only 300mm below the upper crest level, so the net reduction in the upper raised section could only be between 0 and 300mm.</p> <p>Agreed that most of the downstream slope could be reinforced, except for the two mature trees at the west end (on the dam itself) and the large veteran oak at the east end which would be affected.</p> <p>There are discussions about the possibility of dredging the upstream end. The pond is one of the highest priority ponds for de-silting.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	190	<p><u>Hampstead No 2 Pond</u></p> <p>1. Options K, I and M indicate that two plane trees may be lost on this dam. If this loss could be reduced to only one tree by increasing the flood storage at this pond, then we would support this option, but as a last resort only if necessary, after our other suggestions have been adopted.</p> <p>We note that Haycock proposed to raise the crest by 1.0m, and Colvin and Moggridge, Landscape Architects, suggested in Nov 2010 that one could replace the existing fence [posts 900mm high] with a buttressed wall 1m high. This will raise the level of the dam with minimum impact on tree roots. Access could be provided to the fishermen's path at the waters edge. This option might cause flood water to enter the lowest part of the gardens of some houses in South Hill Park, but if so, this would be briefly during exceptionally rare extreme flood events, and the houses should not be affected. This suggestion would require very careful landscaping so as not to be intrusive when viewed from the north. The path may have to be raised, and the wall may need to be screened with vegetation on the north side. In order to assess this option, please provide details on whether storage at this pond would be beneficial.</p> <p>2. We have considered the options of spillways versus culverts. Please provide details of your investigation of the possibility of splitting up the spillways to run between the trees. However, we initially favour culverts, to be sited as far west as possible.</p> <p>3. Your View Point 3 [page 52] shows two trees would be lost. If the tree on the east is removed, then the Royal Free Hospital will become visible through the gap when viewed from the west end of the Mixed Pond causeway, much further west than View Point 4 which is from the east end of the causeway. However, if only the tree on the west is removed, then the hospital will not be visible as the gap will be screened by trees overhanging the west bank of Hampstead No 2 pond. We therefore urge that only the west tree be removed.</p> <p>4. We therefore query if the wide but shallow box culvert could be constructed with a taper in plan to form a narrow waist but deeper section as it passes between the trees so that only the west tree need be removed.</p> <p>5. We also hope that more storage at the Catchpit, Mixed Pond and Hampstead No 2 pond, when combined, might result in the reduction of the number of 3m wide culvert to two, which presumably will have a width of 6.5m. If so, we suggest that only one plane need be lost, as they are at 8m centres</p> <p>6. If two trees will still be lost with shallow culverts, we query if a letterbox drop culvert, with a low level thrust bored or tunnelled culvert could be constructed below the tree roots, to save one or both of the trees proposed for felling with shallow culverts</p> <p>7. We note suggestion for an island [p58]. We would like to meet on site to discuss details and particularly the size of any proposals</p>	<p>A new option, Option P, has been introduced to investigate whether a small amount of raising at Hampstead No.2 can reduce the width of the box culvert spillway in order to reduce the plane tree loss down to 1 (when combined with a 2m raising at Mixed Bathing Pond). The dam crest could be raised by 0.5m by a short wall situated above the sheet piles on the upstream face. The top of this wall is below the highest part of the dam at the eastern abutment, but we will check that the threshold levels of the houses to the east are not below this level.</p> <p>The modelling of the option indicated that the PMF peak water levels were below the raised crest wall level, so this option is now on the shortlist.</p> <p>Option P has been presented at the 14th September workshop and will be described further in the next report.</p> <p>The open channel spillways were modelled extensively, but they were either too wide (if trees are cleared) or would spread the risk of damage to more trees even if none are felled, by overloading the structural roots with soil or reinforcement materials. Agreed that the ideal location of the culvert spillway would be at the west end of the dam.</p> <p>Agreed that if 1 tree should be removed then the western tree would be the better one.</p> <p>The narrowest point in the culvert would constrain the flow so would cause water to back up more upstream in the pond. At outline design stage we will look at more ways to reduce the culvert width, including the maximizing of storage at Catchpit dam as described above.</p> <p>This scenario has been modelled as the new Option P, which has been found to work with a 5m wide x 400mm high box culvert.</p> <p>The Panel Engineer has expressed concerns that a thrust bored culvert could cause damage to the dam by creating preferential flow paths around the outside of the tunnel. The dam crest level is around 500mm above typical water level so any pipe would be small and would have to drop very sharply to get below the tree roots.</p> <p>A site meeting can be arranged.</p>

Source	Query Number	Query	Design Team Response
Jeremy Wright, H&HS on Shortlist Options Report 24 Aug 2013	191	<p>Hampstead No 1 Pond</p> <p>We presume the outflow will be sited at the extreme east end of the dam. If so, then this should be concealed from the footpath on the south by the belt of trees and shrubs at the dam toe, which widens out at the east end. We would therefore prefer a spillway which should be less intrusive when viewed from upstream. However, we suggest that this should be made as narrow as possible, and query if the side slopes could be made steeper, as access to the crest is private</p> <p>We note suggestion for an island [p59]. We would like to meet on site to discuss details and particularly the size of any proposals.</p> <p>Environmental Management Options [p60/61]</p> <p>We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. It is essential that every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p>	<p>This is correct. The preferred option at Hampstead No.1 pond is a narrow box culvert which we believe could be screened by locating it at the east end of the dam.</p> <p>A site meeting with our environmental and dam engineers can be arranged.</p>
Michael Hammerson, Highgate Society on Shortlist Options Report 26 Aug 2013	192	<p>Western "roadway". The pathway/road along the western side of the boating pond is one of the Heath's major thoroughfares, for people and Heath vehicles. It is far from clear how it will be reconfigured and what will be its subsequent relationship with any new edge to the pond. Drawings are required.</p>	<p>Visualisations were presented at the Stakeholder Workshop on the 14th September for consideration.</p>

Source	Query Number	Query	Design Team Response
Marc Hutchinson, Highgate Men's Pond Association on Shortlist Options Report 27 Aug 2013	193	We have assumed – but ask for this to be confirmed – that this raised path will not go up and over or around the crescent-shaped westward continuation of the raised BP dam.	Re-routed path routes have not yet been confirmed and can be discussed as part of the ongoing non-statutory consultation.
	194	Men's Bathing Pond 1. Is the proposed spillway on the dam of the MP to be a hard spillway on which trees cannot grow?	The spillway will not be a hard surface but lined with topsoil and grass. Some planting can be considered for the parts of the spillway which are beyond the downstream toe of the dams, but trees will not be planted on spillways generally.
	195	2. Is it the case that a broader spillway on the Men's Pond would result in a lesser raised dam on the Men's Pond while retaining the existing trees?	No, it is the other way round. The lesser the raising, the wider the spillway would have to be, because increasing storage capacity reduces the outflow to be routed through a spillway and so the spillway can be reduced.
	196	We would like to see a plan and picture showing the returns on the east and west of the MP dam as well as the full "brick" wall. Why is brick chosen? To conceal concrete?	The details of the returns of the raising wall on the Men's Pond dam will be developed in the outline design phase. The cladding of the wall would be to conceal a concrete core, but can be any material eg timber, subject to agreement with the City of London and stakeholders.
	197	On page 29 of the Report there is a reference to the dam slope needing to be 1:12. We do not understand the need for this in the absence of an accessible path to the top of the dam.	The 1:12 slope would be for the side slopes of the spillway along the crest line of the dam. There is a path on the crest, but not a formalised one, so it may be possible to justify a steeper slope.
	198	Will it be necessary to close the MP facility in order to construct the proposed spillway and/or raise the MP dam? If so, why?	The proposed works to the dam at the Men's Pond would not require lowering of the water level, so it may be possible to keep part or all of the pond open during works, but this will be confirmed once construction phasing is planned by the appointed constructors.
	199	Regardless of the actual works at the MP, is it intended, in any circumstances, to use the MP facility as an engineering compound for the storage of plant or material?	This has not been planned, with other locations elsewhere on the Heath being considered for site compounds.
	200	We still consider that insufficient thought has been given to the construction of a side channel which, making the best use of the natural contours of the Heath, would carry the excess water down the side of No. 1 and No. 2 Ponds rather than through them. The channels could be where the existing north/south paths are (and these could remain in use as paths) and creation of the channels would not involve the felling of trees. We anticipate they might be approximately 60 metres wide but would not need to be excavated as channels. Rather a reinforced bund could be constructed on the pond side of the channel with the natural slope of Parliament Hill providing the "bund" on the east side. Drains on either side of the path could deal with mild flooding. The reinforced bund would prevent the water in the channel from flowing over and into the pond.	The proposal of a dry diversion channel and reinforced bund has been considered in detail in the Preferred Options Report.
Rob Mitchell, EGOVRA and Brookfield on Shortlist Options Report 27 Aug 2013	201	The Report specifies that "Less severe floods have also been used to assess the system response to ensure that the options for passing the PMF do not exacerbate the flows downstream during lesser floods." We would like to see the results of this work as it may go some way to satisfy us that these options do not result in worse floods arising in lower return periods than at present. Intuitively the increased storage in the pond system should reduce the potential of flooding, however, the design team have not been able to confirm this for us.	The standard of protection would be increased on Highgate Chain to at least a 1:1,000 year flood event (both preferred options). Options for the Hampstead Chain either maintain the standard of protection at minimum 1:1,000 year event (Option M) or increase it to at least 1:10,000 year (Option P).

Source	Query Number	Query	Design Team Response
Fitzroy Park RA	202	Actual data for expected attenuation down the chain, presented as %age of PMF, and other 1:1000 or 1:5000 year floods, is critical in justifying these significant works.	Hydrographs for Highgate No.1 Pond have been included in the Preferred Options Report to illustrate this attenuation. These hydrographs show the difference between the existing peak outflows from the last pond and the outflows from the last pond spillway in one of the preferred options (Option 4). This option would achieve a reduction in outflows in a 1:10,000 year flood and a PMF flood. All of the floodwater in a 1:1,000 year flood is attenuated (or stored) within the pond system in Options 4 and 6, so the spillway would not operate. The 1:5,000 year flood has not been calculated. Information on the reduction in volumes being discharged from the last pond (in the 1:10,000 year and PMF events) will follow separately.
Prem Holdaway	203	Nowhere is the current outflow of both number one ponds quoted. Each pond needs to be quoted individually.	The capacity of the existing 0.46m diameter overflow pipe at Highgate No.1 Pond has been calculated at 0.9m ³ /s. The outflow in the existing scenario peaks at over 17m ³ /s (in a 1:10,000 year event) and 38m ³ /s in a PMF event, which means that the overflow pipe would be insufficient and floodwater would be back up and flow over the dam. At Hampstead No.1 Pond, the capacity of the existing 0.31m diameter overflow pipe at Hampstead No.1 Pond is 0.48m ³ /s. The PMF event outflow is around 8m ³ /s which again means that the dam would be overtopped.
	204	Nowhere is the maximum outflow of both number one ponds quoted. Again each pond needs to be quoted individually. All options so far seem to be only designed for storing water.	The above overflow capacities are effectively the maximum outflow of the No.1 Ponds. Temporary additional water storage is required to cope with the design flood. The proposals also include crest restoration, new spillways etc. If the additional storage was not included additional engineering works would be required at all ponds in the chain. Without adding storage capacity to some ponds in the chain, the spillways would have to be much larger and would require removal of many more trees.
	205	What happens if there is another 1 in 10,000 year storm, the day after. Where is that water going to go?	The spillways in the preferred options would be overtopped if a second large flood occurred, since the floodwater stored during the first flood would take some days to drain away into the sewer system. However, in the existing scenario, more water would overtop the dams in both the first and second flood.
	206	What are the options for designing the outflow of each pond to its eventual target. The River Thames. So that no additional water is stored.	This option would involve many very large diameter pipes running through central London so it unlikely to be feasible.
David Lewis, Protect Our Ponds on Shortlist Options Report 19 Aug 2013	207	Water Quality Is this water quality standard compulsory? Is it possible to obtain an exemption?	EU bathing directives are compulsory if bathing ponds are to be used as such.

Source	Query Number	Query	Design Team Response
Ken Blyth on Shortlist Options Report 27 Aug 2013	208	I am puzzled by the statement in the section of the Summary about Assessment of Design Flood that, although the data from the Hampstead Scientific Society “provided a useful record of rainfall over about 100 years....it is not suitable to provide design rainfall depths for the 1 in 1000 period events up to the PMF needed for this study i.e. up to the 10,000 year flood, as this would involve significant extrapolation beyond the useful range of the rainfall data”. This does not make clear why the Hampstead data are considered useless for statistical purposes, nor what data extending over <u>more</u> than 100 years have in fact been used. It is not clear either why data from other parts of England (or elsewhere in the UK - and Europe) are thought relevant to Hampstead Heath. The report blinds by mathematical formulae and does not say enough about the data that are fed into them.	<p>See methodology in Problem Definition Report.</p> <p>The statement points to the fact that statistically, the HHSS rainfall record is too short to give a reliable estimate of large rainfall events on its own. The FEH DDF curves are available for the UK which allows for statistically reliable estimates of rainfall for large events as it is based on data from more than one rain gauge. Hampstead Heath Scientific Society rainfall gauge is listed as one of the rain gauges used in the FEH DDF rainfall model (HHSS data from 1933-1995 is used). The DDF curves we used, are therefore likely to incorporate HHSS rainfall observations, complemented by other rain gauges to provide a more statistically reliable estimate of rainfall. With regard to data used in the analysis, the FEH manuals, CDs and reports set out all data used and all underlying methodologies applied, in a very transparent manner. The reader is referred to the FEH manuals for further information.</p> <p>Our assessment has applied the Defra, Flood and reservoir safety Revised guidance for panel engineers to calculate the hydrological inflows to the Hampstead Heath ponds. This includes the Flood Studies Report (FSR) and Flood Estimation Handbook (FEH) methodologies for deriving flood event rainfall hyetographs and flow hydrographs. The FSR and FEH manuals set out the data used in both developing and applying the methodologies.</p>

Source	Query Number	Query	Design Team Response
West Hill Court RA on Shortlist Options Report 27 Aug 2013	209	We would like to know whether there has been a study of previous flooding in the area? We appreciate that this will not help predict the future, but it may inform solutions. We understand, for instance that inadequate drainage at lower levels was an important factor in the 1975 floods.	<p>Previous studies used in the Atkins work:</p> <ul style="list-style-type: none"> Hydrological and Water Quality Investigation and Modelling of the Hampstead Heath Lake Chains and Associated Catchments, Haycock Associates Limited, 2006; Hydrology Improvements Detailed Evaluation Process (HiDEP): Hydrology and Structure Hydraulics, Haycock Associates Limited, 2010; Hampstead Heath Dam 3D Topographic Survey, Plowman Craven, 2010; Haycock Hampstead Heath Stella model, 2010; and Hampstead Heath Reservoirs On-Site Emergency Response Plan for Reservoir Dam Incidents. City of London, November 2012. <p>We have not modelled previous flood events on the Heath as part of our study as, there is very little calibration data for previous other than whether dams overtopped or not. Also, the focus of our work was on deriving events of different return periods to assess the overtopping risk of the dams under these types of events. We have undertaken a review of other studies which have investigated previous flood events.</p>
	210	We are also concerned that there may not be adequate collaboration between the agencies responsible for flood issues. Could it be that stronger joint work between The City of London, Thames Water and Camden Council might enable a modification of the works?	<p>Thames Water are not responsible for the safety of the dams or for the water normally stored in the dams that could be breached. Their sewer systems are only designed for small flood events up to around a 1:75 year return period event. Standard guidance on dam safety requires that dams can safely pass floodwater from a PMF, with spillways able to pass the floodwater from a 1:10,000 year event, so the existing sewer system cannot accommodate these kinds of floods. There is no opportunity to provide sufficient storage of the excess floodwater downstream of the ponds in Camden.</p>
		The City's intention appears to be simply to increase the height of the dams so far that much more water is stored and there is less risk of overspill. Our residents have raised a number of questions in this respect:	
	211	1. How much is 'high enough'?	1. Storage capacity has been added to some of the dams until the design flood (the PMF) is safely passed without overtopping the dam crest as this could cause dam failure.
	212	2. What is a 'safe volume' of water to store?	2. A safe volume would be the amount that leaves a small enough excess floodwater that can be passed through the spillway.
	213	3. Is it not the case that increasing the height of the dam means that if the dam did breach, the volume of water released would be larger and cause more damage?	3. By improving the safety of the dams with adequate spillways and extra storage capacity, the possibility of the dams breaching is much reduced. Ground investigation early next year will provide information to allow the analysis of the stability of dams when loaded with higher water levels. Any issues will be remedied in the detailed design of the safety works.
	214	4. Given that nobody could guarantee the rainfall in a 1 in 10,000 disaster, should not the priority be to manage the water that would, or does, spill over? In some other areas we gather that there are now 'sumps', dedicated wetlands or flood plains to absorb extra water in exactly the way that people in the past managed variations in weather. There is some recognition of this in the report with the use of spillways etc - could not more use of these systems be made on the Heath? Creating more wetlands has improved the situation in many areas of Sussex, protected houses, crops and livestock from serious flooding and had the added bonus of improving the range of wildlife and plants in the areas affected.	4. The principles that decide which aspect is the highest priority are constrained by law and standard industry guidance (see the problem definition section in the Shortlist Options report). In the 1:10,000 year event, it is estimated that around 107,000m ³ of excess floodwater will overtop the dam at Highgate No. Pond in the first 14 hours. This is too much volume to be stored in the Dukes Field area of the Heath, as it would require a new reservoir with twice the capacity of Highgate No.1 Pond. It is therefore more feasible to design the existing dam to pass water safely without collapse. Overtopping could still occur but will not result in dam failure.

Source	Query Number	Query	Design Team Response																																												
Harriet King at PPSG meeting 30/09/13	215	Requested a contour map of the Highgate No. 1 area.	This can be provided separately.																																												
Jeremy Wright at PPSG meeting 30/09/13	216	Requested cross sections of the proposals at Mixed Bathing Pond.	Indicative cross sections of the options for raising Mixed Bathing Pond are given in the Preferred Option report.																																												
Harriet King at PPSG meeting 30/09/13	217	Requested more visuals of the Highgate No. 1 pond area – showing what wall would look like.	A new visual of the view on the spillway and raising wall looking north from downstream is given in the Preferred Option report.																																												
Geoff Goss at PPSG meeting 30/09/13	218	Cross sections of Model Boating Pond and Men’s Bathing pond dam	Cross sections of the raising dam at Model Boating Pond (for Options 4 and 6) are given in the Preferred Option report.																																												
Prem Holdaway at PPSG meeting 30/09/13		Requested the diameter of pipes on both Highgate No.1 and Hampstead No. 1, plus length and angle.	See above response to similar query by Mr Holdaway. Length and angle are not as critical as the diameter of the existing overflow pipes, which are inadequate for dealing with the larger flood events which must be considered.																																												
Harriet King Via email 2 October 2013	219	Please confirm the sizes of all historical events (for which data is available) over the last 100 years.	We have extracted the 10 largest recorded rainfall events from the HHSS record and estimated return period of rainfall, based on the 24-hour DDF rainfall curves derived for the Heath. Please notes that, because the rainfall record is daily, we do not know the exact duration of the event. Hence the return period would be different when the correct storm duration is taken into consideration. The results in the table are therefore rough estimates only. The one event that we do know the duration of is the 1975 event which was 2 hours 35 mins. in duration (highlighted in red). This return period of this event was recently re-estimated by CEH and found to be 19,000 years.																																												
			<table><tr><th>Year</th><th>Date</th><th>24-hour observed rainfall (mm)</th><th>Estimated Ref. Period (based on PDF rainfall)</th></tr><tr><td>2009</td><td>15-Sep-09</td><td>53.2</td><td>5-10 years</td></tr><tr><td>2008</td><td>31-Aug-08</td><td>35.2</td><td>< 5 years</td></tr><tr><td>2002</td><td>07-Aug-02</td><td>71.5</td><td>10-20 years</td></tr><tr><td>2001</td><td>29-Oct-00</td><td>47</td><td>< 5 years</td></tr><tr><td>2000</td><td>15-Sep-00</td><td>42.2</td><td>< 5 years</td></tr><tr><td>1994</td><td>10-Aug-94</td><td>45.2</td><td>< 5 years</td></tr><tr><td>1992</td><td>22-Sep-92</td><td>60.3</td><td>10 years</td></tr><tr><td>1988</td><td>09-Oct-87</td><td>48.8</td><td>approx 5 years</td></tr><tr><td>1977</td><td>16-Aug-77</td><td>79.6</td><td>20-50 years</td></tr><tr><td>1975</td><td>14-Aug-75</td><td>170.8</td><td>500-1000 years</td></tr></table>	Year	Date	24-hour observed rainfall (mm)	Estimated Ref. Period (based on PDF rainfall)	2009	15-Sep-09	53.2	5-10 years	2008	31-Aug-08	35.2	< 5 years	2002	07-Aug-02	71.5	10-20 years	2001	29-Oct-00	47	< 5 years	2000	15-Sep-00	42.2	< 5 years	1994	10-Aug-94	45.2	< 5 years	1992	22-Sep-92	60.3	10 years	1988	09-Oct-87	48.8	approx 5 years	1977	16-Aug-77	79.6	20-50 years	1975	14-Aug-75	170.8	500-1000 years
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Harriet King Via email 2 October 2013	220	The scour pipe has historically been used to prevent the flooding of Brookfield and immediate neighbourhood. The effect of the scour pipe in carrying excess water to the drainage system should be included in your assessment of the existing situation. Please give us the data on the discharge rate of the scour pipe (CoL agreed to this on 30/9/13).	It is City of London’s policy not to use the scour pipe at Highgate No.1 Pond since permission is required from Thames Water. While it has been used in the past, this was not authorized. The capacity of the 350mm diameter scour pipe is likely to be less than 1m³/s and so it will take many hours more to empty this pipe into the sewer system (if this was theoretically allowed) than the time to peak of the flood from a 1:10,000 year storm event (around 3 hours).																																												

Source	Query Number	Query	Design Team Response
Harriet King Via email 2 October 2013	221	Please give us the data on the discharge rate of the scour pipe	See above (response to query 220). The scour pipe will not have the capacity to deal with the 17m³/s inflow expected at Highgate No.1 Pond in a 1:10,000 year event.
Harriet King Via email 2 October 2013	222	Please confirm the peak discharge in the overflow pipe (Atkins' figures show 0.53m³/sec) and how this figure is derived- ie what formula has been used and what coefficient of discharge. As this data is vital, it should be confirmed with a field measurement.	<p>We understand this refers to the Highgate 1 overflow pipe which leads into the sewer system.</p> <p>We assumed in our model, that the <i>[scour outlet]</i> pipe will not be available (i.e. no one to open <i>[the valve]</i>, or sewer capacity exceeded and pipe cannot discharge).</p> <p>The pipe we have modelled is the small overflow pipe. Discharge through the pipes was calculated using information on the length and diameter of pipes.</p> <p>Volume of water that can flow through <i>both pipes</i> is very small compared with the inflows in the PMF event. <i>[Note 18th Oct – clarifications made above].</i></p>
Harriet King Via email 2 October 2013	223	Outflows from HG1 assume all characteristics of the higher ponds are modelled correctly, can this be achieved without extensive field monitoring?	Our assessment has applied the Defra, Flood and reservoir safety Revised guidance for panel engineers to calculate the hydrological inflows to the Hampstead Heath ponds. This includes the Flood Studies Report (FSR) and Flood Estimation Handbook (FEH) methodologies for deriving flood event rainfall hyetographs and flow hydrographs. The FSR and FEH manuals set out the data used in both developing and applying the methodologies.
Harriet King Via email 2 October 2013	224	What is meant by 'first point of connection with another drain'? Where are these connection points?	The overflow pipe discharges into surface water drainage system close to the Highgate No.1 Pond.
	225	How do CoL co operate with TWA?	See above response (to query 210) to similar query from West Hill Court RA on Shortlist Options Report, dated 27 Aug 2013.
	226	Has CoL considered increasing the size of the overflow pipe from HG1 to increase its capacity and to compensate for the possible loss of use of the scour pipe?	The capacities of even a large number of larger pipes would be unlikely to deal with the large excess floodwater volumes for which the dams must be made safe according to the ICE guidelines.
Harriet King Via email 2 October 2013	227	Some form of sluice which would allow the discharge of water to be triggered by a rise in water level of 450mm above TWL of HG1 (300mm below the proposed spillway) would be a straightforward solution to allowing the scour pipe to discharge water before the spillway is overtopped. This option must be considered rather than uncontrolled delivery of water to downstream areas.	The City of London are seeking to avoid mechanical systems which have the risk of breaking down and would be difficult to access during flood events.
Harriet King Via email 2 October 2013	228	At what size event does water leave the Highgate chain in an uncontrolled way ie over the spillway as surface water?	In both Options 4 and 6, the spillway would be operated in a flood of return period between 1:1,000 and 1:10,000 years. In comparison, any flood event larger than a 1:100 year event would cause overtopping of the existing dam at Highgate No.1 Pond.
Harriet King Via email 2 October 2013	229	Please provide a detailed plan of the area showing contours at 0.2m intervals of the area to the S, W and E of HG1. This must show local changes in level. Intelligent conventional surveying can be used to obtain reliable results rather than the remote sensing techniques proposed.	A plan showing 1m contours can be provided separately. While it is true that LiDAR data (obtained from aircraft) is not as accurate as conventional topographical surveying, comparisons of the LiDAR level data with the results of topographical surveying has shown a close match. Further topographical surveying of the area around Highgate No.1 Pond is being carried out and will inform the outline and detailed design stages.

Source	Query Number	Query	Design Team Response
Harriet King Via email 2 October 2013	230	<p>The ground to the north of the dog access to the pond does not rise immediately, please place posts showing proposed level of the western edge of the pond which must (obviously) be at least as high as the proposed wall on the dam. The fence at present is largely below the dam crest, please confirm the location of the proposed new wall (dimensioned, on a plan).</p> <p>How thick will the wall be?</p>	<p>Placing posts along this publicly accessible area at 300mm height might be quite difficult; the posts in the water at the Model Boating Pond are not accessible to the public nor do they present a trip hazard.</p> <p>The proposed level of the spillway at Highgate No.1 Pond where it crosses the path near the dog access will only be up to 300mm above the existing ground levels. The proposed wall to raise the dam would start on the crest beyond the locked gate on the fence across the dam crest.</p> <p>The thickness of the wall would depend on nature of the cladding which is to be discussed with stakeholders. The concrete core would be between 250 and 300mm thick.</p>
Harriet King Via email 2 October 2013	231	Please provide updated figures for table 5.7 of the DFA for the 2 proposed options for 1:100; 1:1,000; 1:5,000 and 1:10,000 events, together with the forecast flood volumes.	<p>This table has not been updated with proposed options and would need to be instructed separately by CoL if required.</p> <p>Please note that storage volumes would be increased in all options and therefore all options would benefit people downstream in all sizes of flood’.</p> <p>Note a 1:5,000 year flood event has not been calculated.</p>
Harriet King Via email 2 October 2013	232	The TWA map (which we have had before) does not show diameters, capacities, chambers or connections. Please provide these.	<p>Details of all of these have not been made available yet. However, we know that the sewer systems are only designed for small flood events up to around a 1:75 year return period event. Standard guidance on dam safety requires that dams can safely pass floodwater from a PMF, with spillways able to pass the floodwater from a 1:10,000 year event, so the existing sewer system cannot accommodate these kinds of floods.</p>
Harriet King Via email 2 October 2013	233	<p>The storm water sewer is capable of taking controlled discharge of water from the Highgate chain and should be taken into account in assessing the outflow capacity of existing drains beyond HG1.</p> <p>A map showing drains, culverts and streams on Col’s land should also be provided, including the stream/ culvert blocked by works to the secret garden and park keeper’s house (historically, these took flood water to lower ponds further down Highgate Road).</p> <p>Please provide a section at 1:50 through the proposed wall and foundation on the dam of HG1 and a section parallel to this through the proposed spillway. Please indicate TWL and the level of the existing overflow.</p>	<p>See above responses (to query 232) relating to the inadequate capacity of existing pipes / drains, in the context of the design flood for dam safety standards.</p> <p>See above response (to query 232) relating to the inadequate capacity of existing pipes / drains.</p> <p>Outline designs showing this kind of information will be made available during the non-statutory public consultation.</p>
Harriet King Via email 2 October 2013	234	<p>What is the actual capacity of existing drains rather than typical capacity? Has this been modelled?</p> <p>Please confirm the capacity of TWA’s new storm water relief sewers (70 years was quoted at the meeting on 30/9/13). If these had been in place for historic events eg 1975, what effect would they have had?</p>	<p>See above response (to query 232) relating to the inadequate capacity of existing pipes / drains.</p> <p>See above response (to query 232) relating to the inadequate capacity of existing pipes / drains.</p>
Harriet King Via email 2 October 2013	235	Please examine this using real historical data or generated realistic data for lesser floods to establish characteristics of when the water will come down the spillway at HG1.	<p>You have stated (query 234) that the capacity of the sewer system is 1 in 70 years, however the capacity of the overflow pipe is much smaller. Flood water is therefore restricted by the overflow pipe, rather than the sewer capacity. It should be noted that examination of the capacity of the sewer is beyond the scope of our work.</p>

Source	Query Number	Query	Design Team Response
Harriet King Via email 2 October 2013	236	We understand that the Environment Agency usually expects most of the water resulting from a flood to be stored in that locality and released slowly afterwards. The intention is to protect life and property downstream from flooding. Whether or not the Ponds fall within this definition, the principle should apply.	As the Environment Agency is the Enforcement Authority for the 1975 Reservoir Act, and the streams are not classed as 'main' rivers, their only interest in this project is in seeing that works to ensure dam safety are carried out. In the proposed options, floodwater will be stored as much as possible. By adding storage capacity, more floodwater will be released slowly after floods into the sewer system via the existing overflow pipes, instead of overtopping the dams.
	237	Please confirm that CoL is keeping the EA informed of the proposals	In terms of the Reservoirs Act the only role that the EA perform is as an enforcement authority.
Harriet King Via email 2 October 2013	238	Can you clarify why the scour pipe [at Highgate No.1 Pond] (457m diameter, 6m head of water) has a discharge capacity of 0.01m ³ /s whereas the overflow pipe (310mm diameter, head of water very much less- I'm not sure what this is), has a discharge capacity of 0.53m ³ /s ie >50 times as large? This doesn't make sense to me.	The figure of 0.01m ³ /s for the scour outlet pipe at Highgate No.1 Pond was quoted in the Emergency Response Plan. A more likely capacity would be in the region of 0.5 – 1.0 m ³ /s. However, this still means that a) the pipe would not cope with the very large inflows expected in the design flood (the PMF), and b) it would probably take too long to drain the pond using this outlet considering the likely warning time available from the beginning of an extreme storm event. The discharge capacity of the outlet pipe will be calculated and the result of this calculation will be confirmed in the near future. However, the result is not expected to change the position on the usefulness of the scour pipe in flood events.
Harriet King Via email 10 October 2013	239	1. TWL describes Top Water Level in the DFA but is now used to describe Typical Water Level. Are these the same?	1. Typical Water Level and Top Water Level are the same, both relate to the invert level of the overflow at a pond (or the proposed spillway).
	240	2. From the DFA I understand that the cumulative % of pmf inflow that can be stored in the Highgate chain is 56%, can you tell me what the relevant figures are for the 2 preferred options for the Highgate chain (and where I can find this)? I'm sure this is somewhere in the information you've sent us but at present I can't find it.	2. The figure of 56% was only the percentage of PMF inflow from the sub-catchment and direct rainfall at Highgate No.1 Pond stored in the pond, ie it did not include the inflows from spilling from the upstream ponds. The equivalent percentage has not been calculated for the current preferred options (4 and 6). However, we have calculated the total increase in storage across the Highgate chain in Option 4 (including the 2.0m raising at Model Boating Pond), this increase is 133,300m ³ . (A similar but larger increase would be achieved by the proposed works in Option 6). This increase in storage in the chain explains why the peak water level in Highgate No.1 Pond is lower than in the existing scenario in all flood events in both options 4 and 6, so that the standard of protection is increased by both options.

Source	Query Number	Query	Design Team Response
Dr Geoff Goss & other PPSG members, Preferred Options Workshop, 14th September 2013	241	Has the 1975 flood been run through the model in order to test and calibrate it?	<div><div>-</div><div>The 1975 return period flood has not been used to test the model because apart from the fact that the dams were all overtopped, there is not much data that could allow an accurate comparison of model results. In particular, the depths of water overtopping the dams were not recorded.</div><div>-</div><div>The 1975 return period flood was examined along with other historical events such as the storms of 1970 and 2010, and their return periods were estimated using depth duration frequency (DDF) curves provided by the Institute of Hydrology for the local area. (See response to query 219 about historical data for the full table of events). The 1975 event was estimated as either a 1 in 500 - 1000 year event, (using the FEH DDF curve), or a 1 in 19,000 year event, (using the FSR DDF curve). The FSR DDF curve is considered to be a more appropriate DDF curve for deriving the return period of the 1975 event given its extreme nature. The calculated 1:10,000 year flood in the hydraulic model causes the overtopping of all the dams in both chains, so if a 1:19,000 year flood was to be calculated and run through in the model, it would lead to overtopping of all the dams again. Similarly, the calculated 1:1,000 year flood causes overtopping of all the dams on the Highgate chain in the model, with a 1:100 year flood just overtopping Highgate No.1 Pond by a few mm, so if a 1:500 year flood was calculated and ran through the model it would also cause overtopping. The estimations of the return periods of the 1975 flood data therefore validate the model, in that the model predicts overtopping of all dams for anything bigger than a 1 in 100 year flood. Any further runs of return periods such as 1:500 or 1:19,000 years would therefore not produce any useful results or increased precision in the model.</div></div>

Source	Query Number	Query	Design Team Response
Susan Rose Email 14th October 2013	242	RE: Preferred Options Report I am confused by these documents; I have asked at least once if not more often for calculations re the difference in capacity between the boat pond as it exists and the boat pond as extended but with raised dame inside the existing dam but can find no record of this in either document.	<p>The existing flood storage capacity of Model Boating Pond is 4,379m³, if the volume stored is taken as the space between the top water level (the invert level of the existing overflow pipe) and the auxiliary spillway level (the lowered ground on the west bank). (This value was originally quoted in table 5-7 of the Design Flood Assessment Report.)</p> <p>The actual storage may be slightly higher than this since the path west of the dam is slightly higher than the spillway level. If this value is used, the existing capacity is 8,717m³.</p> <p>However, the capacity of the pond in Option 4 is increased to at least 56,585m³ by raising the dam by 2.0m. This is an increase in capacity of 52,122m³ (between the existing spillway level and the proposed raised dam crest level). Also, since the Bird Sanctuary Pond would be submerged in a flood event with the raised bank in place in Model Boating Pond, a further 15,007m³ above the Bird Sanctuary Pond would be added, so in effect the total extra capacity of the combined ponds is at least 67,129m³.</p> <p>While we have not yet calculated the increase in storage at the two ponds in the other preferred option, Option 6 (with 2.5m raising at Model BP), it would be a value between 67,129m³ and the 106,000m³ previously calculated as the extra storage in Option 3 (the option with 3.0m raising that has since been discounted).</p> <p>The total increase in storage across the whole of the Highgate Chain in Option 4 is 133,317m³.</p>
Harriet King telecon with Ben Jones of Atkins, 18/10/2013	243	<ol style="list-style-type: none"> 1) What is the level of the top of the proposed raising wall at Highgate No.1 Pond (HG1) in Options 4 and 6? 2) What is of the level of the proposed spillway depth in Options 4 and 6 at HG1. 3) Is a 'spillway weir' the same as a spillway? 4) What is the PMF volume? 5) How would the spillway be lined where it is in natural ground on the west bank? 	<ol style="list-style-type: none"> 1) 65.02mAOD (1.25m above the minimum dam crest level). 2) The spillway weir level would be 570mm below the top of the proposed raising wall, not 670mm as it says in the Preferred Options report text, this was a typo error. 3) The weir is just the flat base section of the spillway, at the top. 4) PMF volume TBC. 5) The section of spillway on the natural ground would be lined with a shallow turf reinforcement mat, then the turf reinstated on top at the same gradient as existing (about 1:10). The TRM would be to prevent erosion near the abutment of the dam. The trees on the natural ground part of the spillway would not have to be removed, only the trees on the downstream slope of the west end of the dam itself (maximum 4) would have to be removed for the spillway).

Position Statement on Discharge of Water (Surface Water and Overtopping of Ponds) from Hampstead Heath

With the introduction of the Flood and Water management Act 2010, there has been a change in emphasis from flood defence to flood risk management, as it is now accepted that it is not possible to defend against the full range of natural disasters that could occur. This paper sets out the current position and responsibilities of major agencies in relation to flood risk management.

Common Law

The rule in Rylands v Fletcher will apply to the man-made dams on the Heath, and strict liability without any proof of negligence will arise if the water *escapes* and causes damage on neighbouring land. The water which the City Corporation are ‘keeping’ on the Heath, is the water held back behind the dams – it only ‘escapes’ if a dam fails, not when additional water overtops a dam. In relation Clerk & Lindsell on Torts (the most authoritative guidance available on all aspects of the law of tort) the position in relation to land downstream is set out at para 21-30, where it states that, *"The owner of land on a lower level cannot complain of water naturally flowing or percolating to his land from a higher level."* The para goes on to say, *"Nevertheless, the higher proprietor is liable if he deliberately drains his land on to his lower neighbour's land, and this appears to be so if the water is caused to flow in a more concentrated form than it naturally would as the result of artificial alterations in the levels and contours of the higher land."* Two other paras from Clerk & Lindsell are relevant - para 21-32 states that, *"It is the duty of anyone who interferes with the course of a natural stream to see that the works which he substitutes for the channel provided by nature are adequate to carry off the water brought down even by extraordinary rainfall ..."* Para 21-33 states that, *"Even if a stream is diverted, there will be no liability if it can be shown that the injured party would have suffered the same damage if the stream had not been diverted."* Halsbury's Laws helpfully states that, *"A riparian owner... has the right to have the water go from his land without obstruction... Conversely, a lower riparian owner is under an obligation to receive the natural flow of water ..."*

It cannot be right that the City should be responsible at common law for all of the water passing through the ponds from upstream, and for downstream flooding that would occur whether the ponds were there or not. The owner of land on a lower level cannot complain of water naturally flowing or percolating to his land from a higher level.

There is no liability arising at common law from the natural flow of water downstream, and the City is under no duty to mitigate this.

Reservoir Act 1975

The Reservoirs Act 1975 provides the legal framework to ensure the safety of UK reservoirs that hold at least 25,000 cu m of water above natural ground level. ‘Undertakers’ are generally the owners or operators of the reservoir, and have ultimate responsibility for the safety of the reservoir. The Heath currently has three designated statutory reservoirs, Model Boating Pond and Men’s Bathing Pond on the Highgate chain of ponds and Hampstead No. 1 Pond. The Enforcement Authority is responsible for ensuring that the Undertakers observe and comply with the requirements of the Act. The Water Act 2003 transferred responsibility for enforcing the Reservoirs Act 1975 to the Environment Agency in England and Wales. It also gave the Government the power to issue a Ministerial Direction to reservoir undertakers (i.e. owners) to produce reservoir flood plans (i.e. emergency action plans). Since 1 October 2004 the Environment Agency has been the Enforcement Authority for England and Wales. The City’s statutory duties under the Reservoirs Act 1975 are very specifically in relation to ensuring the structural integrity of the dams. The Act does not however contain any details as to the works that may be required.

The Supervising Engineer can call for an inspection by an Inspecting Engineer at any time under section 10(2) of the Reservoirs Act 1975. Under section 10(3) the Inspecting Engineer can make any recommendations he sees fit in the interests of safety. If the City is aggrieved by a recommendation of the Inspecting Engineer, it can refer the matter to an independent qualified civil engineer under section 19. If the City fail to comply with a recommendation of the Inspecting Engineer, the enforcement authority have the power under section 15 to carry out the works in default and to recharge the City. Failure to comply with a recommendation of the Inspecting Engineer without reasonable excuse is a criminal offence under section 22 of the Act. Guidance set out by The Institution of Civil Engineers publication Floods and reservoir safety 3rd edition, 1996 states that, *"Its main intentions are to ensure that, where a community could be endangered by the breach of a dam, the risk of any breach caused by flood is virtually eliminated."* The Heath reservoirs are currently designated as a Category A and to quote the guidance for Category A dams: *"It is considered that public opinion will not accept conscious design for a specific threat to a community, even though it tolerates to an extent both random and accidental loss of life. Consequently, no dam above a village or town should be designed knowingly with a finite chance of a disastrous breach due to the under-provision of*

spillway capacity.” A community in this context is considered to be not less than 10 persons who could be affected.

The design standards for Category A reservoir require that to be tolerant of overtopping, the spillway structure(s) should be capable of safely passing a 1:10,000 year rainfall event.

As an Undertaker the City Corporation has in accordance with the Water Act 2003 prepared an on-site emergency action plan.

Flood and Water Management Act 2010

The Floods and Water Management Act was brought into UK law in 2010 to improve flood risk management and support continuity of water supply. Within Government the Department of Environment, Food and Rural Affairs is the lead Department.

A key feature of the Act is the implementation of recommendations from the Pitt Review into the summer 2007 flooding, thus increasing the emphasis on sources of flooding other than fluvial and tidal, in particular surface water which featured heavily in the 2007 flooding. The Act also updates the Reservoirs Act 1975 to reflect a more risk-based approach to reservoir regulation.

The Act gives a number of responsibilities and powers to both the Environment Agency and the Lead Local Flood Authorities (LLFA). LLFA are made responsible for local flood risk and main rivers (this includes responsibility for managing flood risk from surface water and ground water), the sea and large reservoirs are the responsibility of the Environment Agency. The LLFA for the majority of Hampstead Heath is Camden Council. The reservoir sections of the Act are dependent upon on the development of secondary legislation (regulations and orders) before the law can be fully implemented. Some of the proposed changes include:

- Reducing the capacity at which a reservoir will be regulated from 25,000m3 to 10,000m3; and
- Ensuring that only those reservoirs assessed as a higher risk are subject to regulation
- All undertakers with reservoirs over 10,000m3 must register their reservoirs with the Environment Agency
- Inspecting engineers must provide a report on their inspection within 6 months
- All undertakers must prepare a reservoir flood plan
- All incidents at reservoirs must be reported

The secondary legislation is being introduced in Stages; recent advice from DEFRA to the Heath & Hampstead Society has indicated that Stage 1 is likely to result in a change of classification of reservoirs from the current A-D (the Heath reservoirs are currently Category A), to a single “High Risk” category [where likely loss of life is 1 or more] with a high level of supervision and control, and a “Not High Risk” category with less control. It is likely that the Heath dams will be reclassified as High Risk.

It was anticipated that Stage 1 would also introduce the concept of cascade of reservoirs with an aggregate volume in excess of 25,000 cubic metres, resulting in potentially more of the Heath ponds being subject to reservoir legislation. It is now considered unlikely that this will form part of Stage 1. Officers are seeking a meeting with DEFRA to try and clarify the position will include the redesignation of dams.

Environment Agency

Following the Pitt Review, Defra, instructed the Environment Agency to produce simplified inundation maps for all 2,092 large raised reservoirs regulated by the Reservoirs Act 1975. Local Resilience Forums (LRFs) and reservoir undertakers have now received these maps to help them produce emergency action plans.

Thames Water Authority

Camden Council is responsible for the maintenance of gullies up to the point where they connect to the main sewer, which is then the responsibility of Thames Water Authority.

Thames Water Authority sewers are designed to cope with the majority of storms, but occasionally storms are so heavy that they overwhelm the system.

London has a combined sewer system that takes in both sewage and rainfall - which means during a heavy storm, the flow in the sewer is much greater. London also has a high number of basement flats below street level, which are at greater risk of sewer flooding.

Thames Water Authority installed a flood alleviation system that runs across the Heath, the exact location and details of which are currently being investigated.

Camden Council

Under the 2010 Act Camden Council has a duty ‘to identify where flooding risks are present’.

A Preliminary Flood Risk Assessment (PFRA) has been undertaken for the London Borough of Camden. It has been carried out to assist the London Borough of Camden to meet its duties as a LLFA, with the delivery of the first stage of the Flood Risk Regulations (2009). These regulations implement the EU Floods Directive in the UK.

This study for the London Borough of Camden forms part of the wider Drain London project, which is a wider initiative that involves the undertaking of Surface Water Management Plans and Preliminary Flood Risk Assessments for each of the thirty three London Boroughs.

An important principle of the method for assessing the significance of surface water flooding, is of it occurring 1 in 100 chance in any given year.

Funding for any flood defences is not specified within the Act, but the Environment Agency is specified as the lead funding body for flood risk management and is able to make grants in respect of expenditure incurred or expected to be incurred with flood risk management in England.

It is understood that Camden are proceeding with a more detailed study on surface water flooding issues that have been identified within the Borough. This includes areas around Gospel Oak, just south of the Heath. At this stage solutions regarding potential surface water flooding have not been identified or whether these might involve schemes of water attenuation on Hampstead Heath.

Civil Contingencies Act 2004

In London, the Community Risk Registers have been created to provide public information about hazards identified which could potentially have an impact upon London. The registers have been published in response to the Civil Contingencies Act 2004.

Camden’s local Risk Register is designed to provide information about hazards identified which could possibly have an impact upon the local area. There is a specific risk associated with local urban flooding and as a result major dam failure.

Ref No:	Hazard	Outcome description extracted from the London Community Risk Register version 1 (issued 2011)	Likelihood and Impact	Risk Rating	Camden responders commentary
HL18	Local / Urban flooding (fluvial or surface runoff).	<p>Outcome Description</p> <p>A sustained period of heavy rainfall extending over 2 weeks, perhaps combined with snow melt, resulting in flash flooding and steadily rising river levels over entire counties, could threaten a large urban town.</p> <p>Localised flooding of 1,000 to 10,000 properties for 2-7 days. Up to 15 fatalities & 150 casualties. Up to 15,000 people evacuated. Up to 500 people stranded over a large area and in need of rescue. There would be a major impact road and rail links, making them impassable for up to 5 days.</p> <p>Impact on infrastructure includes: some buildings collapse, water damage, road and bridge damage. Sediment movement and contamination of water supplies. Loss of essential services (gas, electricity & telecoms) to 20,000 homes for up to 14 days. Widespread disruption for 7-14 days, significant debris and pollutants from affected businesses. Up to 1,000 people needing assistance with sheltering for up to 12 months.</p> <p>Rural impacts include widespread livestock carcasses, waterborne disease. Sewage treatment works flooded. Up to 50 properties destroyed and many more uninhabitable. Up to 2,000 people needing assistance with sheltering for up to 12mths.</p> <p>Variation & Further Information</p> <p>The flooding event would have a regional impact, possibly translating into loss of lives, localised economic damage and need between 6 and 18 months recovery before business as usual conditions are restored. The depth and velocity of water flows will vary. Significant mutual aid would be deployed from neighbouring regions, although other regions are also likely to be at risk or impacted at the same time.</p>	3 and 4	Very High	Risk rating identified for Camden 9/12/2010
H44	Major	Outcome Description Collapse without warning resulting in almost	1 and 5	Medium	The down

reservoir dam failure / collapse	instantaneous flooding. Significant movement of debris (including vehicles) and sediment. Complete destruction of some residential and commercial properties and serious damage of up to 500 properties. Several thousand other properties could be flooded. Up to 200 fatalities, up to 1000 casualties. Up to 50 missing persons and people stranded. Hazardous recovery amongst collapsed infrastructure and debris. Water supply to homes and businesses is lost. Up to 200 people need temporary accommodation for 2 – 18 months. Variation and further information Assumes: No time to evacuate, flooding lasts less than 24 hours. Emergency services not pre-warned. Extent of downstream effect could reach 50-60km. Significant damage to gas, electricity supplies, telecommunications, road and rail links.			stream effect of the very unlikely event of the Hampstead or Highgate dams breaching remains in Camden. The effect of the Islington dam has the potential to impact Islington and Camden.
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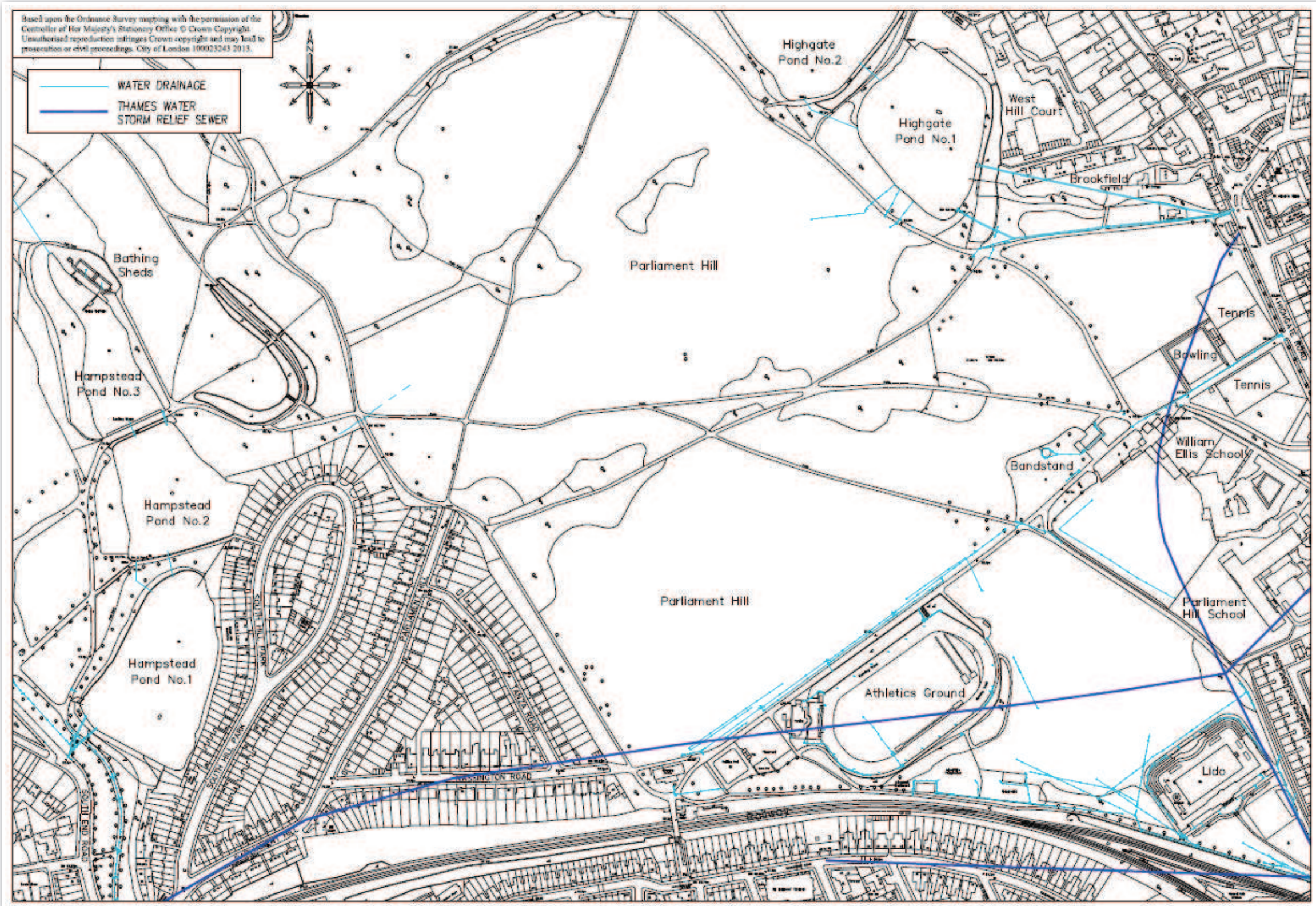
Camden has responsibilities under this legislation to prepare off-site emergency action plans. The City Corporation have been liaising with Camden Council on the preparation of their off-site emergency action plans in relation to the above risks.

Health and Safety at Work Act 1974

Employers also have a duty for the welfare of others under current health and safety legislation. Section 3 states the duty of all employers and self-employed persons “*is to ensure, as far as is reasonably practicable the safety of persons other than employees, for example, contractors, visitors, the general public and clients*”.

References:

- British Property Federation - The Flood and Water Management Act 2010 - 21st April 2010
- London Borough of Camden - Preliminary Flood Risk Assessment – 13th April 2011
- London Borough of Camden - Borough Risk Register – March 2012
- The British Dam Society – website Reservoir Safety - http://www.britishtdams.org/reservoir_safety/default.htm#bill2010





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**Ponds Project Stakeholder Group
DRAFT NOTE OF MEETING
Monday 21 October 2013, 6.00pm
Parliament Hill meeting room**

Present:

Karen Beare	KB	Fitzroy Park RA (Acting Chair)
Jeremy Simons	JLS	City of London elected member (Deputy Chair)
Tom Brent	TB	South End Green RA
Rachel Douglas	RD	Mixed Pond Association
Geoff Goss	GG	Highgate Men's Pond Association
Prem Holdaway	PH	Hampstead Heath Anglers Society
Harriet King	HK	Brookfield Mansions RA
Simon Lee	SL	Superintendent, Hampstead Heath
Mary Port	MP	Dartmouth Park CAAC
Susan Rose	SR	Highgate Society
Jane Shallice	JS	Kenwood Ladies Pond Association
Ellin Stein	ES	Mansfield CAAC
Will Temple	WT	Vale of Health Society
Peter Wilder	PW	Strategic Landscape Architect, Wilder Associates
Jennifer Wood	JMW	Communication Officer, City of London (notes)
Jeremy Wright	JW	Heath & Hampstead Society

Alternate members observing

Tony Gilchik	TG	Heath & Hampstead Society
Marc Hutchinson	MSH	Highgate Men's Pond Association
Ed Reynolds	ER	Oak Village RA

Officers observing:

Declan Gallagher	DG	Operations Service Manager, Hampstead Heath
Paul Monaghan	PM	Assistant Director Engineering, City Surveyors
Peter Snowdon	PS	Project Consultant, City Surveyor's

1. Apologies

Michael Hammerson (Highgate Society), Harley Atkinson(Fitzroy Park RA), Mary Cane(Kenwood Ladies Pond Association), Nick Bradfield (Dartmouth Park CAAC)

2. Approval of previous note

- Approved
- KB thanked JMW for her support in getting the notes out.

3. Matters arising

Legal Meeting

- KB – a meeting took place between the H&HS and City's legal representatives and a note is to be distributed. This has not yet been agreed but it will be coming.
- JLS - H&HS put forward a first version which City received last week. City has now sent back their changes and hope to have a note agreed next week.

- WT – what is note about?
- JLS – it is about the differences in opinion over the legal basis for the project.
- JS – it is important to work out what these differences are before the public consultation, so it can be clearly presented to the public.
- JLS – we can't go into too much detail as the meeting was sought by H&HS on a privileged basis.
- CL – will it impact on the timetable?
- SL – probably not as the City is proceeding with the advice it has been given.
- RD – this legal difference needs to be made clear during the public consultation.
- SL – agreed that we will make our legal position clear. It is up to the H&HS to present their legal position.

Meeting with Brookfield/EGOVRA and Atkins

- SL – hoping to organise this meeting in the next week or two.
- MP – will it include West Hill Court Residents Association?
- SL – this would need to be discussed with the Chair and also Brookfield/EGOVRA.
- KB – this meeting is primarily to discuss the outstanding queries that Brookfield/EGOVRA have so perhaps not appropriate to invite West Hill Court, but they can be updated on the meeting and discussions can be shared with them.
- MP – West Hill Court should be invited to join PPSG
- SL – the membership of the PPSG will possibly need to be reviewed at some point and at this stage they can be perhaps be brought in. The City has met with them separately and has been keeping them updated.
- PH – Anglers should be involved in discussions about Highgate No.1 Pond

Meeting with Prem Holdaway – Hampstead Heath Anglers Society

- SL –important for PH to come in and be updated on any aspects he may have missed.
- PH – Anglers meeting next week.
- SL – need to get a specific meeting in the diary.

4. Feedback on Preferred Options Report

- SL – we started off six months ago on this iterative process. Comments tonight will form the basis of a report which goes to Consultative Committee. Important to remember this is not the detailed design, these are outline options which go to a wider public consultation.
- KB – we will go around the table and everyone can give their views.
- MP – still unclear about the proposals for mitigating the works which will have a profound effect on Heath and those who live nearby. The Model Boating Pond (MBP) is extremely artificial looking and to concentrate work here is the least unreasonable location. We support Highgate Society in their opposition to a floating island on Stock Pond. We need to be clearer about what the spillways will look like. H&HS made a proposal to increase depth of MBP – we are interested in this proposal. Need better visualisations.
- SR – spillway diagrams completely inadequate. Need to be marked out on ground and the depth must be made clear. Worried that the general ecology will make everything look far too tidy and manicured. What would be the purpose of a water channel in Bird Sanctuary Pond? There should only be absolute minimum raising of MBP. Access must be carefully considered. The digging out of MBP creates such a huge volume of storage we question why the embankment needs to be so high.
- HK – the threat to life and property at the end of the chain should be considered. Scour pipes can be adapted in a way to make them passive. Pipes need to be looked at in more detail. Thames Water need to be more involved. Lots of tables in the Design Flood Assessment have now been superseded – it is difficult to make comparisons. The idea of

creating a dry reservoir has not been given any serious consideration. The concerns of Brookfield and downstream residents have not been taken into account. The water that leaves the chain through the bottom spillway will create a lot of damage.

- CL – our statement was joint with Brookfield. Beggars belief that only minimal communication has taken place between City, Thames Water and Camden Council. It should be a legal requirement for these organisations to work together. Still no idea about what the storm relief drain does. Happy that the standard of protection is going up. It is supposed to be a generational project, but how can it be if it doesn't take into account changing weather patterns. We urge City to put pressure on Thames Water and Camden Council to get more done.
- JS – Kenwood Ladies Pond relatively happy as the impact on their pond is minimal. The spillway will be in a wooded area and not visible. But swimmers are also users of the Heath and we are urging them to contribute during the public consultation. Worried that there isn't any room for manoeuvre. Very clear information on the flood estimates must be produced to allow people to have an educated choice. People must be convinced by the stats otherwise consultation is a waste of time.
- TB – too many vague stats. KB picked up the differences in the scales of the hydrographs – makes a mockery of the process. I support the principle of the works and when Catchpit was raised as a solution, it became a catch all and negated serious work south of the chain. However now we have a proposal to raise the Mixed Bathing Pond dam by 2m – I do not believe this is necessary. The figures are fantasy and there is no logic why there needs to be a raising here. I think we've been misguided and a lot of it doesn't make sense and is very confusing.
- RD – we've got to go back to basic principles. We need to know the City's legal obligations. I can't justify the project to any of my members. We haven't been told anything about early warning systems. We think the figures are designed to scare and would urge City to stop using them. Concerned about timing of public consultation – especially with Mixed Pond users as not around over winter. What is the purpose of the consultation exercise? Catchpit sounds like a good idea but we don't want a big walkway – it must remain as a wooded dell. Must be done in a sensitive way. Mixed Pond Association do not support the 2m raising and the idea of having a wall on top is horrendous. Strongly opposed to Option P.
- WT – support the high level comments that have been presented already. Atkins have been very conservative. The proposal to raise Vale of Health is now at 0.6m and has gone up from 0.2m – quite a big increase relative to the work required – needs explanation. We feel the best place for the spillway is at the south end as this follows the natural contours much better.
- GG – we do recognise there is a risk of flooding but we think the solutions are disproportionate. We want Atkins and the City to go back and look at combining a range of solutions and take into account early warning systems. We don't understand the hydrographs and they are difficult to read. Spillways should be shown on the maps and need to be more explicit. We proposed a solution which was discounted because it would have been a 60m wide channel running down the side of the ponds, but some of the spillway proposals are 60m wide. We want a solution which uses a combination of ideas – pipes combined with spillways etc.
- PH – all of the proposals take away angling from the ponds, especially where dams are being built up. Is it legal for a spillway to come off Highgate No. 1 and take water onto the public highway? Need to look at storm relief system and enlarging pipes.
- JW – we cannot support any of the options but will continue to work with the City to see if we can get the minimum that is legally required for the scheme. Consultation with this group is going too fast. The public consultation starts the day after the Management Committee – too soon. Unclear about the period after the public consultation. We have little faith in the figures, especially the QRA and we have not had answers to our questions and will not get them until after 28 October. Too much is required on Highgate No. 1 – it is a very visible dam. Our idea to have the whole of Mixed Pond as a spillway was not incorporated in the

report. Visualisations need to be better. We are worried about the landscape and ecological analysis – we thought it was indicative and we want site walks, but now worried these are set in stone.

- ES – we share concerns of other downstream community representatives about lives and properties at risk and worried about where water will be sent out. We need to know more about drainage. We don't have the information we need to make decisions. The likelihood of various events needs to be clarified. The information for the public consultation needs to be simplified and in plain English. It must address the issues people are concerned with. A cost benefit analysis must be presented and simply explained. Money, inconvenience and time are big questions.
- KB – the changes through the document have been difficult to track. A lot of work has gone into presentation but the documents are hard to read. No information on spillways and it is regrettable there are no contour maps. It has been helpful to meet with CL and HK but lots of anomalies were discovered - hopeful that the meeting due to take place will resolve these. Still not sure how early warning will affect the design. Visualisations need to be clearer. Consultation is about listening and paying respect, which the City has done. Consultation is not about agreeing.
- PW – I've drafted a report about the effectiveness of the consultation process. Not everyone in the PPSG is happy with the outcome but I feel that people might have been a little unfair and dismissive of what has happened so far. Atkins have gone to great lengths but perhaps they need to be clearer. If you look back at the Critical Review you will see your initial ideas have been taken on board. The legality issue is overhanging but are these the best results we can achieve? I'm hearing around the table that this group does not think they are the best and that many are still not convinced about the scale and that it is too much.
- CL – not everyone thinks it is too much.
- PW – how can this group come back and vocalise what they are not convinced about? We have been on a balanced journey, not everyone agrees with the outcome but it has followed the original brief, set out by this group.
- SL- PPSG thinks the designs are too conservative. With regards early warning, the Met Office will not give us a guarantee on an accurate prediction of a convection storm. If people are truly unhappy then a judicial review may be the only thing to settle it. We are proceeding with the advice we have and following industry standard.
- KB – let's now have a Q & A for 15 mins.
- JS – PW wrong that the question of law as the only way this is being judged, the biggest issue will be what the public consultation throws up. Clarity in the public consultation is key.
- SL – we understand we must set out the City's story.
- TB – still lots of vague aspects that need sorted out. Scales on hydrographs must be like for like.
- GG – from an engineering perspective, it is the optimisation which concerns me. None of our suggestions, such as extra pipes have been taken on board. Heath is a special place, if it takes 3 to 4 months to thrash out a better plan that would surely be better.
- JW – H&HS have put forward alternative approach.
- SL – unfortunately our lawyers could not accept that approach.
- JW – SL challenged the H&HS to bring a judicial review.
- SL – Not true, did not say H&HS, but if those who don't agree with our proposals, we would prefer this challenge sooner rather than later.
- JW – no judicial review until a report on final design is taken to Management Committee.
- SL – if we do not progress the project at deliberate speed, a section 10 could be called. If this happens, the work must take place without the City being able to control and influence and works could be focused on the three statutory reservoirs. The implementation to resolve risks would be would be time bound.
- GG - is Section 10 part of 1975 Reservoirs Act?
- SL – yes

- RD – there has been a change in emphasis from Government recently that moves away from flood defence to reduction in flood risk, as the authorities realise they cannot defend against a flood.
- SL – yes this is true and very important.
- WT – seems absurd that the flood relief system has not been taken into account.
- SL – on 14 Jan, the PPSG heard a presentation from Thames Water and in this it was said that the flood defense system under the Heath can only deal with a 1 in 70 year size flood. In the PMF event this system would be full and would not help the situation.
- PH – if all pipes are enlarged, then the dams wouldn't need to be so high.
- SL – we've looked into this option but it is not viable with the amount of water we are talking about.
- HK – what is the percentage of the PMF that can be stored in Option 4?
- SL – not sure
- HK – is the purpose of the 2010 Act not to protect life and property? If not should it be?
- CL – after public outcry in 2011 a more landscape led approach was put forward. Is there any way this could be peer reviewed?
- KB – having run through the figures, we are not convinced that the standard of protection increases.
- TB – why can't more height be put at Catchpit to reduce work downstream?
- TB – what is the build-up time of a convection storm?
- JW – City rejected early warning because MET office can't warrant a convection storm, but in the Design Flood Assessment they talk about several hours of overtopping before collapse.
- JW – please retitle Preferred Options Report, Proposed Options Report
- SL – no – it is the the City's lead designers (Atkin's) Preferred Options.
- KB – we'll take item 6 next.

6. Update on Communications and Consultation

- SL – important to stress this is the City's consultation exercise. We take on board all of your comments about setting out all of the facts clearly and giving people as much context as possible.
- JMW – we've been working with our consultants Resources for Change to design a consultation which will reach as many people as possible. Using a mixture of methods – drop-in center, consultation stands, mail shot of questionnaire, online questionnaire.
- ES – could a question and answer session which is open to the public, but moderated beforehand be useful?
- WT – perhaps an event on the Heath, which could attract a large number of people.
- KB – need targets to demonstrate value in the consultation. Dismayed that Resources for Change were not planning to consult upon the background of the project.
- SL – they are now. All of the comments made by the group have been taken on board

5. Update on Contractor Appointment and Programme– Simon Lee

- SL – thanks to JW and SR for giving up their time to be part of the contractor appointment process. Moderation took place earlier that day and hopefully very close to appointing.
- JW – very impressed by the rigorous procedure.
- SL – a report on this process will be taken to Management Committee.
- JW – need to flesh out the timetable after the public consultation.
- KB – perhaps a calendar could be produced?

7. Next meetings

Monday 2 December

Monday 13 January

Monday 24 February

8. AOB

- SL announced he would be leaving his position as Superintendent to become Chief Executive of Wimbledon and Putney Commons.
- PPSG said it had been a pleasure working with SL and he will be sorely missed on the Heath.

Hampstead Heath Ponds Project

STRATEGIC LANDSCAPE
ARCHITECT REVIEW

27th October 2013

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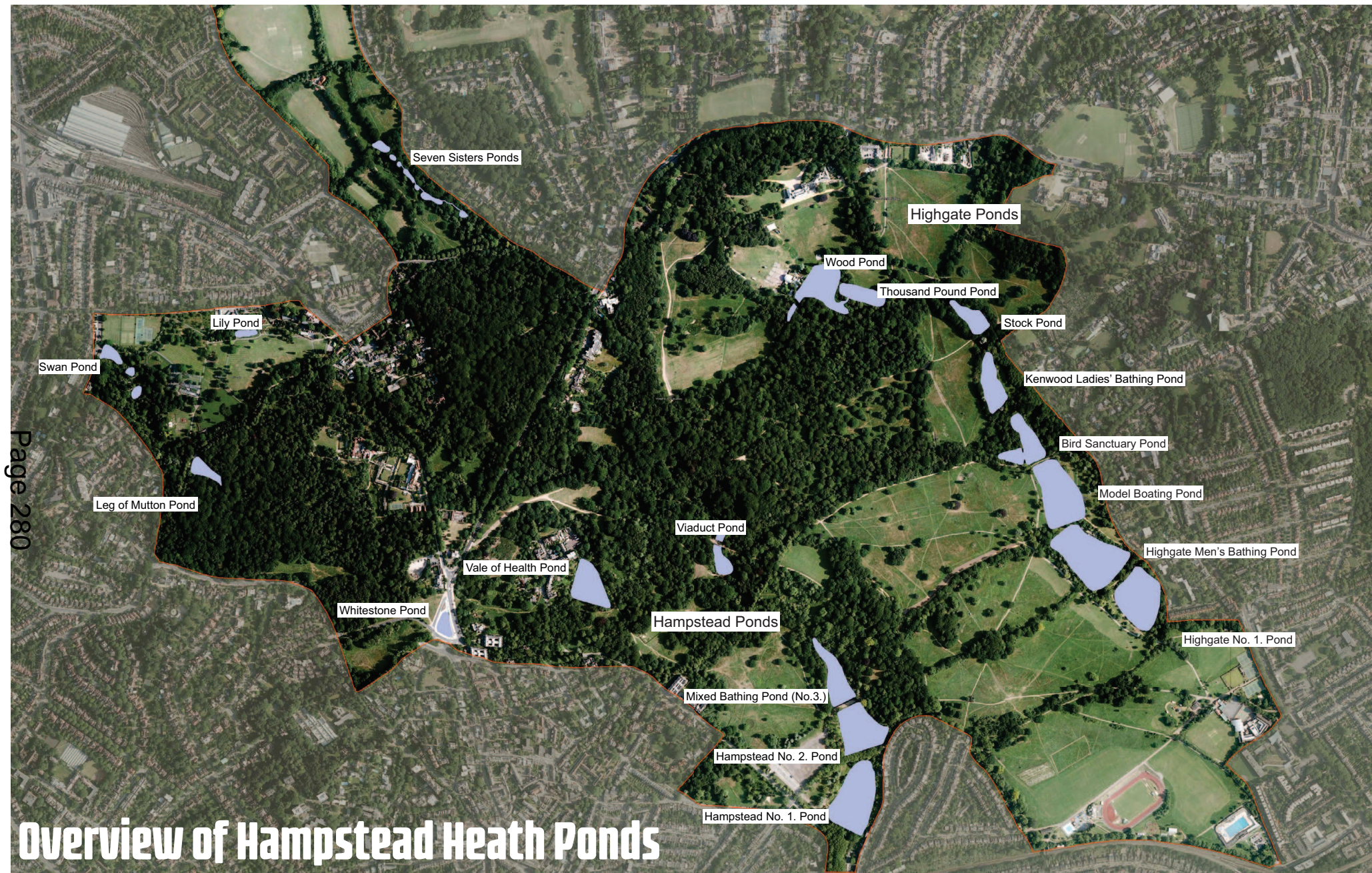
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DOCUMENT REVISIONS

First Draft 15th October 2013
Second Draft 22nd October 2013
Final Version 27th October 2013

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Overview of Hampstead Heath Ponds

INTRODUCTION

Peter Wilder was appointed by the City of London in August 2012 to act as the Strategic Landscape Architect for the Hampstead Heath Ponds Project. The brief for this role was to act as an impartial representative of the Ponds Stakeholder Group and to challenge the design team to come up with the most sensitive and appropriate solutions for the Heath, taking into account the various nuances of the legislation, flood modelling and environmental considerations. This is a role that has continued to evolve as the project examines both the legal and moral obligations of the City of London to comply with the Reservoirs Act, Flood and Water Management Act and the Hampstead Heath Act.

One of the first initiatives undertaken by the Strategic landscape Architect was a workshop designed to consolidate the opinions, fears and aspirations of the Ponds Project Stakeholder Group (PPSG) into a cohesive document that could be formulated into a brief for the design team. This was to become an important milestone in the project as it provided a platform for the stakeholder groups to formalise their concerns into a powerful message both to the City of London and to the Atkins design team.

This report sets out the process that has ensued since the issue of the Critical Review of Key Issues by the Water Management Stakeholder Group in February 2013.

On the 6th October 2012 Peter Wilder accompanied the PPSG (formerly known as the Water Management Stakeholder Group) with Simon Lee, Superintendent of Hampstead Heath, on a walk of the Hampstead chain of ponds to discuss possible approaches and issues regarding the proposed works on the Heath. In subsequent visits The Panel Engineer, Dr. Andy Hughes, also joined the group to discuss possible options in addressing the issue of dam safety. The issues discussed ranged from potential impacts of the dam works or more sensitive parts of the Heath to how the proposals by Haycock might be mitigated through the work of the newly appointed design team (Atkins). Dr. Andy Hughes proposed a number of possibilities including works on less sensitive areas of the Heath such as the Catchpit on the Hampstead Chain and the Model Boating Pond on the Highgate Chain. As a result of these discussions the Strategic landscape Architect, Peter Wilder, proposed a workshop in order to gather all of the ideas, thoughts, opportunities and fears of the stakeholder group into a

single and coherent document that would provide a guideline for Atkins in their approach to the Hampstead Heath Ponds Project.

The workshop which took place on the 10th January 2013 involved a virtual walk through both chains of ponds in order to review specific concerns for each pond and to review the perceived shortfalls of the Haycock proposals. The following is a summary of the outcomes of the workshop and the subsequent report produced by Wilder Associates for the PPSG.

GENERAL OVERVIEW

There was an general consensus, among the PPSG, that much of the proposed works in the Haycock report were aimed at creating water storage high up in the Heath for flushing the lower ponds in order to improve water quality. It was deemed that the impact of such development on the more sensitive ponds was disproportionate to the benefits. It was also felt that other means of achieving water quality, such as re-circulation, de-silting and bio-filtration would be a more appropriate and far less intrusive. It was also felt that the main objective of the ponds project, to ensure the resilience of the dams, was not best served by increasing water storage at the top of the pond chain.

Other key objectives of the PPSG were the prevention of tree loss on the more intimate ponds, such as Stock, Bird Sanctuary and Kenwood Ladies Bathing Pond and the protection of critical views. There was general consensus among stakeholders that in order to improve the overall resilience within each pond chain and to lessen the impact on the Heath, the focus of works should be aimed at the middle of each pond chain. The possibility of major works at the Catchpit on the Hampstead Chain and the Model Boating Pond on the Highgate Chain was agreed on the basis that only minor works would be required to improve the dam structures and spillway capacity of the remaining ponds.

The **Critical Review of Key Issues by the Water Management Stakeholder Group** (PPSG) identified possibilities and principles that were broadly acceptable to the group based on feedback from site walks and the 10th January workshop.

The following is a brief summary of the points made by the PPSG on each of the ponds likely to be affected by the Ponds Project:

Highgate Chain

Stock Pond

A small and intimate pond, third in the chain, this pond has a very small capacity for storage and its dense vegetation means that any changes to the dam height or water level would result in tree loss. The small causeway that crosses over the dam is one of the most delightful experiences on the Heath and it was felt the value of the pond character far outweighed the relatively small gains that might be made through works to improve storage capacity. It was felt that works here should only address resilience of the dam to overtopping and improved ecology through some light clearing of base vegetation but retention of the tree canopy structure.

Kenwood Ladies Bathing Pond

The screening of the Ladies Pond by trees is fundamental to the secluded setting and the location of the changing facilities on the dam crest provides the lifeguards with the best possible views over the pond. It was therefore felt that minimal changes to the dam height and the retention of existing entrances and access arrangements were important considerations. Retention of key views from the south meadow and improvements to water quality were also considered important issues to address along with improved resilience to overtopping during extreme rainfall events.

Bird Sanctuary Pond

The Bird Sanctuary Pond receives water both from the Ladies Bathing Pond and surface water runoff from Heath which feeds its western arm. Any change in water level here would dramatically change the character of the shallow wetlands and emergent vegetation that have made this a rich ecological environment. It was considered that any disturbance of this pond through dam improvements may have a detrimental effect on the wildlife and biodiversity which surrounds this pond. Many considered that further management, including the removal of invasive species and expansion of bird nesting areas, could be enabled through the Ponds Project. It was considered that a raising of the dam here would have little benefit, particularly



Front cover of the Critical Review by the Water Management Stakeholder Group (now Ponds Project Stakeholder Group)

as the raising of the dam at the Model Boating Pond would result in the temporary flooding of the causeway between the ponds without a long term detrimental effect to the wildlife.

Model Boating Pond

One of the largest ponds on the Heath, the Model Boating Pond is also one of the most open and formal with hard edges and pathways to the entire perimeter. This pond offers the greatest opportunity for expansion through raising of the dam and expansion towards the west. There are still concerns however about the loss of openness and the ability for the pond to continue to function as a boating pond. Existing trees on the west side of the pond should be retained and incorporated into an island or peninsula of the pond and a new spillway on the south-western corner of the pond should aim to minimise tree loss.

Highgate Men's Bathing Pond

The largest pond in the Highgate chain, the Men's Bathing Pond has limited room for expansion due to large groups of trees on its east and west banks and a relatively narrow dam on its southern perimeter. Works on the Model Boating Pond are likely to have an impact on the setting of this pond and any raising of the dam on the Men's Bathing Pond should avoid any loss of trees. The ponds project should also aim to create improvements in water quality, either through

dredging or aeration systems and to improve disabled access to facilities.

Highgate No.1 Pond

This pond, the lowest in the Highgate Chain, sits in close proximity to residential properties including Brookfield Mansions to the east. The dam has a large number of trees on it which provide screening to the Heath. Whilst raising of the dam is not the preferred option here, due to loss of tree cover and impact on adjoining properties, there is a strong desire to improve the flood resilience of this pond and to avoid flooding of nearby and downstream properties. Whilst major works to the Model Boating pond would help to improve the flood resilience and reduce the incidence of overtopping, some work should be carried out on this pond to improve its capacity to pass water safely on and past Brookfield Mansions in the event of a major storm.



The PPSG review the setting of the Model Boating Pond



Dr. Andy Hughes discusses dam safety at Highgate No.1 Pond.

Hampstead Chain

Vale of Health

Lying at the head of the western branch of the Hampstead Chain, the Vale of Health Pond is an integral part of the Vale of health community. As such it was felt that very little should be done to disturb the setting of the pond and that increased storage capacity here would be of little benefit to the flood resilience of the chain. Minor improvements to the dam crest (crest restoration) and improved spillway capacity would help to ensure that the pond can safely pass flood water downstream in a peak storm event. Loss of trees and access to the water's edge were key concerns of residents.

Viaduct Pond

Lying at the head of the northern branch of the Hampstead Chain, the imposing structure of the viaduct makes this one of the most photographed of all ponds on the Heath. This pond suffers from silt problems due to the largely untreated runoff from the Heath and the dam suffered damage in the 1975 storm. Since then the dam has had repair work carried out and is now considered to be one of the more resilient structures in the chain. Therefore the major concerns for this pond are around loss of vegetation and alteration of the scene if major dam works were proposed. Potential for de-silting and reed bed filtration at the northern end of the pond should be

considered as part of the ponds project along with improved overflow capacity for major storm events.

Catchpit

Although not currently a dam, the Catchpit currently acts as an interceptor for silt before it enters the Mixed Bathing Pond. There is scope and space for a potential new dam here that would relieve pressure on lower dams in the event of a major storm event. There is an opportunity for the new dam to remain well concealed and to act as a semi-permanent wetland in the centre of the Hampstead Chain. The main concerns around this proposal were about loss of significant trees and the route across the Heath as well as the proximity of the works to the Mixed Bathing Pond.

Mixed Bathing Pond

The Mixed Bathing Pond is well concealed from the east and the west side with a low and open causeway to the south that affords views into and out of the pond. While there is an opportunity to raise the dam on this pond due to the absence of trees, there is a strong view that this should be no more than 1m in order to preserve the openness to the south. There are concerns about water quality on this pond and the introduction of cascades and biofiltration beds as well as dredging of the pond should be considered as part of the

ponds project. There is also concern about loss of swimming area if the dam works were to further encroach into the pond.

Hampstead No.2 Pond

This pond is bounded by residential properties and woodland to the east, open meadows to the west and a spectacular avenue of Plane trees to the south. There is concern that any raising of the dam would result in certain loss of trees and therefore any raising of the dam here should consider the use of a wall or internal dam structure to prevent such loss. The creation of an improved overflow will also have a potential impact on trees and should be considered carefully.

Hampstead No.1 Pond

This is the lowest pond in the chain and lies in close proximity to housing on its eastern edge. There are therefore limits to how high the dam can be raised without affecting neighbouring properties and without a loss of trees on the dam. Tree loss may be necessary in order to improve dam resilience and overflow capacity of the dam. However efforts should be made to retain or improve screening beneath the toe of the dam and to reduce the impact of tree loss on the crest of the dam.

PROBLEM DEFINITION

Following the submission of the Critical Review Atkins produced their Problem Definition report which provided an assessment of the Probable Maximum Flood (PMF) event and the capacity of water that was likely to flow through the chains in such an extreme event. The report examined the methodology of approach used in the Haycock report and compared it with new estimations on the rate of runoff from the site and likely overtopping heights of water at each dam during a PMF event. The report found that whilst the Haycock report may have exaggerated the scale of the problem, there were still substantial shortfalls in the capacity of the dams to safely pass a PMF event through each respective pond chain and that works would be required to alleviate pressure on those pond that were likely to fail during shorter return periods.

The second iteration of this report entitled **Assessment of Design Flood** provided a more detailed assessment of the hydraulic modelling for the Highgate and Hampstead catchments. The report looked at both the current capacity of the ponds and standard of protection as well as predicted scenarios of failure during a PMF event. This initial report illustrated the height at which each dam would overtop in a PMF event and provided evidence behind the calculation methodologies. The report concluded that whilst the flood estimations by Atkins were

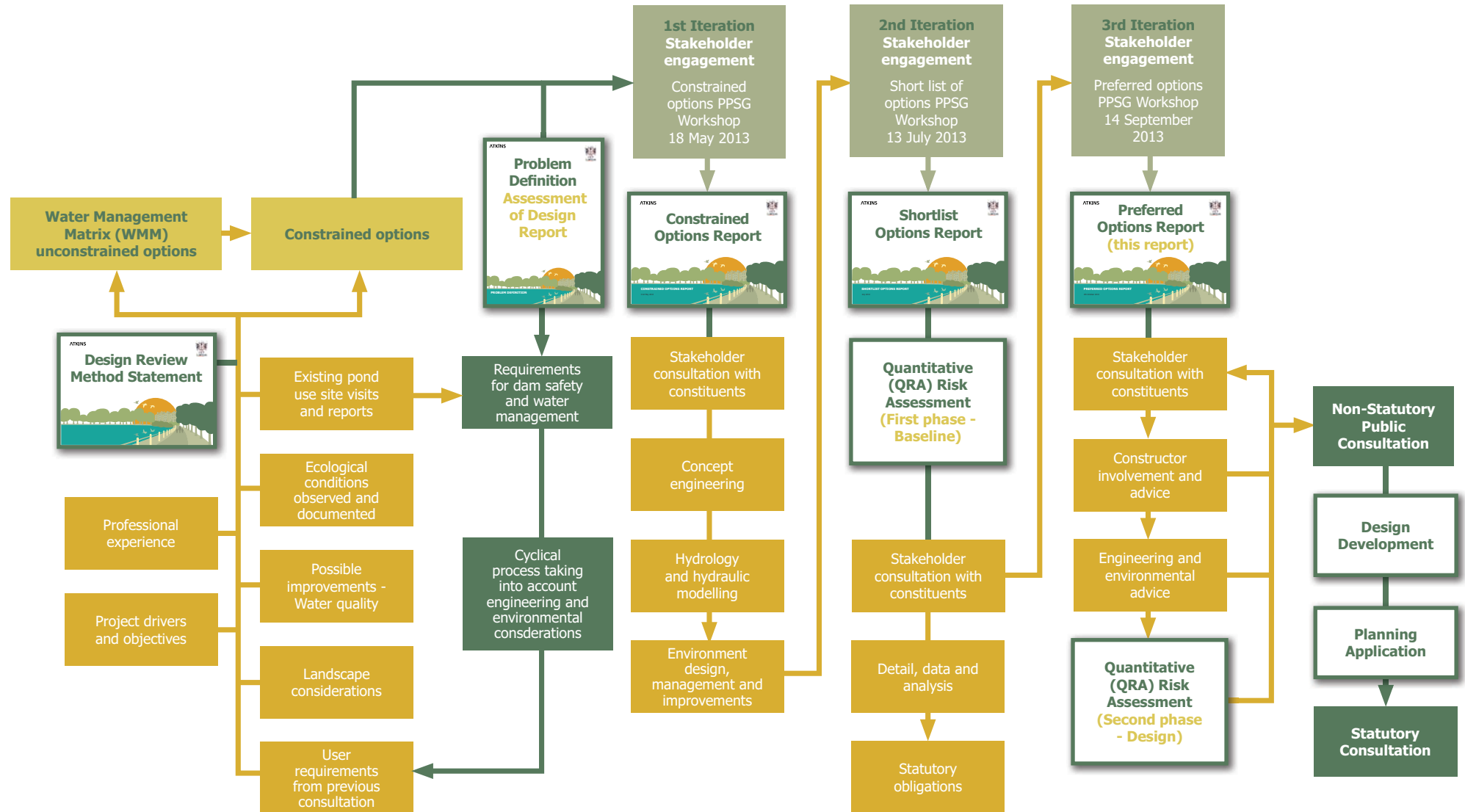
some 30% to 50% lower than those produced by Haycock, the volume and duration of overtopping during a PMF event combined with the uneven nature of the dams led to increased likelihood of erosion and potential dam breach.

Whilst not strictly part of the brief, Atkins pointed out that a benefit of increasing storage capacity in order to control the overtopping of dams within the two chains would provide an enhanced level of protection for residents downstream of Hampstead Heath during lesser return periods.

The Problem Definition/ Assessment of Design Flood report became the first in a series of reports designed to explore all of the options available to the design team and to eliminate those which were less likely to satisfy the objectives of the PPSG and the flood modelling carried out by Atkins.

The diagram opposite outlines the iterative process agreed by the design team, CoL and the PPSG in arriving at a shortlist and final preferred options for the project.

Overview of options development process



DESIGN

Atkins proposed that the first step in responding to the Problem Definition was to produce a matrix of Unconstrained Options for the Highgate and Hampstead pond chains. This matrix considered options for each pond that ranged from doing nothing to raising dam levels and expanding the pond in order to accommodate increased storage capacity. Each option was reviewed in the context of habitat, ecology, landscape, water quality and the concerns of the PPSG, Heath Staff and the wider public. Whilst the matrix was useful in capturing all of the related issues and conflicts it was found to be difficult to read and provided too many irrelevant or non viable solutions.

It was also at this stage that there was particular concern from the PPSG that there was insufficient time being provided to consult with members and to provide meaningful digestion and feedback of reports being produced by Atkins. After much deliberation, a new programme was devised that created greater length of time between reports, time for feedback and re-issue of reports at each stage of development and a full day workshop at each design stage in order to provide direct feedback to the design team on concerns or questions about the approach.

On the 18th May 2013 the first design workshop took place on the unconstrained options for the Heath Ponds. At this meeting

Mike Woolgar, Managing Director of Atkins, explained that the principle of creating storage on the Heath was not in effect to prevent flooding downstream, although flooding in smaller return periods would be reduced, but to reduce the impact of flood events on those ponds lower down in the chain where it was difficult to carry out any major dam works. By attenuating water higher up the chain where more space is available for significant works, the scale of works on the more sensitive ponds could be reduced and still achieve the required standard of protection during a PMF event. This was summed up most eloquently by Karen Beare who said "By storing water higher up the chain you are taking the energy out it by reducing the force and velocity out of the storm surge".

During this session many questions arose about whether increasing storage volumes would lead to a greater risk of flooding downstream and how the proposed dams would impact upon the Heath. At this stage no actual design had commenced and only a methodology of approach was being discussed. Nevertheless Atkins were asked if they could start to illustrate some of the concepts that they had in mind and to illustrate some of the terminology they were using such as Crest Restoration, Spillways, Overflow Pipes and Box Culverts. The final part of the workshop involved the Strategic Landscape Architect asking each member of



Above: Stakeholder Workshop on 13th July 2013 discussed the merits of the shortlisted options and the general approach to dealing with a major storm event on the Heath.

the PPSG to identify their main concern on each of the pond chains to gauge whether there was consensus or divided opinion over the key issues. This provided a useful insight into key concerns that ranged from loss of trees to loss of key views on the Heath which was fed back to Atkins in their refinement of the design principles.

Whilst some members of the PPSG were not satisfied that a proper case for the works had been established through the Problem Definition or a Quantified Risk Assessment, Atkins were asked to proceed with developing a Constrained Options report that looked more closely at viable options rather than focus on those which were considered non-viable. At the same time they were asked to continue developing their hydraulic modelling and landscape and environmental solutions to address both mitigation of the works on the heath and water quality issues.

On the 7th June 2013 Atkins issued their draft Constrained Options Report. This report set out for the first time the likely scale of the works at the middle of each pond chain and on the 17th June ranging poles were used to demonstrate the likely scale of the new dam heights proposed at Catchpit and at Model Boating Pond. This exercise was met with a mixed response that ranged from incredulity to acceptance of the scale of works required if the upper and lower ponds were to remain

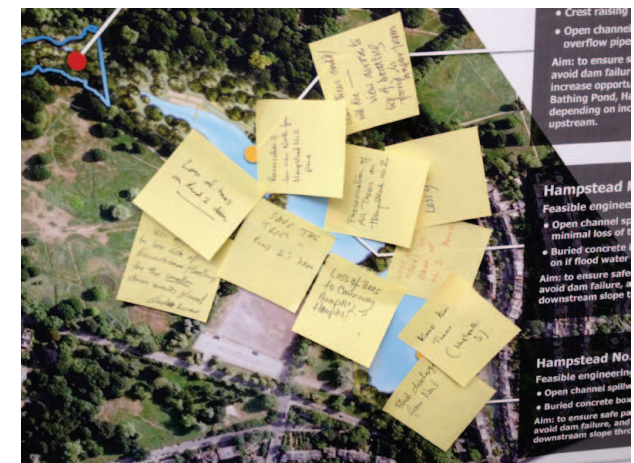
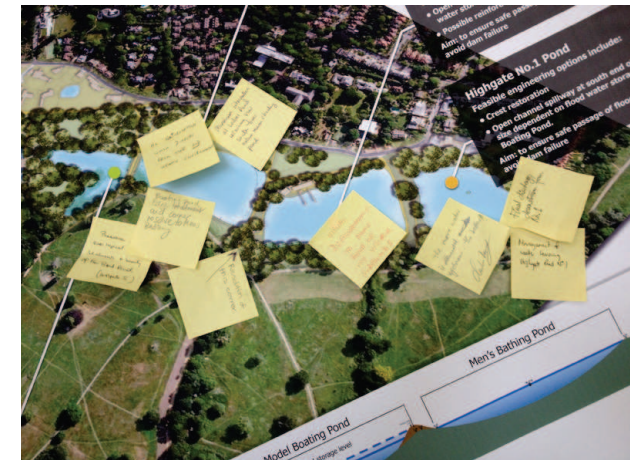
largely untouched.

The general consensus from this exercise was that:

- 3m was too high for the Model Boating Pond
- 5.6m high was acceptable for the Catchpit as long as it was relatively concealed and did not impact on significant trees or views north from the Mixed Bathing Pond.

The initial Constrained Options report also set out key heights and variations for other ponds including some of the residual works (those works aimed at improved dam resilience rather than the creation of storage) including crest restoration and spillway types. The Constrained Options Final Report was issued on the 11th July 2013.

On the 13th July 2013 the second stakeholder group workshop was held with the objective of debating the merits of the constrained options and a method of arriving at a series of short-list options. At this meeting Atkins presented their flood modelling and dams options along with the work their environmental team undertaken with regards to landscape and water quality issues. As further information was revealed about the flood modelling and hydrology approach the more questions it raised from the PPSG with regards to the methodologies applied. It was decided that the best way to address this would be through a series of offline meetings involving a handful



Above: Stakeholders were asked by the Strategic Landscape Architect to identify their one main concern on each pond chain in order to distil the major issues from the minor ones. This exercise showed that most concerns centred around the lower ponds (since minimal intervention was proposed for the upper ponds) and that loss of trees and important views were key issues. Other issues around standard of protection downstream and design detail were also considered important.

of PPSG members with particular interest in the technical aspects of the dam breach modelling.

At the PPSG meeting on the 22nd July 2013 Atkins were asked to consider further options in their constrained options report, including the likely impact on other ponds if the height of the Model Boating Pond dam were lowered to 2m and to 1m. Ben Jones, Senior Engineer from Atkins, presented the options as a flowchart which illustrated the implications of certain decisions taken higher up the chain. One such option involved the implications of not raising the Model Boating Pond and the likely consequences to the downstream ponds and a reduced standard of protection. At this stage, as anticipated, some of the options began to drop away as they were shown to be less viable and less acceptable with regards to their impact on the Heath. The implication of spillways on the character of the Heath was also a key concern and Atkins were asked to avoid the loss of trees, particularly on Hampstead No.2 Pond.

On the 5th August Atkins published their Shortlist Options Report which included further options as discussed in the stakeholder workshop and the flowcharts options for both pond chains. Crucially this report also provided the first photomontage work of how the proposed dams might look in the different scenarios proposed. Unlike the ranging

pole exercise carried out on the Heath, the PPSG were able to see how the view might vary depending upon the viewpoint. Whilst these views provoked more debate, they illustrated how some viewpoints would be marginally affected. Most of the viewpoints chosen were focussed around the ponds that would be most affected by the works including the Model Boating Pond, Men's Bathing Pond, Mixed Bathing Pond and Hampstead No.2 Pond. The report also provided a number of options and illustrations of environmental treatment systems including types of revetment, ecological management and water quality systems for the ponds. Biological control and floating islands were considered to help balance the biological oxygen demand within the ponds and to reduce the level of nitrates and phosphates present. Significantly the report still lacked information on water quality and silt testing. Also lacking at this stage was the Quantified Risk Assessment, which Atkins were then requested to provide as a legal imperative for the works.

The summer hiatus meant that while there was an extended period for the PPSG to review the Shortlist Options Report, there were also a large number of people away on holiday. This made it difficult to obtain input from members of most stakeholder groups. Some meetings, such as the one with Brookfield Mansions and EGOVRA, did take place over the summer period and a

representative from the Hampstead Heath Anglers Society was briefed ahead of joining the PPSG.

At the Preferred Options Stakeholder Workshop on the 14th September the early part of the meeting focussed on the lack of time for consultation and comments from Heath and Hampstead Society on the Draft Quantative Risk Assessment issued on the 29th August. Simon Lee agreed to provide more time for comments on the Shortlist Options Report and that issues surrounding the QRA would be dealt with in a separate meeting with representatives from the Heath and Hampstead Society.

Mike Vaughan gave a presentation on water quality issues and the results of water testing which revealed high levels of phosphates and nitrates and poor dissolved Oxygen content. He stated that this made some of the water quality options such as biological control difficult to implement.

Ben Jones talked through options for each pond chain in turn and stated that the design for PMF in the Highgate chain had resulted in a greater standard of protection, 1:1000, than the current standard of protection which is 1:100. It was explained that the ponds would safely pass all water down the chain during a PMF event but that during a shorter return period the greater attenuation capacity of

the ponds would ensure that more water was stored on the Heath rather than being passed down the chain. This was in fact is good news for members of Brookfield Mansions and EGOVRA who had been requesting this since the beginning of the design exercise.

On the Hampstead chain Ben Jones, Senior Engineer from Atkins, explained that the only way to reduce tree loss on Hampstead No.2 Pond from 2 down to 1 would be to increase the height of the Mixed Bathing Pond from 1m to 2m, an equally unpalatable option. When asked why raising the height of the Catchpit would not further alleviate the situation. Ben explained that the dam at Catchpit would never fill due to its position in the upper catchment and that at 5.6m it was already accommodating the PMF volume for this part of the chain.

One of the issues that emerged from this workshop was a feeling from the stakeholders that questions being raised were not being properly addressed in writing by Atkins. The SLA suggested that although many of the questions being asked had been answered in previous reports by Atkins, a useful reference to where to find them or a written response would help to resolve any queries. Further important meetings took place between the workshop of the 14th September and the stakeholder meeting of the 30th September. The first was a meeting between

legal representatives on the City of London and Heath and Hampstead Society to the discuss the legal precedent for the dams project on the 18th September.

The second was a meeting on the 27th September between PPSG representatives, the City of London and Atkins to discuss the methodology of approach used in the Quantitative Risk Assessment. Both meetings argued the moral and legal obligations of the City of London to protect the Heath and those residents downstream at risk of flooding during both catastrophic and regular storm events. Jeremy Wright expressed his frustration that early warning systems did not constitute a greater part of the risk assessment methodology and that manual release mechanisms and early evacuation procedures should be considered to reduce reliance on the dams during a PMF event.

The City of London's response was that the MET Office are still not able to warrant the accuracy of weather forecasts for early warning systems and that manual procedures may also prove unreliable during such events due to the risk that it places on staff and emergency services. The City of London reinforced their position that any designed system must be passive and not rely on human intervention to prevent failure of the dams. They also stated that whilst it was reasonable to assume there might be a loss of life from flooding downstream during a severe

storm event that the City of London were legally bound to prevent any likely loss of life from a dam breach during such an event.

A further meeting was held on the 27th September with members of the Mens Bathing Pond Association to discuss proposals that they had put forward for a dry channel to run between the Model Boating Pond and Highgate No.1 Pond in order to alleviate the need for a 3m high dam raising at Model Boating Pond. Atkins had stated previously that this option would accelerate the rate at which water reaches the end of the pond chain and provide a lower standard of protection than the current situation. They also stated that the channel would have to be around 50m wide in order to accommodate water in a PMF event and that this would be a greater intrusion on the Heath than the proposed dam increase. Atkins suggested that where proposals had been offered by the stakeholder group but not adopted they would provide reasons why the option had been discarded.

At the Stakeholder meeting of the 30th September 2013 issues around options were again discussed and the option of the normally dry channel flanking the Men's Bathing Pond was discussed and debated with mixed views on how it improved on the current scheme offered. Geoff Goss stated that the Highgate Men's Bathing Pond Association were adamant that they did not want a 3m increase in height of the dam adjacent to their facility. Whilst there was some debate over whether this was an appropriate time to be introducing new ideas or going over old ground, Ben Jones confirmed that the 3m option for the Model Boating Pond was no longer being considered and instead there were two new options as outlined in table 1.1.

Table 1.1

Highgate Chain

	Option 4	Option 6
Model Boating Pond	2m	2.5m
Men's Bathing Pond	1.5m (wall)	1m (wall)
Highgate No. 1 Pond	1.25m (wall)	1.25m(wall)
Standard of protection	1 in 1000 year	1 in 1000 year

Table 1.2

Hampstead Chain

	Option M	Option P
Mixed Bathing Pond	1m	2m (embankment or wall combination)
Hampstead No. 2	3x 3m box culverts	0.5m wall, 1x4.5m box culvert
Hampstead No. 1	1x4.5m box culvert	1x4.5m box culvert
Standard of Protection	1 in 1000 year	1in 10,000 year
Tree loss on Hampstead No. 2	2	1

On the Hampstead Chain some work has been done to show the two main options which centred around the raising of the Mixed Bathing Pond by 2m or the loss of 2 trees on Hampstead No.2 Pond. These options are summarised in table 1.2.

PREFERRED OPTIONS REPORT

On the 7th October 2013 Atkins issued their **Preferred Options Report** in 3 parts. Volume 1 contained the main body of the report, Volume 2 contained comments received on the Shortlist Options Report and Volume 3 contained a compilation of all stakeholder comments received and answers provided by Atkins. The Preferred Options Report acts as a summary of the design decisions taken to date and although it is not intended as the final solution, it sets out the broad principles of a viable scheme. It includes a section on suggestions by stakeholders that have been incorporated into the preferred options and a summary of the consultation process undertaken to date. Importantly the report contains plans for each pond that indicate the dam works proposed, the proposed location of spillways or box culverts and a range of environmental considerations designed to reduce the impact of the works or improve the water quality and biodiversity credentials of the pond.

The Preferred Options Report contains more visualisations of the main works proposals than previous reports and aims to capture key views for each chain including views across the Model Boating Pond, Men's Bathing Pond, Highgate No.1 Pond, Catchpit (aerial locations), Mixed Bathing Pond and Hampstead No.2 Pond. The report also includes a section on discounted options, including those put forward by the PPSG,

with reasons why they were not considered viable or appropriate.

Summary of the report

The design process that has been undertaken by Atkins has paid close attention to the Critical Review offered as a guideline by the PPSG back in February 2013. The preferred options leave the upper ponds largely untouched with only minor remedial works proposed for the dam structures. Ponds considered more sensitive, such as the Bird Sanctuary Pond and the Kenwood Ladies Bathing Pond, would only receive minor reinstatement of the dam crest in the current scenario. The majority of the works would occur in the middle of both pond chains, as suggested by the Critical Review. Whilst the proposal for a new dam near the Catchpit has met with relatively little resistance, it is the proposals centred around the Model Boating pond that have attracted most criticism. It is surprising that the one pond labelled as 'sterile' and requiring softening by the PPSG should meet with such resistance to change. However, as with all things on the Heath, it is a matter of context rather than scale of operations that seems to be under most scrutiny. The proximity to the facilities of the Men's Bathing Pond and the fact that the Model Boating Pond is one of the most open a visually accessible ponds means that any changes should be in keeping

ATKINS



Hampstead Heath Ponds Project



with the context and setting of the Heath. The options developed by Atkins to reduce the dam height increase from 3m to 2m and 2.5m respectively, demonstrate a willingness to adapt to the opinions of the stakeholders. With further environmental mitigation, the impact of a 2.5m dam height increase could be further softened and blended into the existing landscape. The opportunity to soften the western edge of the pond and create an island from the current tree group would add a feature to the pond which feels instantly old and in keeping with the rural nature of the Heath.

There are certain aspects of the report by Atkins that do not tend to sit comfortably with the character of the Heath. These include proposals to improve water quality through the removal of overhanging trees in order to reduce the build up of organic matter from leaf drop into the ponds. This is very much part of the character of the heath and it is likely that large volumes of material will still be washed or blown into the ponds. The creation of islands from excavated sediment or floating islands in the ponds is also uncharacteristic of the Heath and apart from reducing the view of open water could in fact accelerate the build up of litter within the ponds. Floating islands should at least be kept out of swimming ponds where they may block views of swimmers from lifeguard positions.

The creation of reed beds at the head of each pond would only contribute to increased water quality during periods where there is an active flow of water. This usually occurs during the winter months when algal blooms and water quality are less of an issue. Mechanical aeration of ponds through pumps or aeration curtains result in a relatively short term improvement of dissolved oxygen content. Significant improvements in water quality could be obtained through a combination of reed beds and pond recirculation through Flowform cascades. These devices, which operate on low flow volumes, help to provide improved aeration at a molecular level and could be concealed within reed beds.

Testing of pond sediment has revealed relatively low levels of toxicity meaning that material gained from dredging could be used or disposed of on site. Though the material is unlikely to be suitable for the construction of dams, due to its lack of cohesion and structural qualities, it could be swapped with material extracted from borrow pits to create a net balance. Conveyor systems could be used to transport materials in order to reduce the impact of vehicle movements during this process.

Ultimately some of these issues could be the subject of a management plan for the Heath, but it is essential that any opportunities for long term improvement of water quality is considered as part of the Ponds Project. Early contractor involvement in the design process may also lead to further solutions that have not yet been identified by the design team.

THE NEXT STAGE

Negotiations with contractors have already commenced and it is likely that a contractor will be appointed in as early as December to assist in the design process. Members of the PPSG have been involved in the selection process and we hope to have the contractor engage directly with the stakeholder group once they are appointed.

Public consultation is due to commence at the end of November 2013 and run through to February 2014 to ensure sufficient time for all users to have their say in the future of the Hampstead Heath ponds. A further stakeholder group meeting is planned for 2nd December 2014.

This is by no means the end of the design process, and further dialogue is likely to happen once a contractor is appointed and the design team commence detailed design for the project. This will be a time when many other questions previously raised by the PPSG around site access, circulation, security, noise, vibration, timing of works, phasing and type of equipment used could be dealt with directly by the contractor.



Above: Members of the PPSG, City of London, Capita, Atkins and the Strategic Landscape Architect visit projects by shortlisted contractors as part of the tender evaluation process.

CONCLUSION

The introduction of the Flood and Water Management Act 2010 has altered the risk categories of dams from A,B,C and D to either High Risk or Not High Risk depending on the likely loss of life during a PMF event.

In addition to this the Flood and Water Management Act will introduce the evaluation of water bodies as cascades so that the cumulative volume of water within a chain can be dealt with under the Reservoirs Act if it exceeds 25,000m³.

In order to address this legislation the City of London have undertaken to review the Hampstead and Highgate chain in their entirety in order to ensure current and future compliance with the Flood and Water Management Act 2010 and the Reservoirs Act 1975.

There is currently a statutory obligation to have regular dam inspections by a Panel Engineer and recent inspections have highlighted the inadequacy of the Hampstead and Highgate chains to safely pass a PMF storm event without a risk of collapse.

The City of London have no alternative but to embark on a process to undertake statutory works to the dams in a manner that is, as far as possible, in keeping with the sentiments of the Hampstead Heath Act of 1871.

Whilst it is conceivable that the Panel Engineer could impose a solution to rectify the dams at Hampstead Heath, it is in the interest of all parties to work towards a solution that is both sensitive and warrantable. This involves first recognising that the problem is real and the works justifiable.

The commitment shown by the City of London to deliver an acceptable scheme has been matched by the Hampstead Heath Ponds Project Stakeholder Group who have shown incredible resolve and determination to make this scheme as subtle as possible. The consultation process, which has engaged with an organised and articulate community, has had a noticeable impact on the depth and breadth of information provided by the design team. The design team in turn have responded by putting forward a range of options that are broadly aligned to the key issues identified in the Critical Review by the PPSG.

Whilst there are still concerns among the stakeholders that the proposals are disproportionate to the scale of the problem, we need to be mindful that the design is catering for extreme events. There are still many iterations to follow before a final scheme is decided. The important issues at this stage to be decided by the PPSG are the following:

- Has the design provided sufficient resilience for the pond chains on the Heath.
- Has the design taken account of the special character of the Heath and preserved where possible that character.
- Have the solutions provided gone far enough to minimise the impact of the works within the constraints of the required works.
- Have stakeholders been given sufficient input into the key decisions that have been made.

The Preferred Options Report provides a basis on which the City of London are able to take the current proposals to wider public consultation. The options provided are an indication of the types of solutions that would address the problem identified. They are however not final design solutions and there is still scope for review once a contractor has been brought on board.

I look forward to working with the Ponds Project Stakeholder Group and the City of London in the further refinement of Atkins preferred options in order to ensure that the best possible outcome is achieved for future generations who will come to know and cherish Hampstead Heath.

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City of London Hampstead Heath Ponds Project

Non-Statutory Process for Information Giving and Consultation

26 November 2013 – 17 February 2014

Context for the Non-Statutory Consultation

This document outlines a non-statutory process of information giving and consultation to be carried out with support from Resources for Change (www.r4c.org.uk) a specialist engagement organisation employed by the City of London to offer expert and independent advice. This non-statutory consultation process will be guided by reference to the City of London's Communication and Engagement Strategy. The Strategy provides a broad framework for this non-statutory consultation process, as well as for the City's overall communication and engagement approach.

As set out in the Strategy's timeline, the non-statutory process of information giving and consultation is being rolled out at a key milestone in the Ponds Project: the development of the Preferred Options report for meeting the City of London's legal obligations to improve the safety of dams in both the Hampstead and Highgate chains of ponds to prevent them from failing, whilst maintaining the site's natural aspect as an open space. It will run from 26 November 2013 – 17 February 2014 (12 weeks). The non-statutory process is intended to support and compliment the range of other communication and engagement activities described in the Strategy, including the extensive and detailed engagement of the Ponds Project Stakeholder Group.

Note: The first two weeks of the public process from 26 November will largely focus on information giving and consultation via online methods. This will enable the process to take account of the City's internal committees' approvals process (Hampstead Heath, Highgate Wood and Queen's Park Management Committee, 25 November).

Purpose of the Non-Statutory Consultation Process

Working with the Ponds Project Stakeholder Group and informed by activities to date, options have been narrowed down to those that best meet the Design Objectives, Principles and Philosophy as originally set out in the Constrained Options Report. It is the Preferred Options for each chain of ponds, which the Non-Statutory Consultation will be focused upon.

The primary purpose of the consultation process is to inform the public about what is being done and why. Full details of the timeline of the project to date, how we have reached the current position in terms of the site constraints, hydrology and the legal context that has framed the development of the Preferred Options, will be given as part of the information giving process.

People will be given the opportunity to inform the City of London's choice of solution based on the Preferred Options report for the Hampstead and Highgate pond chains. This will involve a simple indication as to which option they prefer; however, the consultation will include an opportunity for open responses that will allow people to comment on the options by subject heading: such as amenity; wildlife; landscape; and water quality.

There will still be a planning application stage and this will involve a formal consultation for planning approval.

What the consultation element (seeking public views) will not cover

Whilst all comments will be invited and recorded, to avoid confusing the purpose of the non-statutory public consultation and / or raising unrealistic expectations the consultation will **not** specifically:

Consult on the legal context

The consultation will not cover any challenge to the legality of the need to safeguard the pond dams. Resources for Change will only consult on the proposals to address the City's legal obligations. It is not R4C's role at this stage to engage in consultation on the appropriateness or otherwise of the current UK law. This would cause confusion as to the purpose and role of the consultation.

Consult on the science

The consultation will not seek public views on the science behind the hydrology or associated modelling.

What the Consultation will achieve

We cannot expect to walk away from the consultation with a clear consensus or support, i.e. we may not get a clearly favoured option or approval from the public for the work on each of the chains. However it will highlight issues (significant or otherwise) that the City Corporation or Atkins need to take account of in approving or refining the chosen options to address the concerns of the public about the impact of works on the Heath and it will give a sense of where public feeling is in its reaction to the proposals.

Who we will seek to reach

There has been significant engagement already with key stakeholders which will continue. The purpose of this process, both its information giving and consultation, is therefore to 'reach out' to others who may be affected and have had less involvement to date, with a focus on those with a defined interest in the issues raised by the Ponds Project work. These are identified as:

- Users of the ponds and immediate surrounds
- Those living within the vicinity of pond chain areas
- Users of the Heath
- Those having a specialist interest in the Heath (e.g. bird watchers)
- Off site - those within potentially impacted area in the situation of a dam failure
- Those who may potentially (or have reason to think they will) be impacted by the Ponds Project when works take place
- Wider public (considered beyond scope apart from information sharing)

The non-statutory public consultation will therefore focus on the following groupings identified within the City of London's Communication and Engagement Strategy, based on the nature of their interest in the issues raised by the ponds safeguarding work as listed in the bullets above.

- Individual members of the public
- Recreational groups
- Advisory and user groups
- Neighbours and residents
- Wildlife and science groups
- Religious and ethnic groups
- Volunteers
- Local schools and youth groups
- Those with local business interests

Baseline data

The City's existing data would be used to ensure that outreach to and coverage of the above listed groups in the roll out of the process is robust. We would expect this would include the following kinds of data:

- City of London statistics on visitors/users
- Data currently held by the City on the residents', advisory and user groups what they are and their contact details
- Contact data already supplied by individuals who have registered their interest in the Ponds Project via previous information giving and consultation exercises undertaken by the City of London.

The following groups are either already involved or there are separate, defined mechanisms that already exist by which the City of London is able to engage them at the appropriate time; this may not be necessary until the statutory consultation process:

- Hampstead Heath Consultative and Management Committees
- The Ponds Project Stakeholder Group, which has representatives from Heath user & interest groups and local residents' groups.
- Staff
- Local, regional and national elected representatives
- Local Authorities with jurisdiction adjacent to the Heath
- Statutory consultees

Proposed Information Giving and Consultation Methods

Both the information given and the consultation questions asked need to be clear. The topic is extremely complicated. It is important that plain English and precise, non-ambiguous language are used. Clear explanations should be provided of any project specific terms used. There is a lot of detail informing the need for the project and its options development which is too much to present in the public consultation. However those reached by the public process also need to have easy access to all the background information, including information on the legal and scientific background, should they wish to consult it in more detail.

The following activities are proposed to help ensure the public (with a focus on those affected or potentially affected) are informed and able to comment:

Public meetings

Note: We have not chosen this method since in our experience it will not reach or give a voice to the general public as effectively as the methods below.

On site methods

Parliament Hill and mobile caravan drop-ins

At Parliament Hill, a simple, visual display situated in the garage space in the staff yard near the café where it is clearly visible from the path. The purpose of the drop-ins would be to maximise access for the public to information about the project and an opportunity to give feedback on the Preferred Options at a very busy Heath location. The drop-ins' displays and facilities would include the following material:

- Information boards summarising the project timeline to date
- Information boards summarising the options considered and their pros and cons
- A more detailed summary (with images) of the preferred option(s) on a handout for people to take away
- Questionnaires to give feedback on the options for people to fill in or take away
- A post box for questionnaires to be returned
- Postcards for people to take away which signpost where further information and feedback opportunities can be accessed.
- Information collection pin boards to gain a sample of visitor numbers and their profiles (age, gender, etc) for use when the drop-ins are staffed.

This should be open to the public as much as possible over the consultation period as an unmanned display and be staffed at times of high footfall.

In parallel, a mobile caravan unit, encapsulating the broadly the same range visual information, (adapted to fit the available space) and feedback materials will be available to widen the coverage of the drop-in facility across the Heath, particularly for the Hampstead chain of ponds.

Site information

Information boards should be located at all sites where works are proposed. The purpose of the site information is to enable people to understand the Preferred Options in their immediate location and get an enhanced understanding of what the impacts of them might be. It also engages Heath-users attention in the Ponds Project and its proposals at a specific point of interaction or interest for them

This site information would include:

- Summary information boards on the proposed changes
- Instructions on how to comment / location of other information
- Visual markers and other methods of helping people understand the proposals
- Dispensers for the consultation postcards

Guided walks at key areas

The public would be able to meet staff from both Atkins and the City of London to hear about the options on the Ponds Project work first hand. This would be at the key areas on the Heath such as the Model Boating Pond, Men's Bathing Pond, Highgate No. 1 pond, Mixed Bathing Pond and the Hampstead No. 2 pond. This would provide an opportunity to 'ask the experts' and would complement the on-going work the Heath management team have already done. This kind of 'on the spot' information giving will make the work and options more meaningful and easier for people to understand. The Guided Walks at Key Areas would be advertised by the City of London for example in the local press and on boards around the Heath to indicate which days they were available.

Participants would then be encouraged to complete questionnaires (i.e. the same as those provided at the drop-ins) at the end of the talk, having had their interest and understanding stimulated by that. If possible, there should also be pin boards set up for basic information collection (age, gender, etc.) at these Key Areas to gauge the use of the events. This is because not all people may complete questionnaires, and may just be attending to gain understanding what is happening and only responding if they have a concern or problem.

Involvement of City of London staff

City of London staff will be briefed on the project and the non-statutory process. This will enable selected staff to provide additional support at the Heath drop-ins and at the walks at key areas. A key benefit will be that, on a more ad-hoc basis, staff will then be able to provide informed, spontaneous assistance to the public and direct Heath users to the planned information and feedback opportunities described above.

Off site methods

Stalls at strategic public locations

To be carried out by Resources for Change in collaboration with City and Atkins staff within the area potentially:

- The downstream community
- Living within vicinity of pond chain areas
- Adjacent to transport hubs e.g. over-ground stations

The primary purpose of the stalls would be to provide information on the ponds project including its purpose and rationale. Feedback would also be possible via the stalls. The stalls would comprise:

- Information boards summarising the project timeline and options considered and their pros and cons
- Map of the site
- A more detailed summary (with images) of the preferred option(s) on a handout for people to take away



- Questionnaires to give feedback on the options for people to fill in or take away
- A post box for questionnaires to be returned
- Postcards for people to take away which signpost where further information and feedback opportunities can be accessed
- Information collection pin boards to gain a sample of visitor numbers and their profiles
- Pin boards for feedback on people's preferred options

Consultation Support Materials

We propose to develop the following consultation components to support the above activities and enable the public to be informed and to comment:

Questionnaire

The consultation questionnaire would be available online and also as a paper take-away from consultation stalls, the Parliament Hill and caravan drop-ins and guided walks. This would provide an introductory summary and links to the web based information.

Postcard

Primarily a simple postcard with a set of visual images of the ponds on the front (possibly showing the ponds at a number of periods in history plus the proposed options) could be used as an information giving tool. The postcards would then have simple summary on the back, locations for further information and link to the website information and an on-line questionnaire.

As well as being accessed at the Parliament Hill & caravan drop-ins, the guided walks, the site information points, and the consultation stalls as described above, the postcard should be made widely available around the Heath (café, swimming ponds). They could also be distributed in cafes and other venues with the potentially affected areas (local vicinity of the works or potential areas affected by dam failure).

Online information

Information is already available on the City of London website. However, its location is not immediately obvious and so a clear hyperlink is required via the other information-giving materials.

Record Keeping

Responses will all be kept anonymous (and we will highlight this approach in the questionnaire). All of the consultation methods could request people's contact details should they wish to be kept informed and this information would be collated separately in order to be made available to the City of London. Analysis may be undertaken with regards to respondents' post codes (the first part and first digit of the second part).

A full final report will be produced to inform the City of London and Atkins so that they can take account of public feedback in their decision-making and final chosen option. A two-sided summary report with visuals should also be produced for wider public circulation.

Feedback Loop

In addition to the above, we would expect the City of London provide some kind of report-back on the feedback that they have received from the consultation via the above reporting and to share this publicly. This 'feedback loop' would for example reflect on and address the key findings reported from the consultation and state how Atkins/City of London had been able to incorporate them (or not) in the next stages of decision-making. At the same time information should also be provided on what the next steps are for the project, including any future consultation opportunities for the public. This information as well as being posted on the City's website could also be circulated to those stakeholders who have provided their contact details via the consultation.

Publicity

Work will be required around the advertising and publicity of the public process such as local media, leaflet drops and posters around the Heath for the launch of the non-statutory consultation process, which will be undertaken by the City of London with additional advice from Resources for Change. This will include the announcement of the drop-ins and site information, availability of online questionnaire and postcards; specific dates for activities such as the guided walks at key areas, and stalls in public locations.