ATKINS

CITY OF LONDON

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:

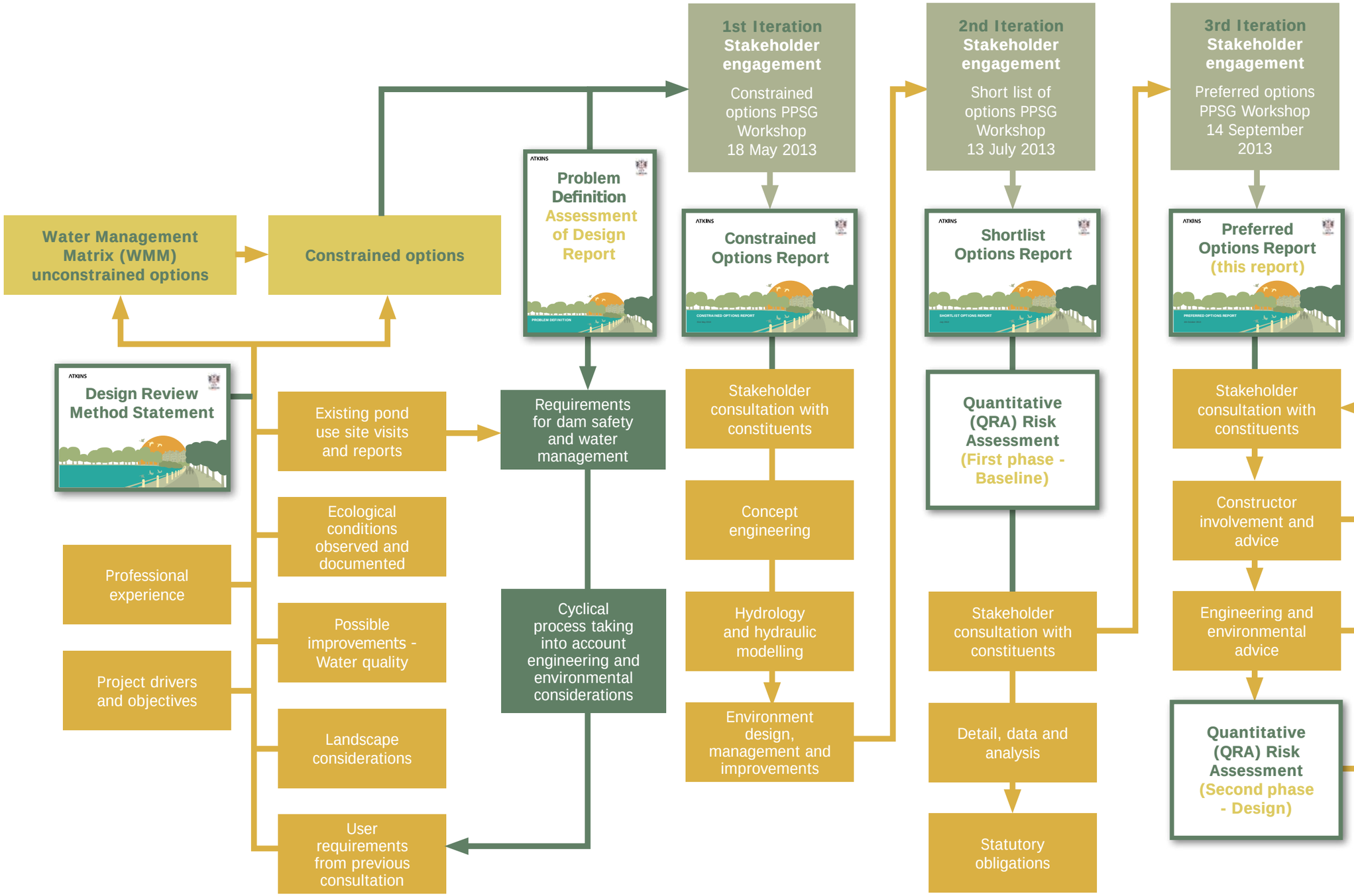
- Comments on the Design Review Method Statement and the Assessment of Design Flood Report,
- The Critical Review, where the Strategic Landscape Architect asked the stakeholders about their concerns and preferences, then captured these into a document given to the City of London and Atkins,
- Constrained 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 12,000m^3 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.

Highgate Chain - Modelled Options flowchart

Preferred options as at 26/09/2013

Stock Pond	Crest restoration by 0.5m max Spillway 500mm deep, min 21m base width, 33m upper width, plus 2 new 900mm dia overflow pipes	
Kenwood Ladies Bathing Pond	Crest restoration by 0.2m max Spillway 800mm deep, 15m / 34m wide	
Bird Sanctuary	Crest restoration by 0.1m max no spillway works	
	Option 4	**Option 6**
Model Boating Pond	Dam raising **+2.0 metres** Spillway 1100mm deep, 20m base width / 46m upper width	Dam raising **+2.5 metres** Spillway 1000mm deep, 20m base width / 46m upper width
Mens Bathing Pond	Dam raising + 1.5m Spillway 750mm deep, 25m / 43m wide	Dam raising + 1.0m Spillway 750mm deep, 25m / 43m wide
Highgate No.1 Pond	Dam raising +1.25m Spillway 570mm deep, 60m / 74m wide	Dam raising +1.25m Spillway 570mm deep, 60m / 74m wide
Flows downstream in PMF (existing scenario PMF flow, including flows round dam at Highgate No.1 Pond = **38.0**m^3/s)	PMF output flow: **32.7**m^3/s	PMF output flow: **30.9**m^3/s
Standard of protection (existing standard of protection of last pond in chain = **1 in 100 year flood**)	Standard of protection **at least 1 in 1000 year flood**	Standard of protection **at least 1 in 1000 year flood**
Option status	Preferred	Preferred

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.

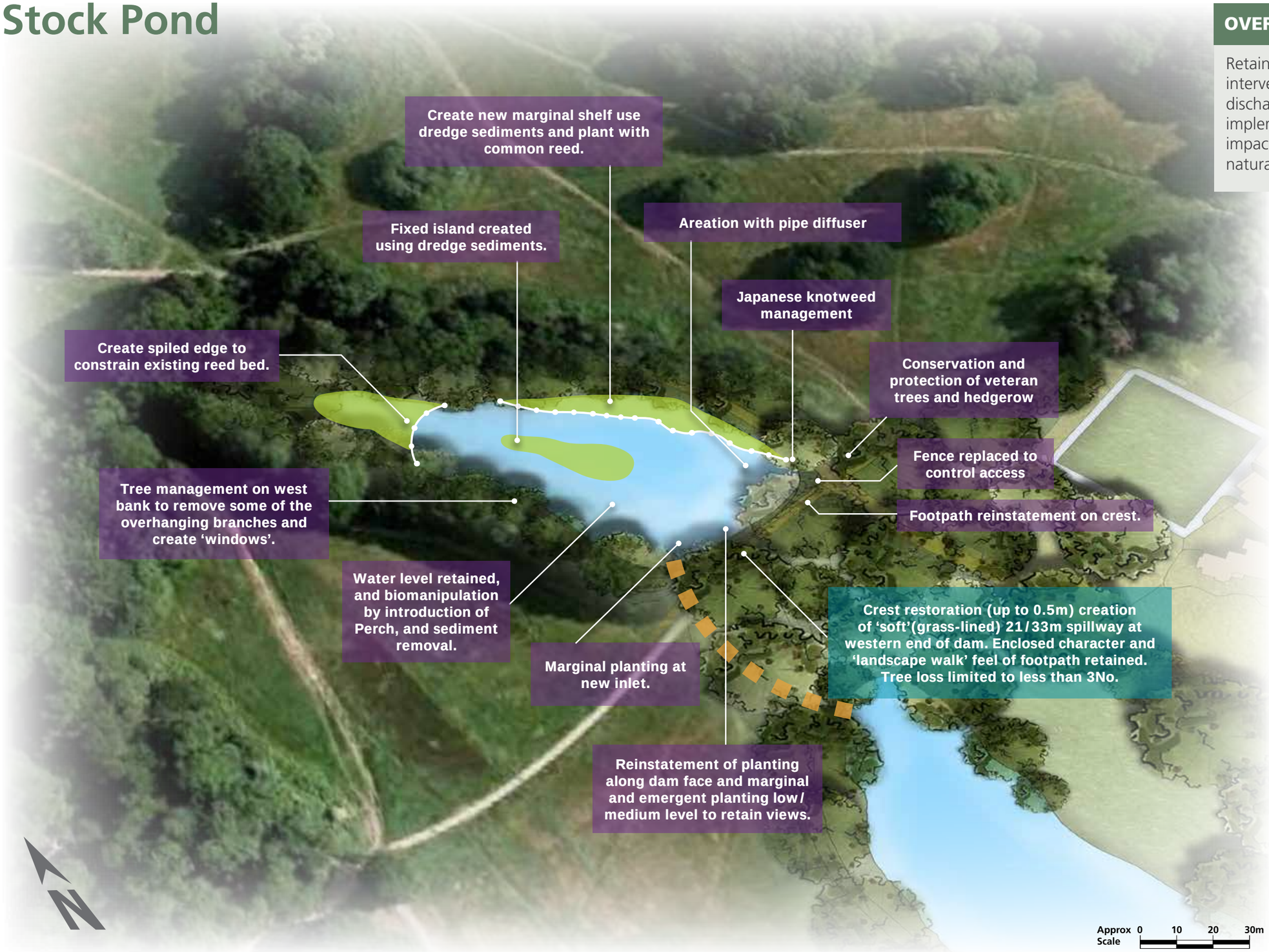
View Point 12 – View to north east along dam from south west of Stock Pond - Existing

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.



Environmental engineering.

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

Indicative centreline of possible spillway location.

Kenwood Ladies Bathing Pond

5.6 Proposed works involve:

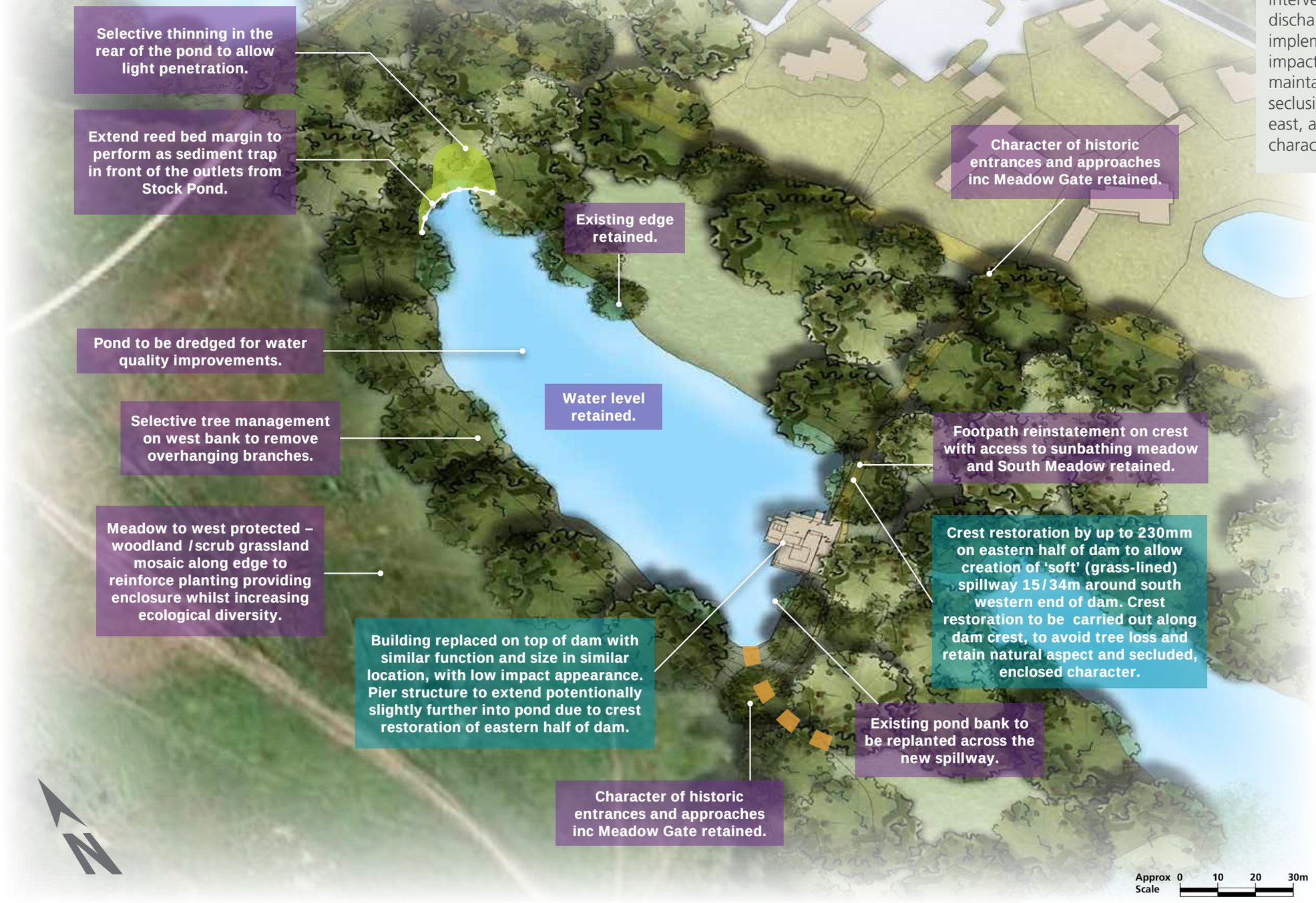
- Crest restoration works to bring up the eastern half of the dam by up to 230mm.
- An open channel spillway to be installed around the western end of the dam, subject to further surveys/ investigation and design development. This spillway would be 800mm deep and if required could have have side slopes 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.

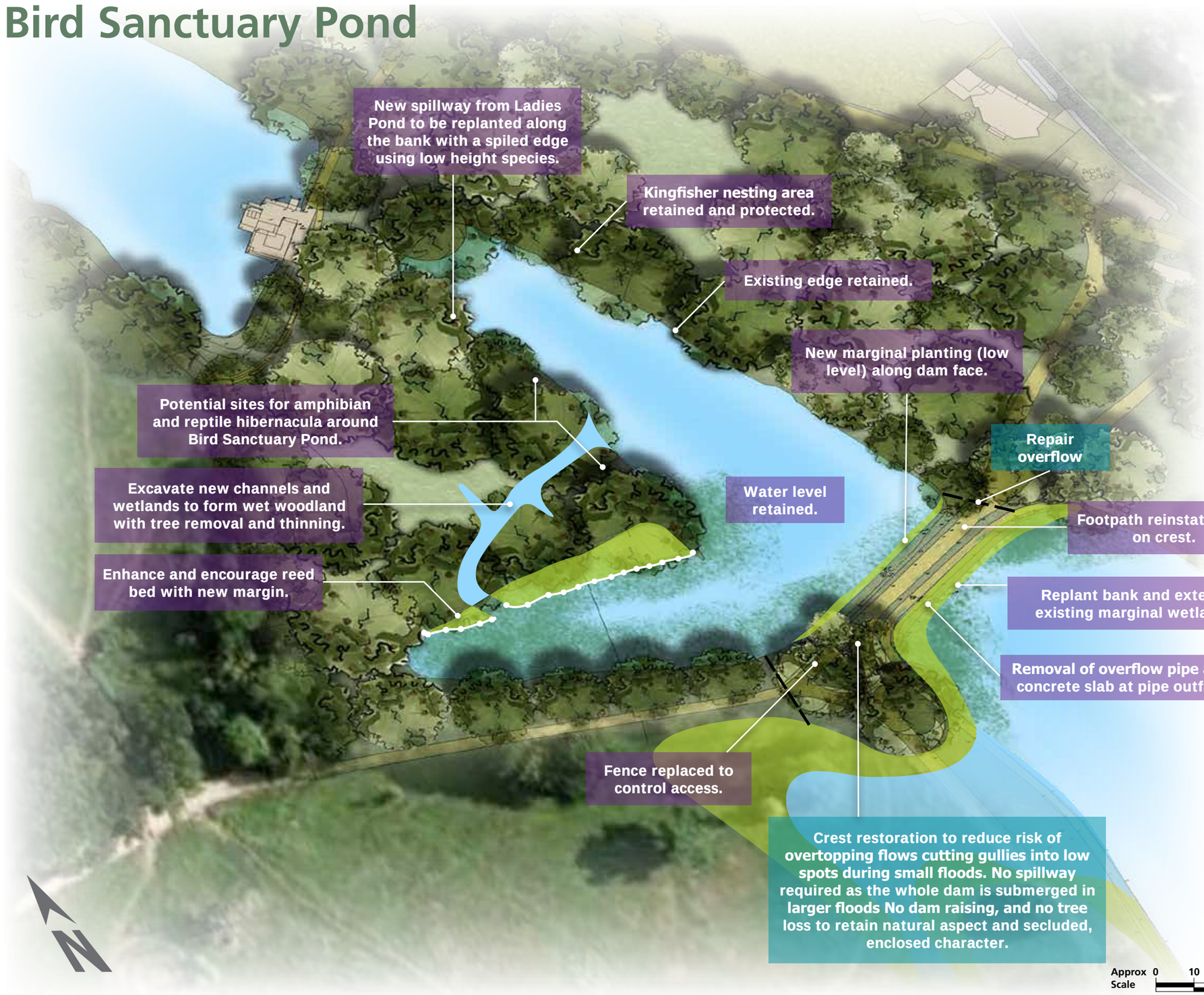
Kenwood Ladies' Bathing Pond

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.



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.

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)

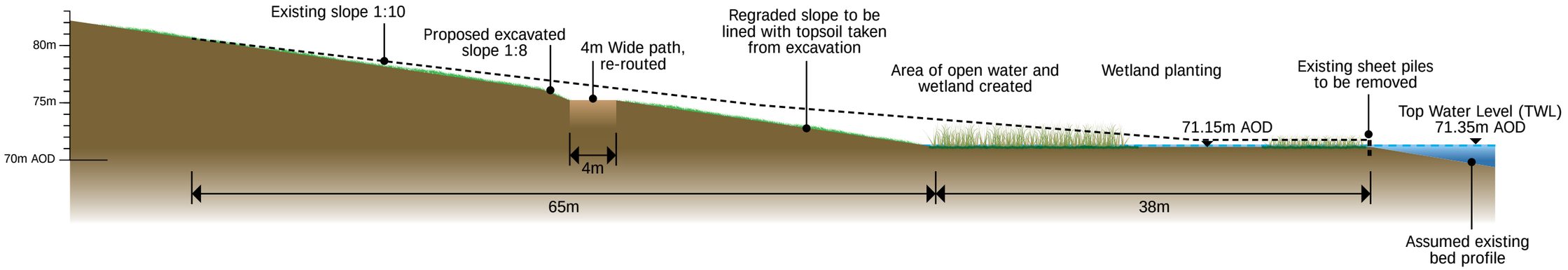
View Point 6 – Across Model Boating Pond looking South
Existing

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

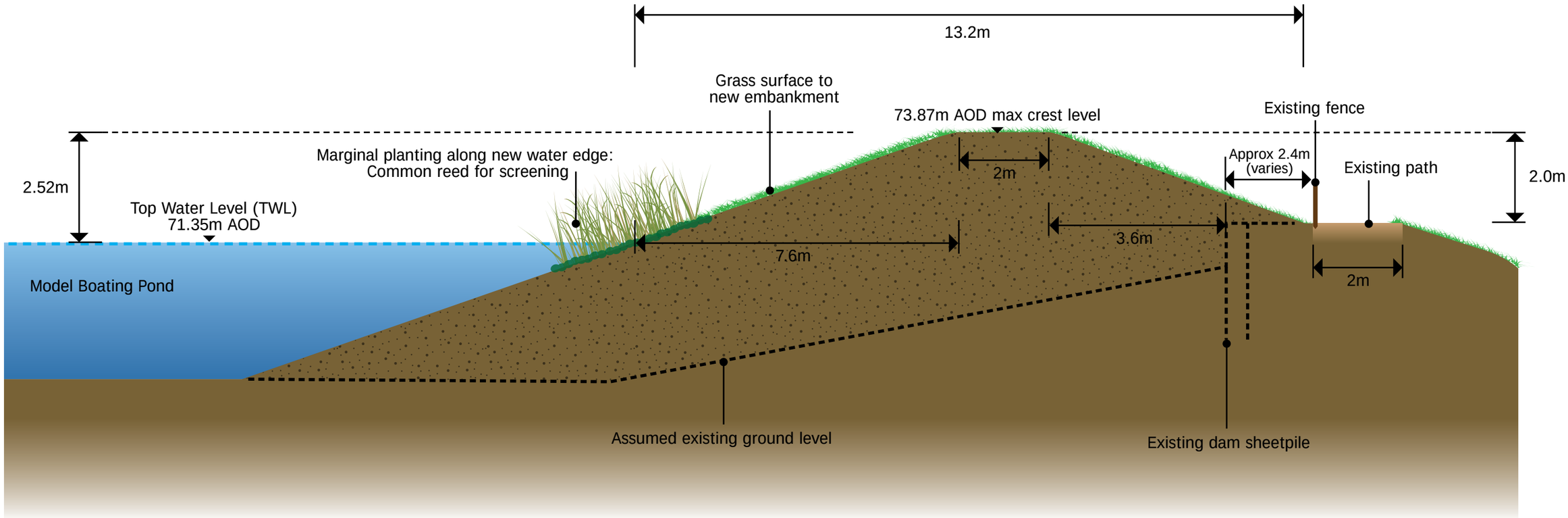
View Point 8 - View across Model Boating Pond looking East
Existing

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

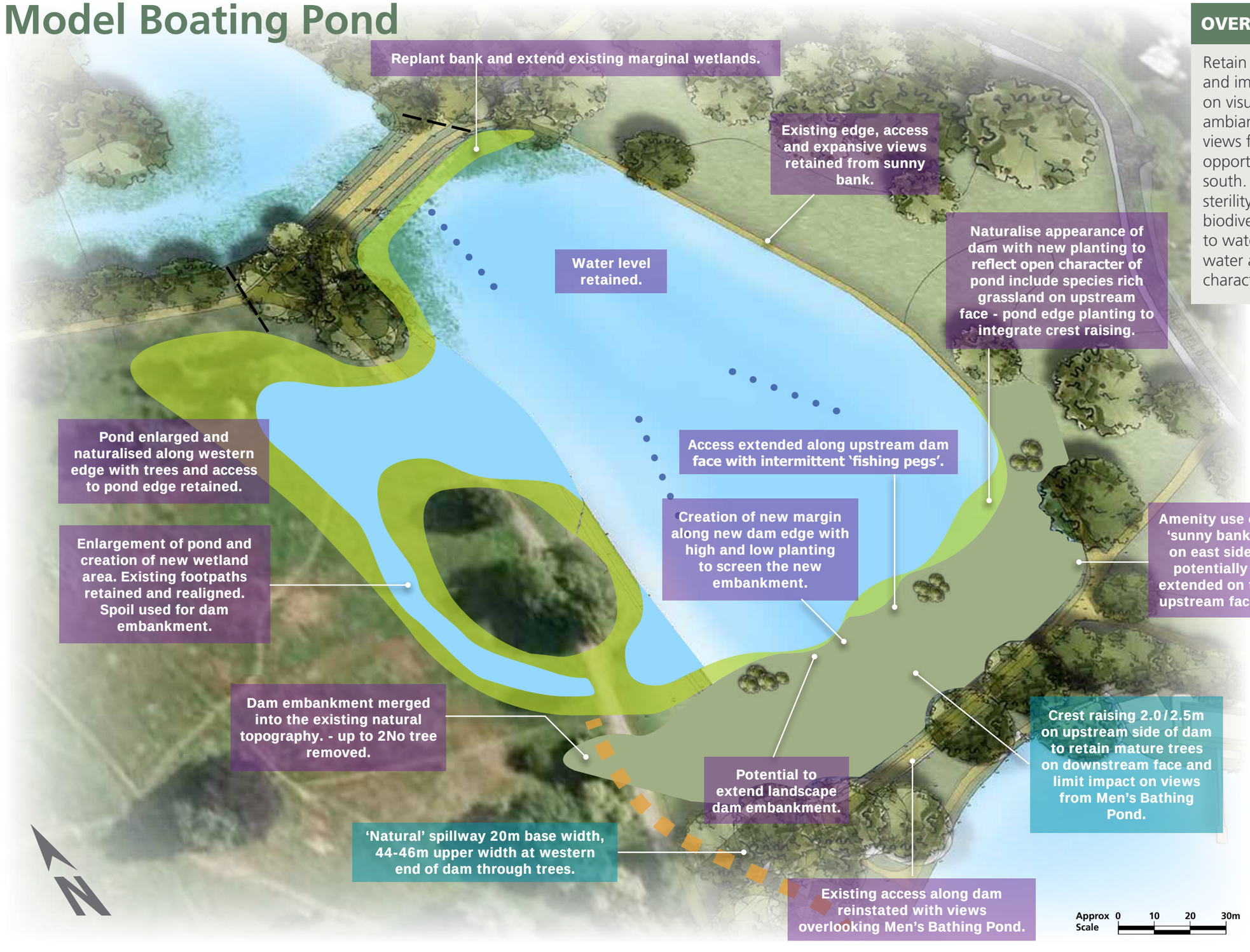
Cross section of widening / excavation at west bank of Model Boating Pond



Model Boating Pond Option 4 - 2.0m raising



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.

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

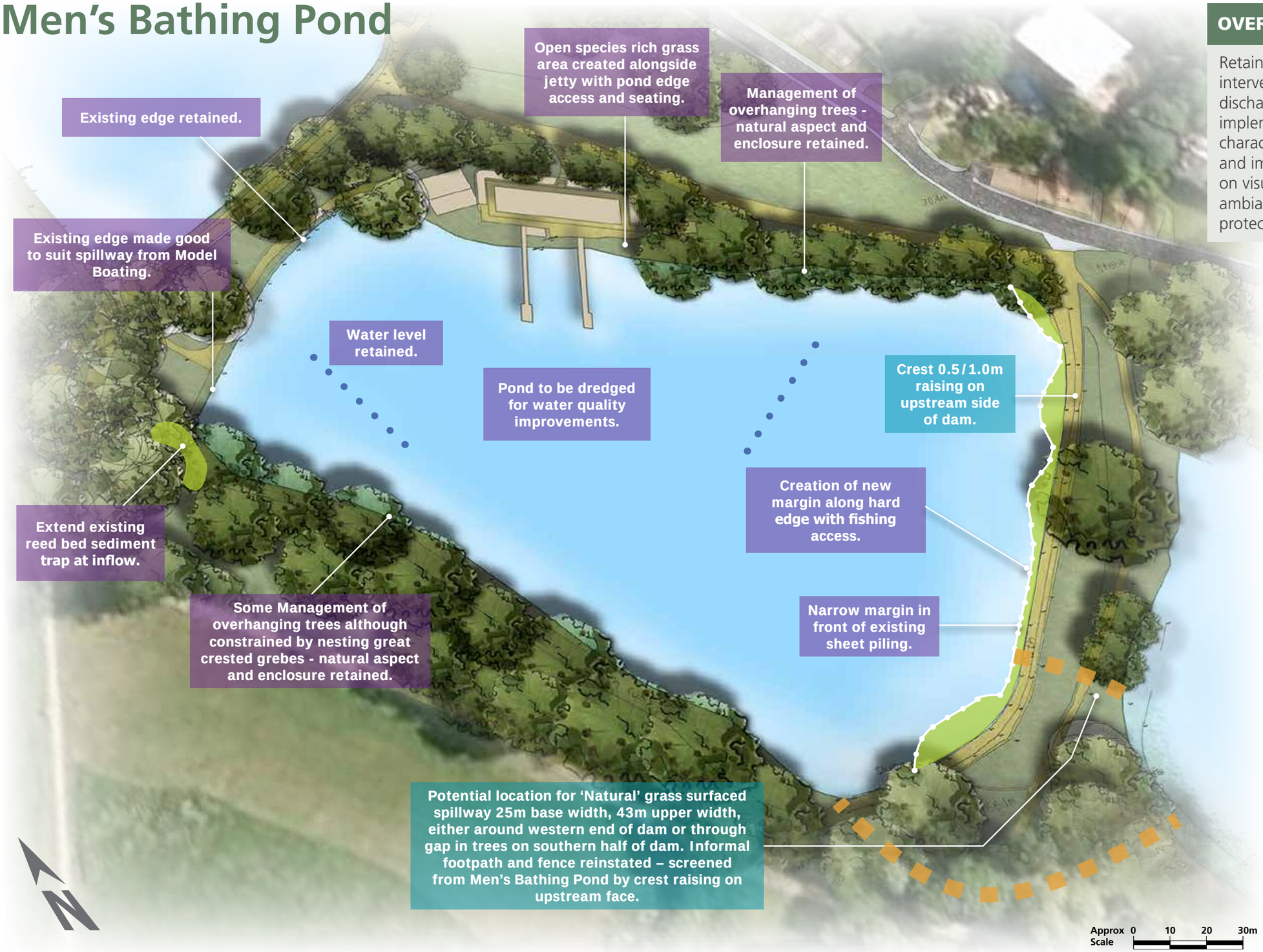
View Point 9 - View across Mens Bathing Pond looking South
Existing

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.

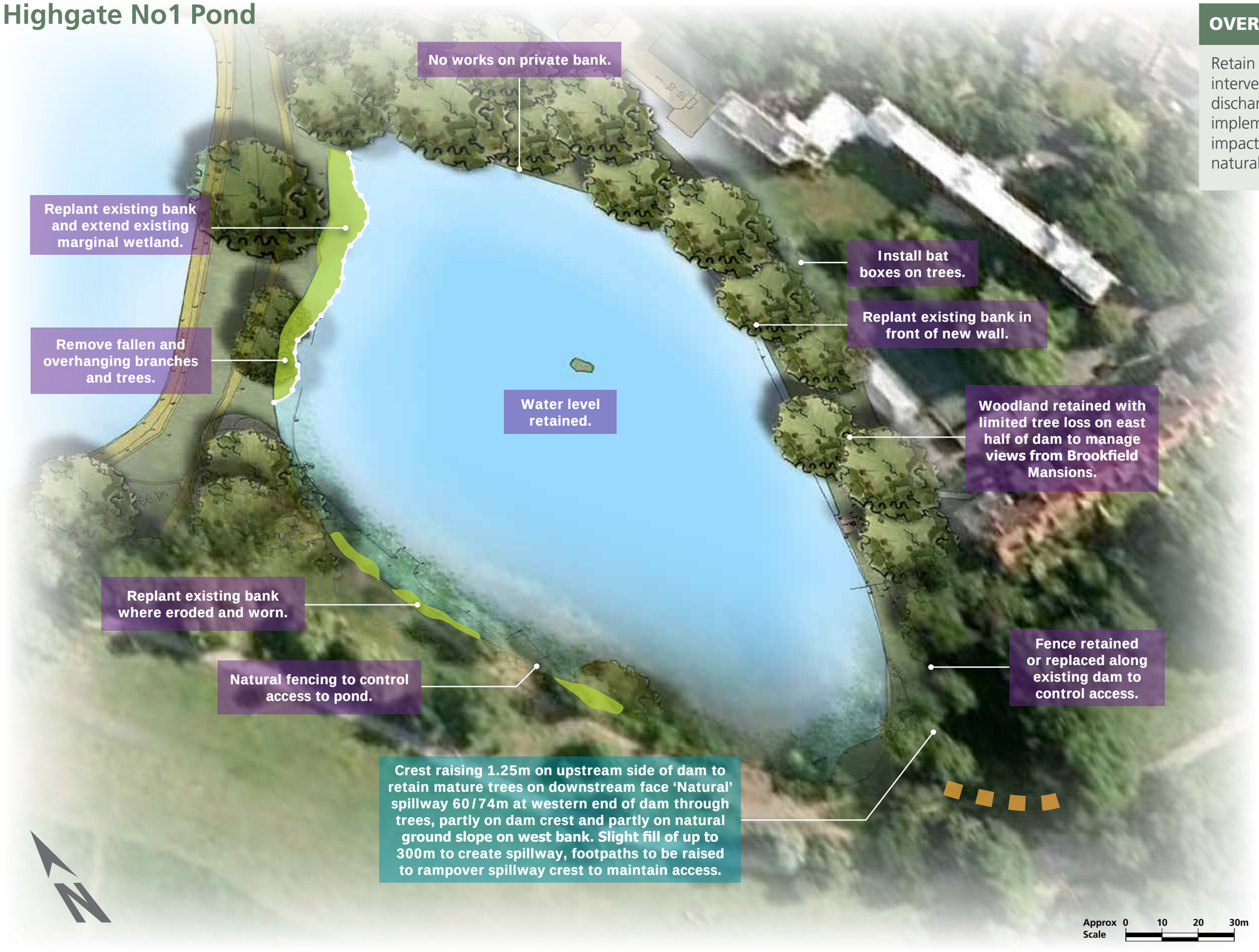
View Point 10 – Across Highgate No. 1 Pond looking South
Existing

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.

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

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 and 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)

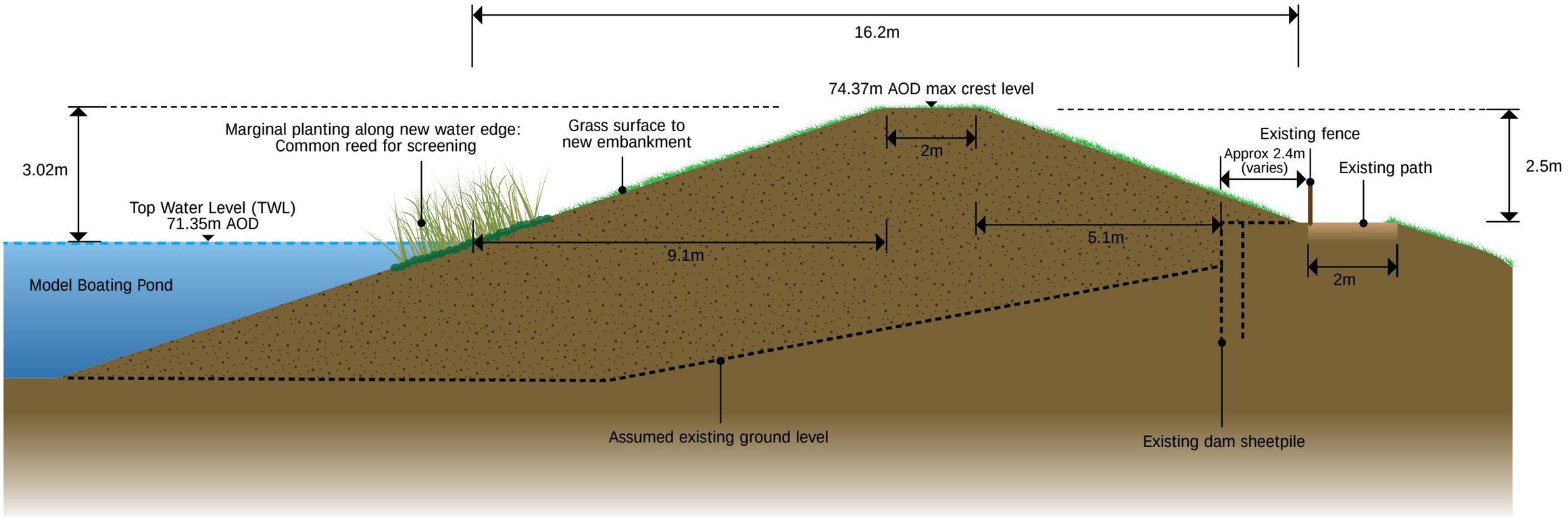
View Point 13 – View south west / west across Model Boating Pond from sunbathing bank in east
Existing

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



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.

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

View Point 9 - View across Mens Bathing Pond looking South
1m Raising (option 6)

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 38m^3/s. In Option 4, the peak flow over the spillway is modelled at 32.7m^3/s and the peak flow in Option 6 is 30.9m^3/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

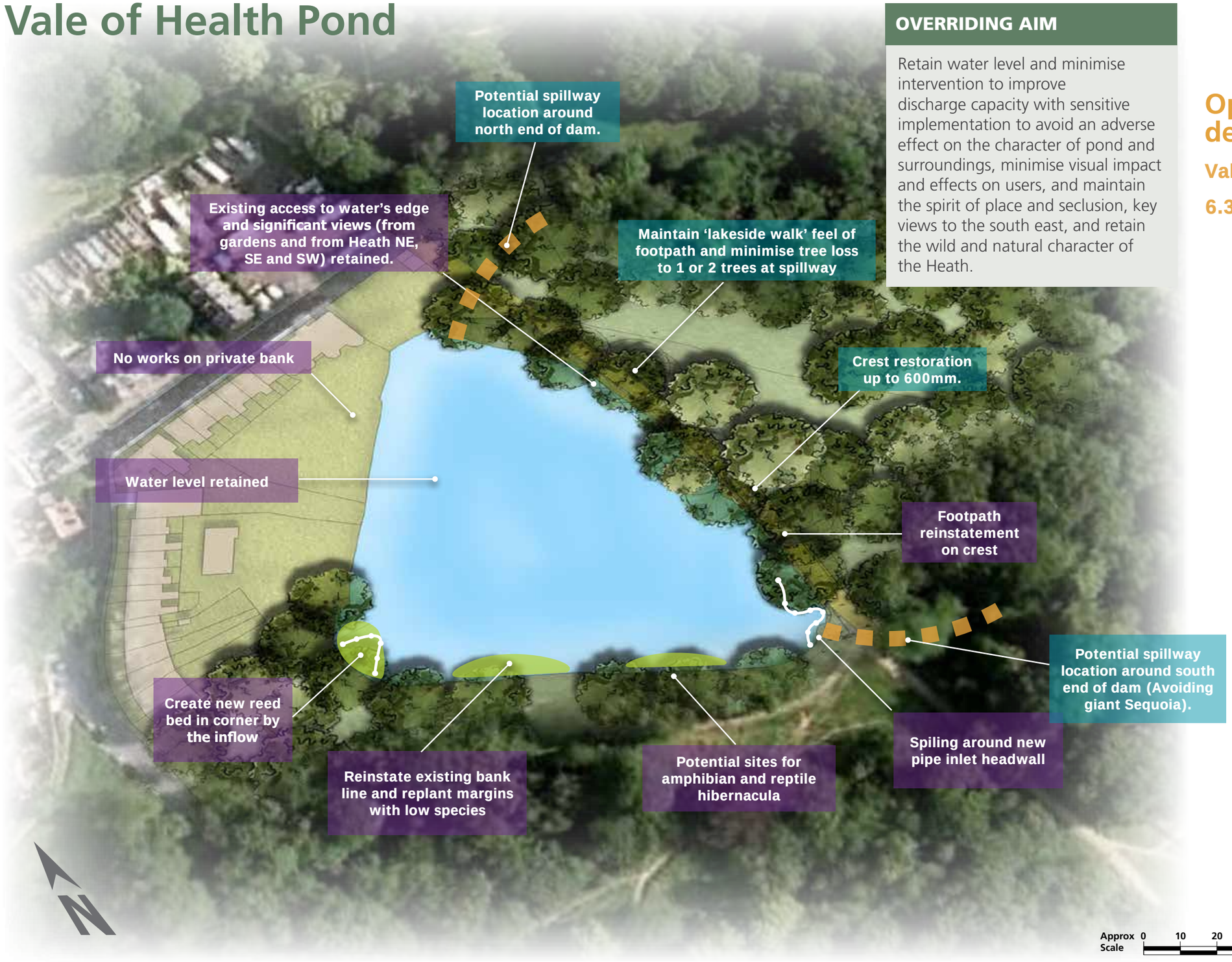
Details of Preferred Options - Hampstead

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.

Hampstead Chain - Modelled Options flowchart
Preferred options as at 26/09/2013

	Vale of Health Pond - all options	Viaduct Pond - all options
	Crest restoration by 0.6m max Spillway 550mm deep, 5m base width / 18m upper width	Crest restoration by 0.2m Spillway 300mm deep, 4m base width / 11m upper width
Catchpit Area	**Option M** New dam 5.6m high with 300mm pipe. Spillway 500mm deep, 80m /dished	**Option P** New dam 5.6m high with 300mm pipe. Spillway 500mm deep, 80m /dished
Mixed Bathing Pond	**Option M** Dam raising +1.0m Spillway 300mm deep, 25m / 32.4m wide	**Option P** Dam raising +2.0m Spillway 310mm deep, 17.1m / 24.5m wide
Hampstead No.2 Pond	**Option M** No raising Box culverts, 340mm below EGL, 3No. 300 x 3000mm wide = 9.6m total width. 2 plane trees lost	**Option P** Crest raising with 0.5m high wall Raising by max 0.5m with crest wall. 1No. Box culvert, 400 x 5000mm wide (5.2m total width). 1 plane tree lost
Hampstead No.1 Pond	**Option M** Box culvert 400 x 4500mm wide, 600mm deep	**Option P** Box culvert 400 x 4500mm, 600mm deep
Flows downstream in PMF event (existing scenario PMF outflow = 7.6m^3/s)	PMF output flow = **3.3**m^3/s	PMF output flow = **1.4**m^3/s
Standard of protection (existing standard of protection = more than 1 in 1,000 year flood)	Standard of protection **more than 1 in 1,000 year flood**	Standard of protection **more than 1 in 10,000 year flood**
Option Status	Preferred	Preferred

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:

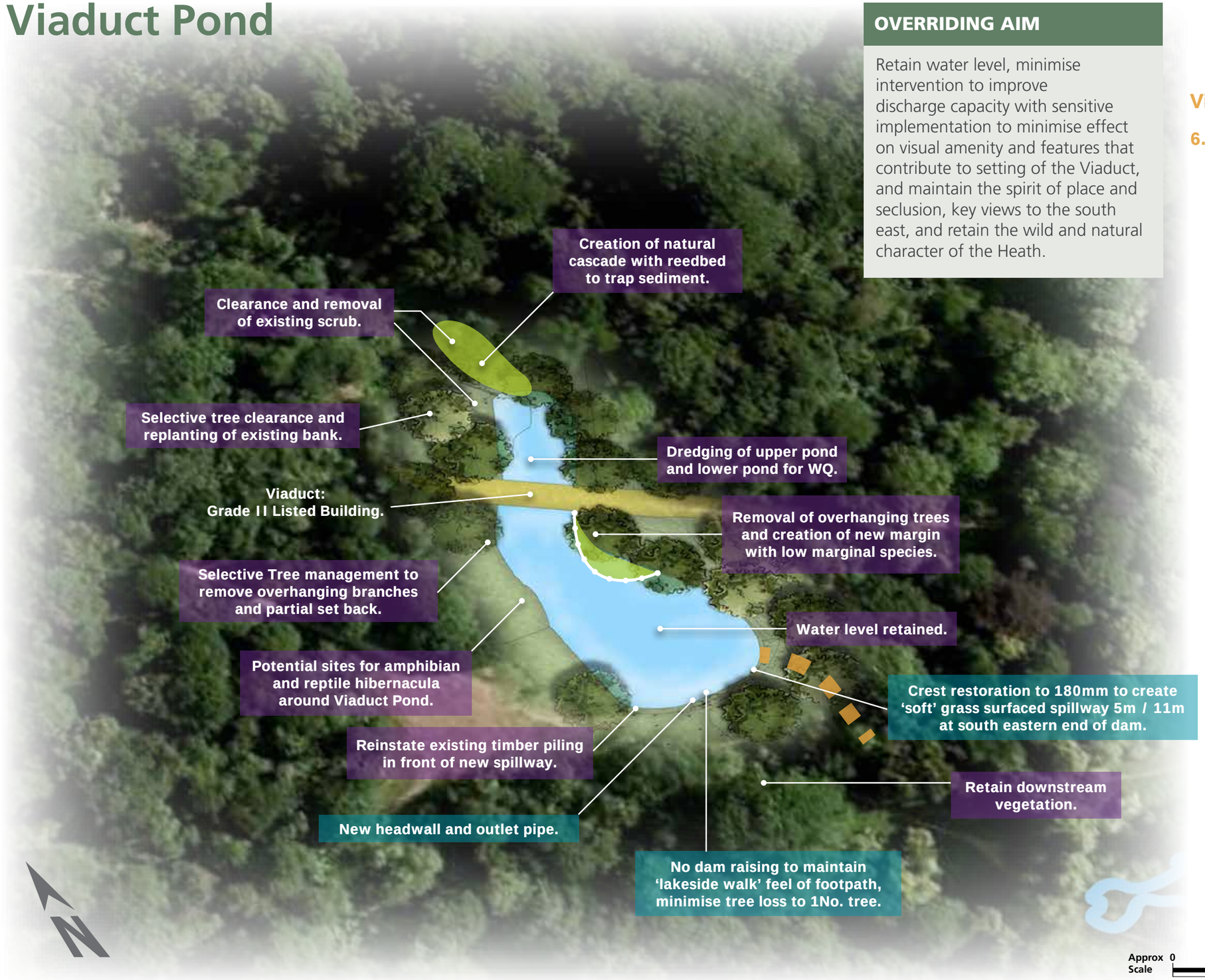
- Crest restoration of the dam to a maximum of 0.6m above the lowest dam crest level.
- An open channel spillway, 550mm deep, 5m wide at the base, 18m wide at the top of the 1:12 side slopes, reinforced with topsoil and grass surface. The spillway will be located to run around either the south or north 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.

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.



Environmental engineering.

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

Indicative centreline of possible spillway location.

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.

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.

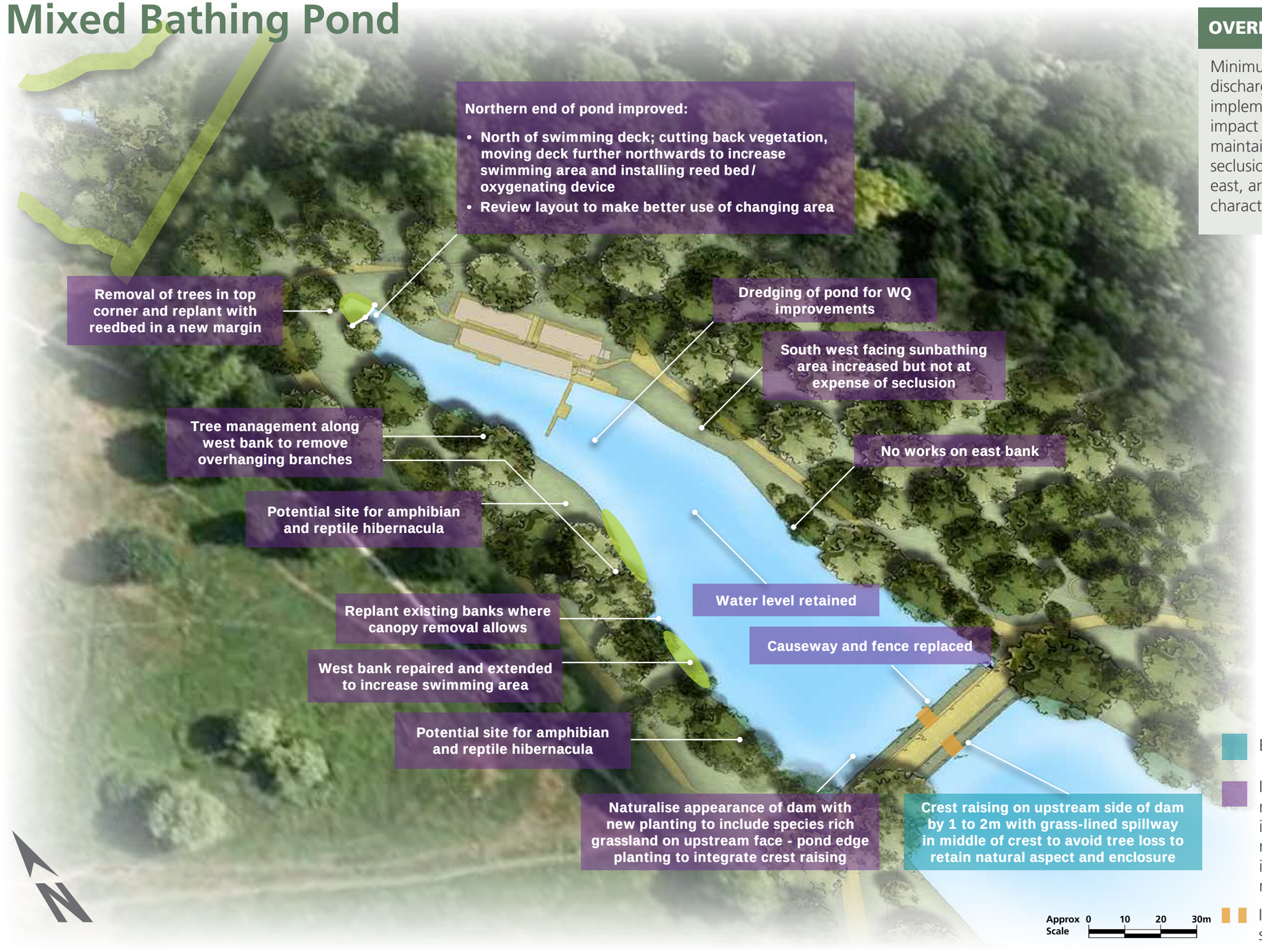
View Point 11 - View South across Mixed Bathing Pond
Existing

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.

Environmental engineering.

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

Indicative centreline of possible spillway location.

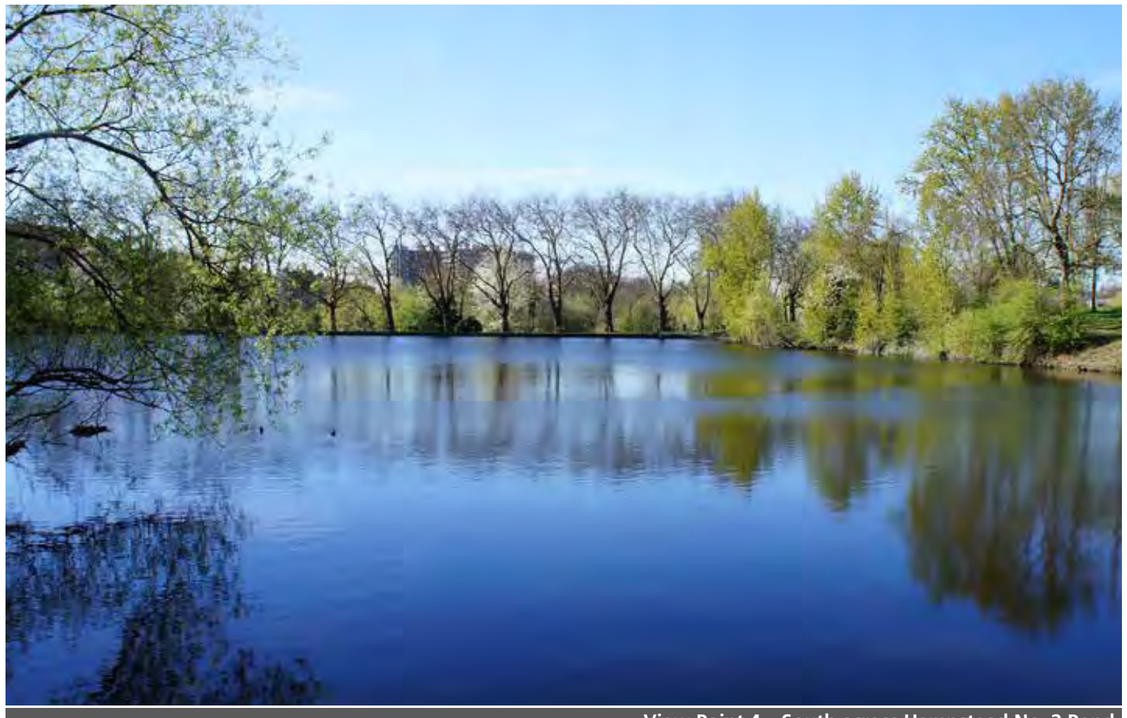
Hampstead No.2 Pond

6.9 In Option M the proposed works here involve:

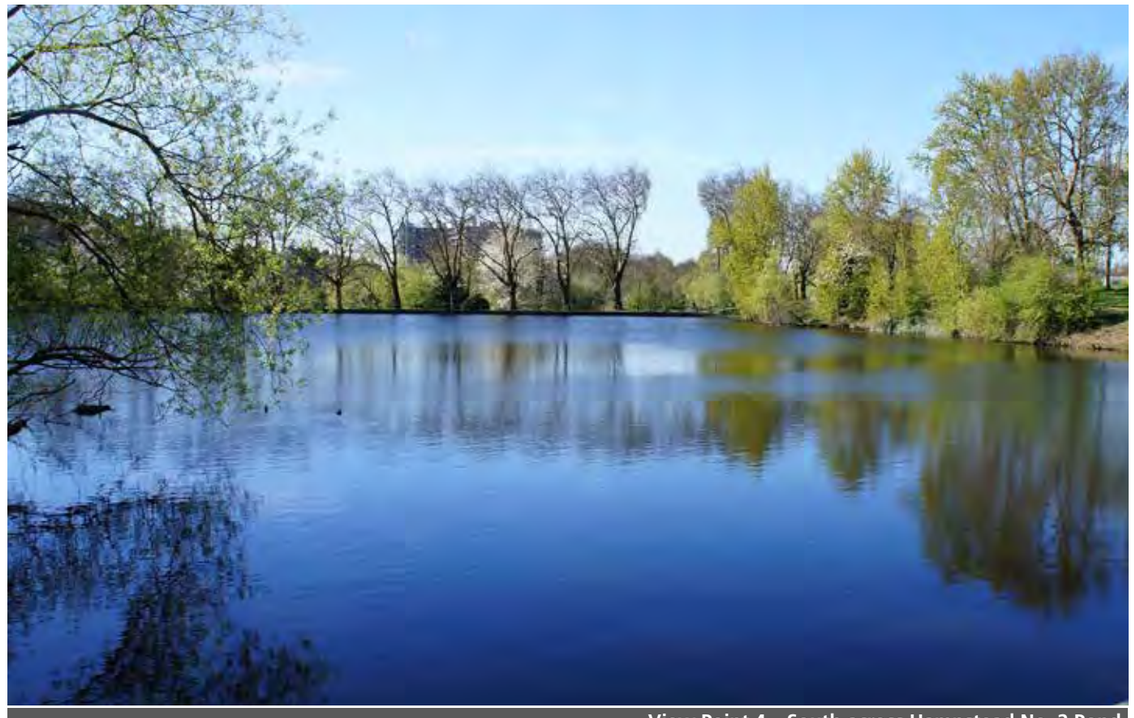
- Installation of three reinforced concrete box culvert spillways through the upper dam crest at the southwest end, each 300mm deep x 3000mm wide, making a total of approximately 9.6m wide,
- Reinforced grass open channel spillway starting from the exit of the box culverts and running down the downstream 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.

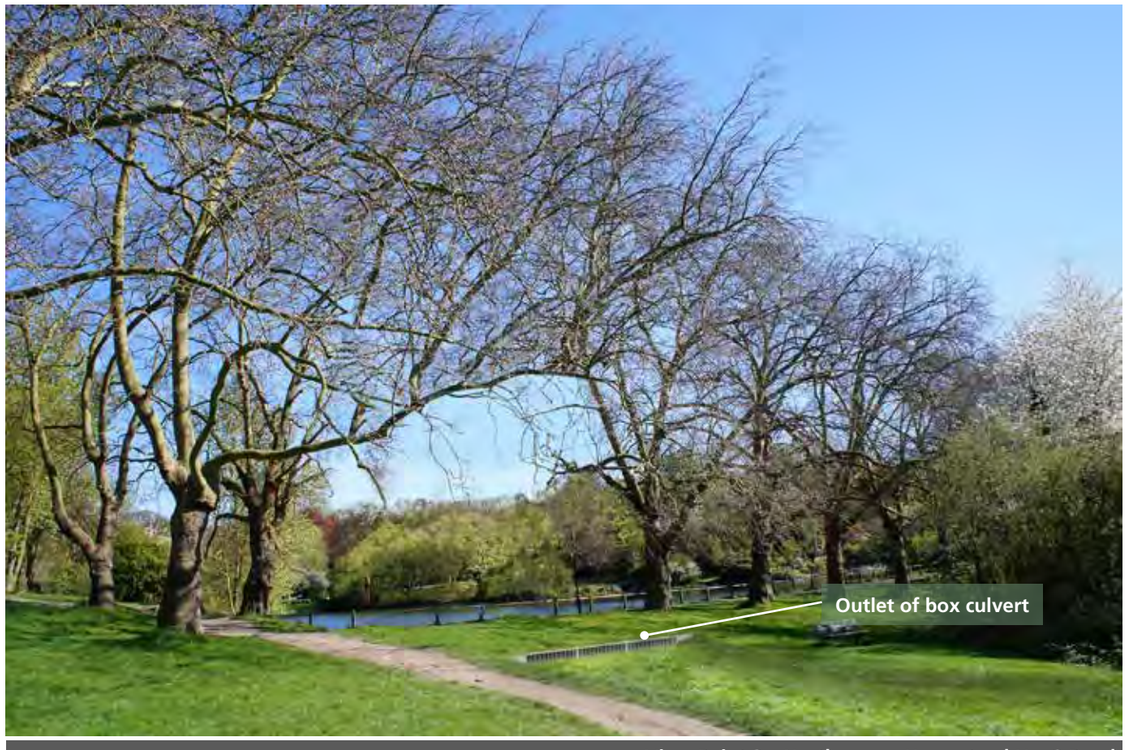


View Point 4 – South across Hampstead No. 2 Pond
Existing



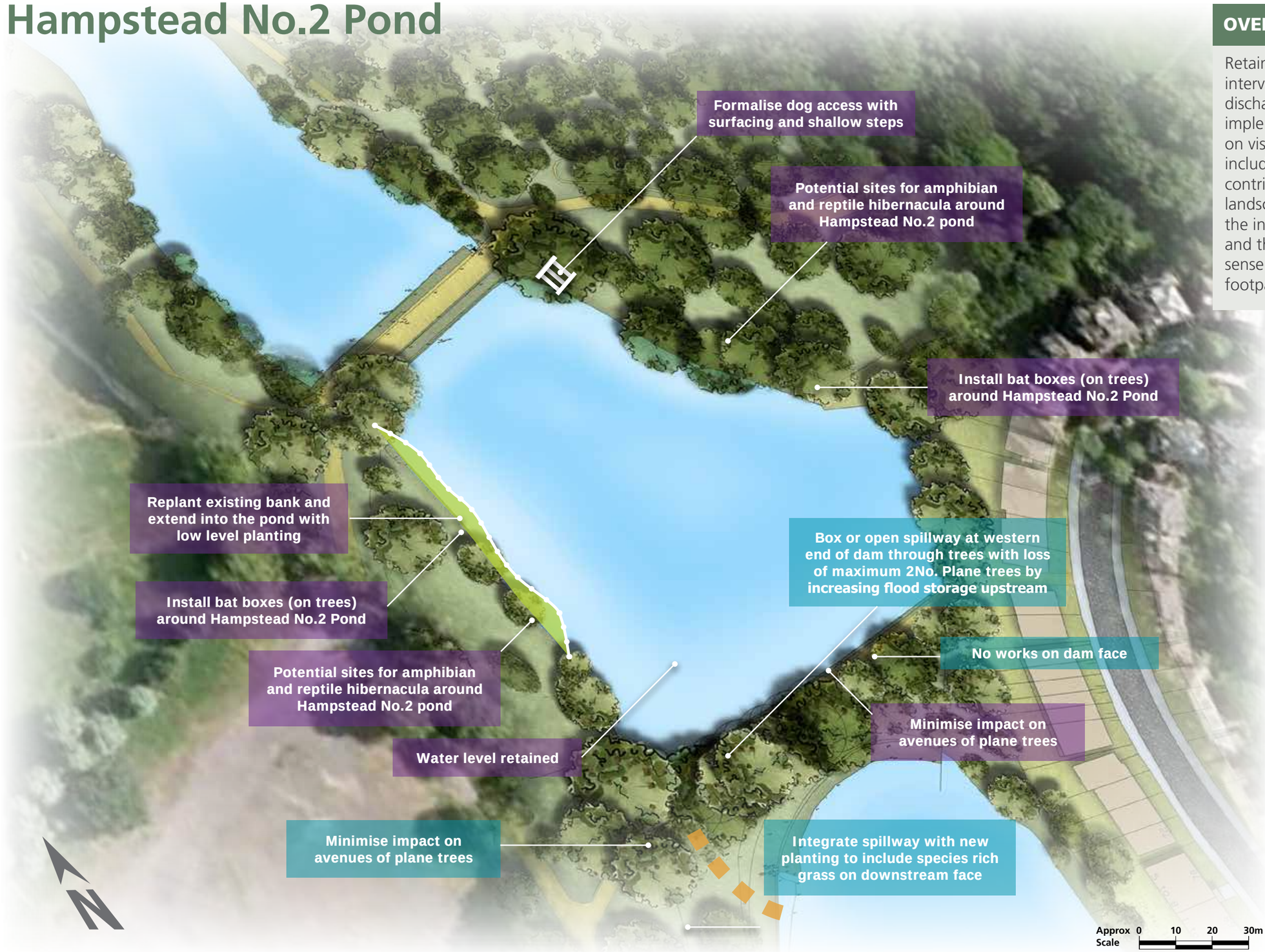
View Point 4 – South across Hampstead No. 2 Pond
2 Plane Trees Lost, 3 x (300 x 3000mm) culverts (option M)

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.

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

Hampstead No.1 Pond

OVERRIDING AIM

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

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.

Approx Scale 0 10 20 30m

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

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)

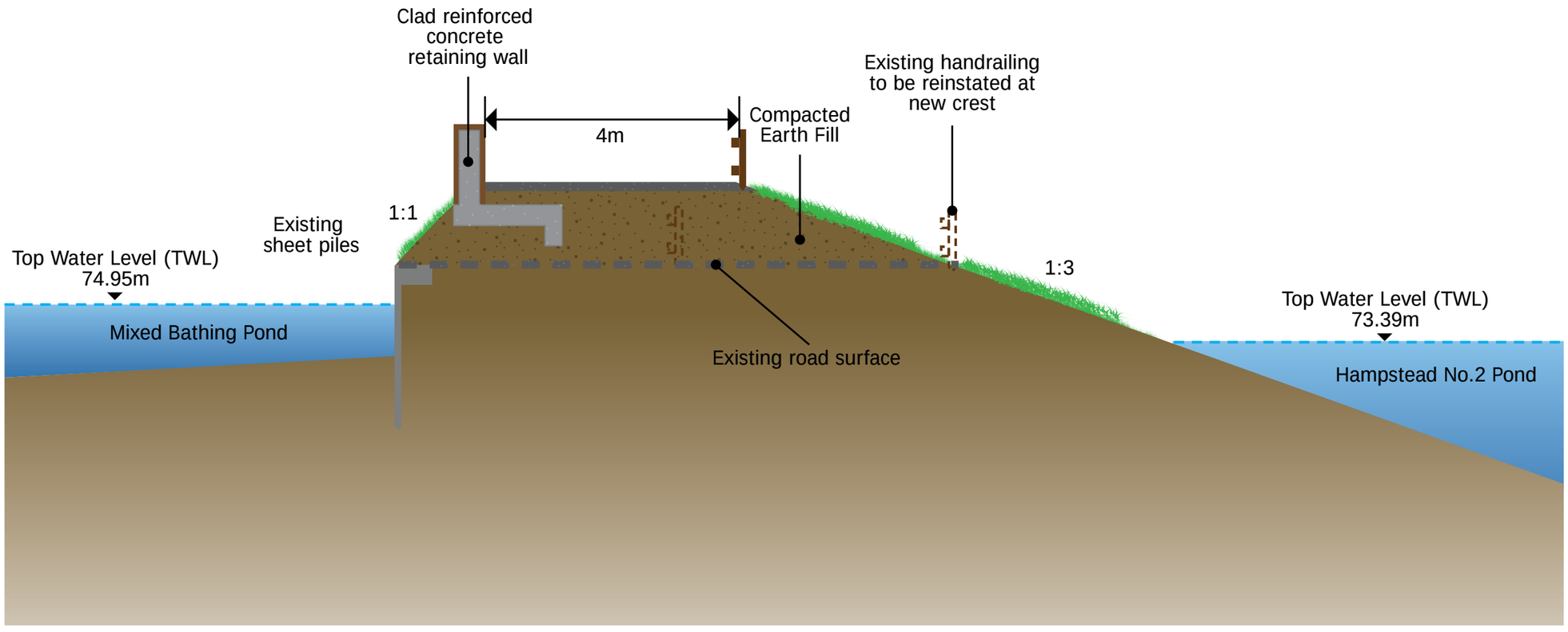
View Point 11 - View South across Mixed Bathing Pond
Existing

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

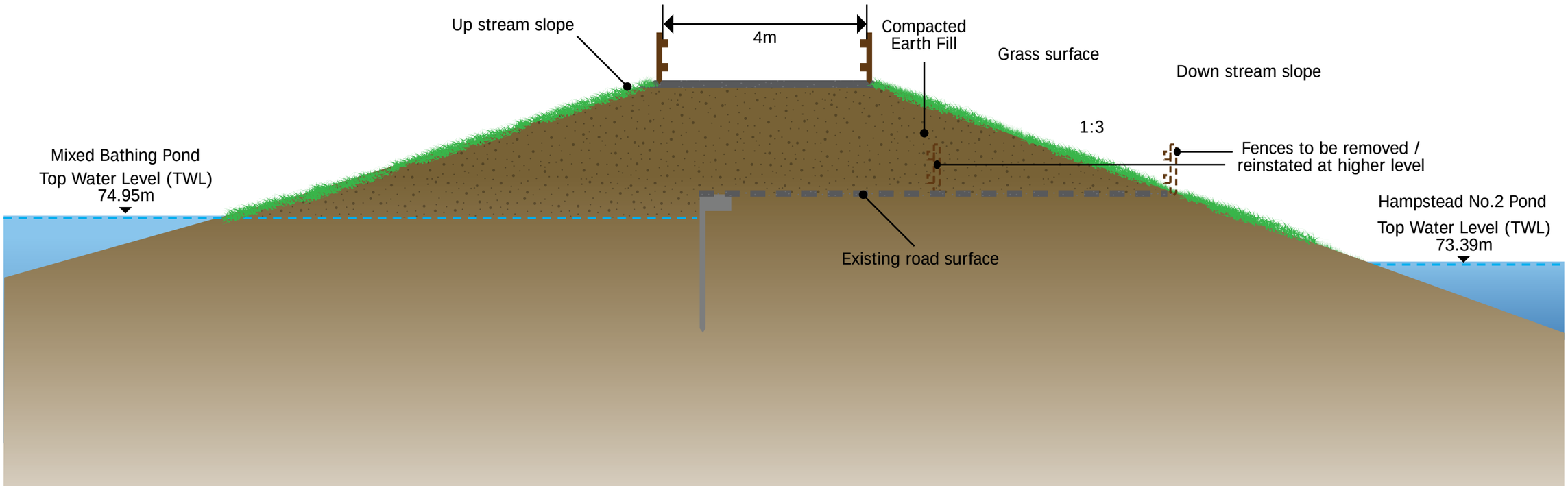
View Point 2 – Across Hampstead No. 2 Pond North to Mixed Bathing Pond
Existing

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



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



Hampstead No.2 Pond

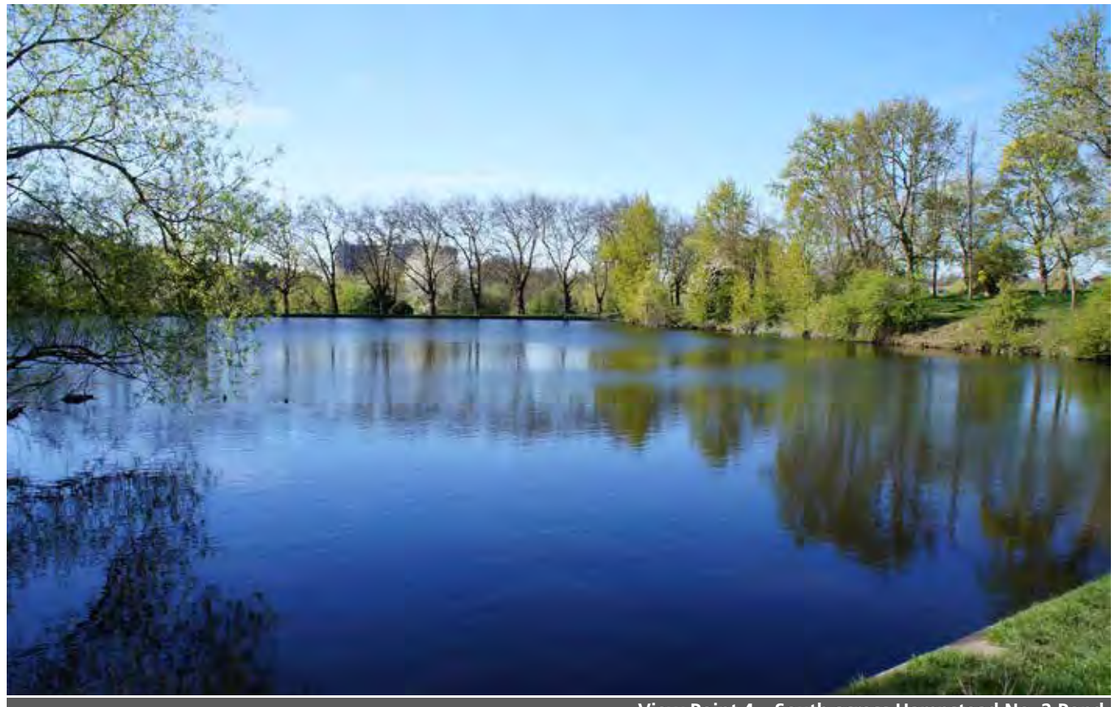
6.15 In Option P the proposed works here involve:

- 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.

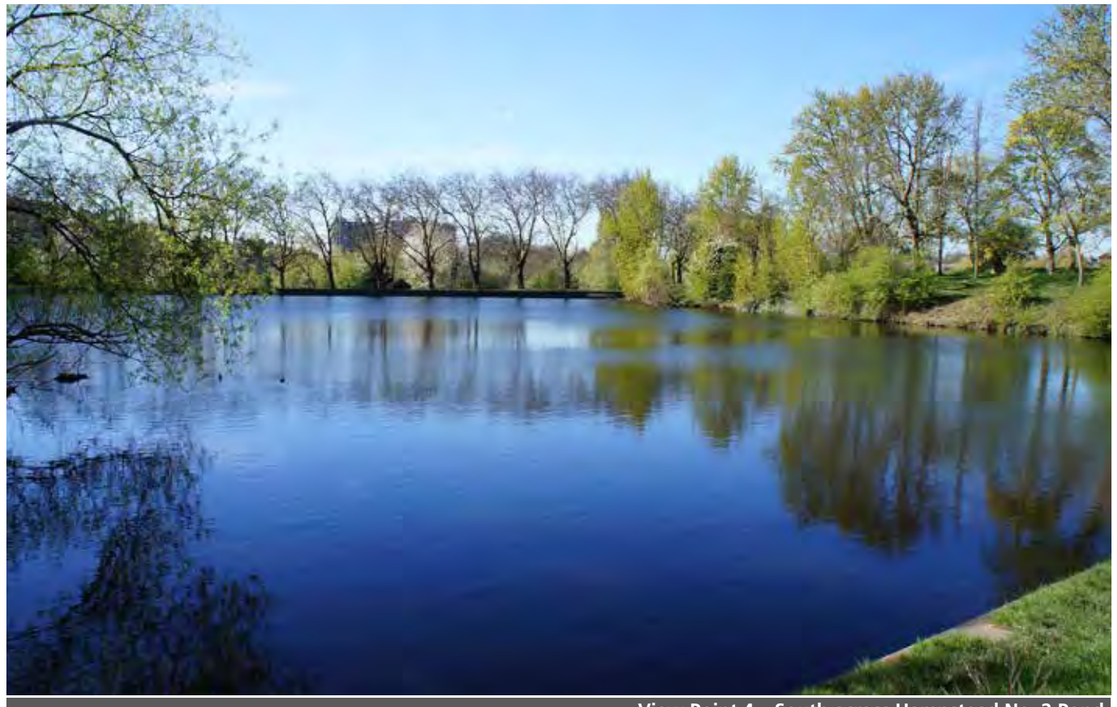
6.16 By adding storage at this dam, and maximising storage at Mixed Bathing Pond, the loss of plane trees is reduced to one.

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

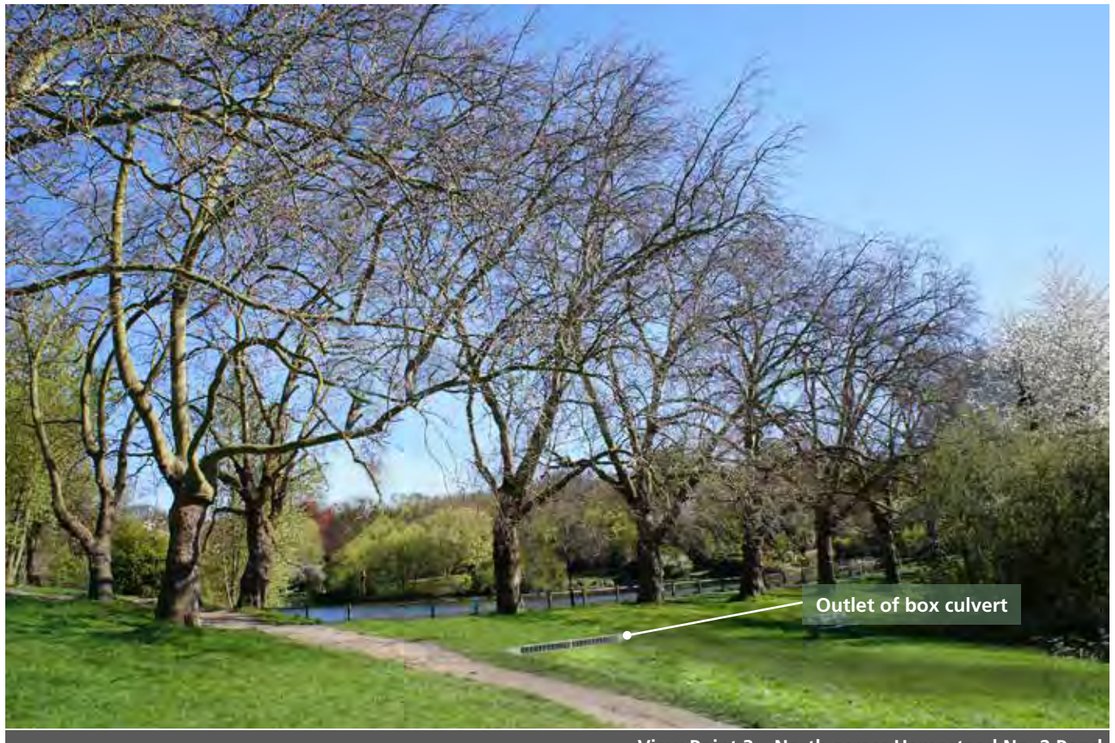


View Point 4 – South across Hampstead No. 2 Pond
Existing



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 24,700m^3) 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 11,760m^2.

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

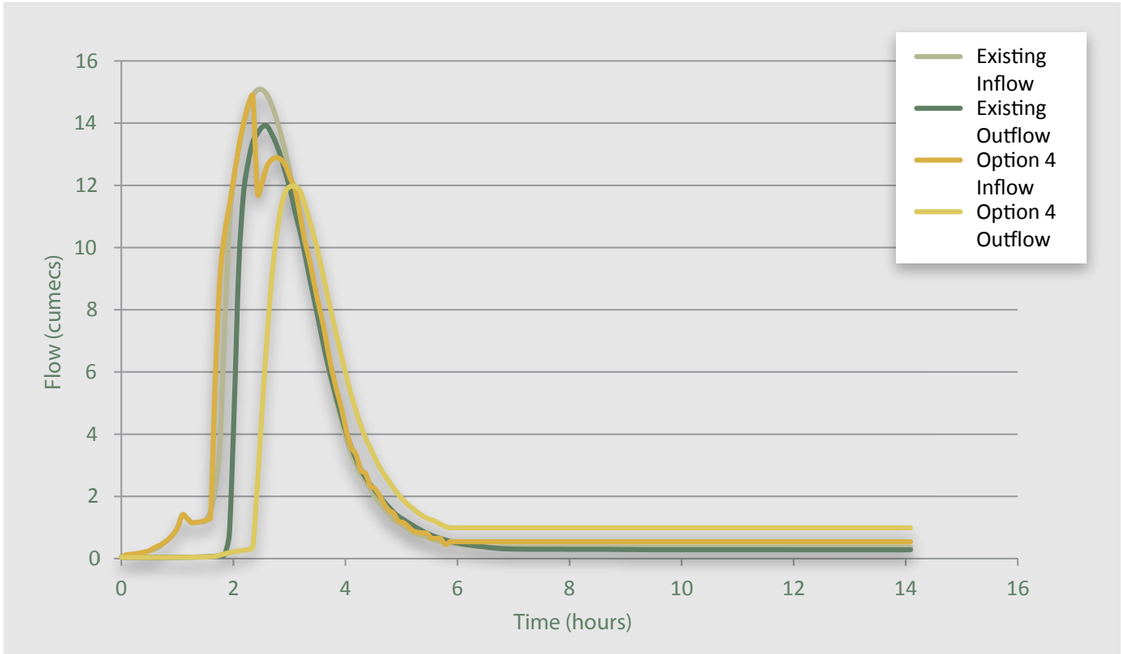
The following hydrographs are intended to show the differences between inflow and outflow in both the existing scenario and a typical proposed option scenario (where extra flood storage capacity is added upstream in the pond chain). The flows are extracted from the hydraulic model and are given in 'cumecs' (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:

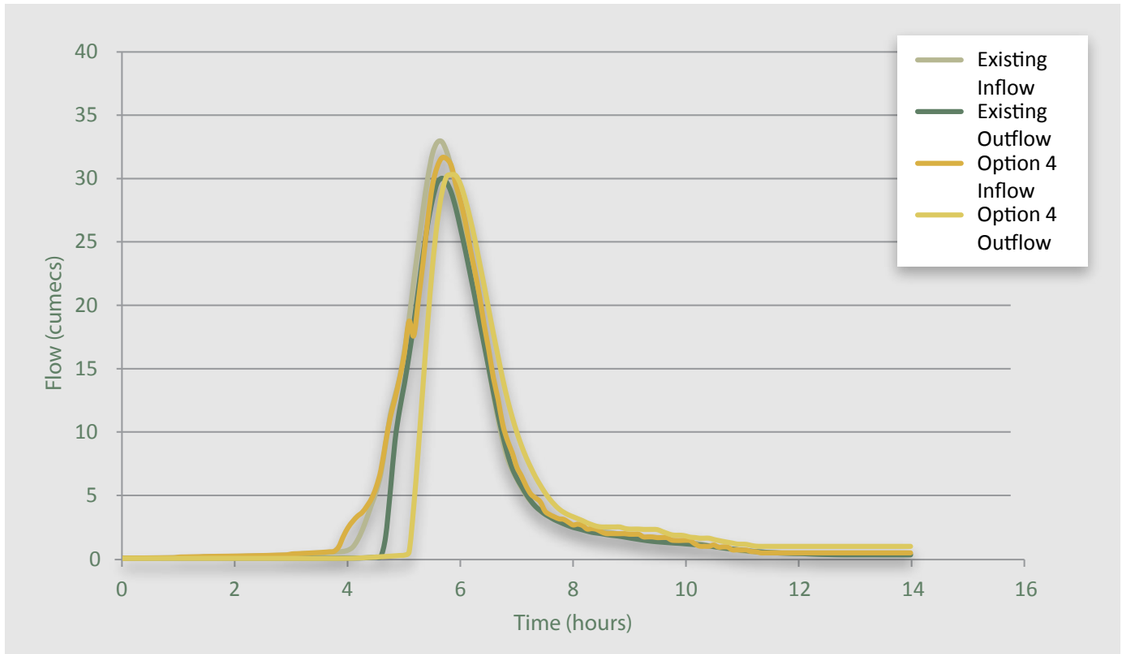
- The peak outflow occurs after the peak inflow, due to the storage capacity in the pond (either existing or in an option). This time difference, or 'lag' tends to be increased when extra storage is added.
- The peak outflow is usually less than the peak inflow, due to the flood storage capacity in the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

Model Boating Pond - 10,000yr



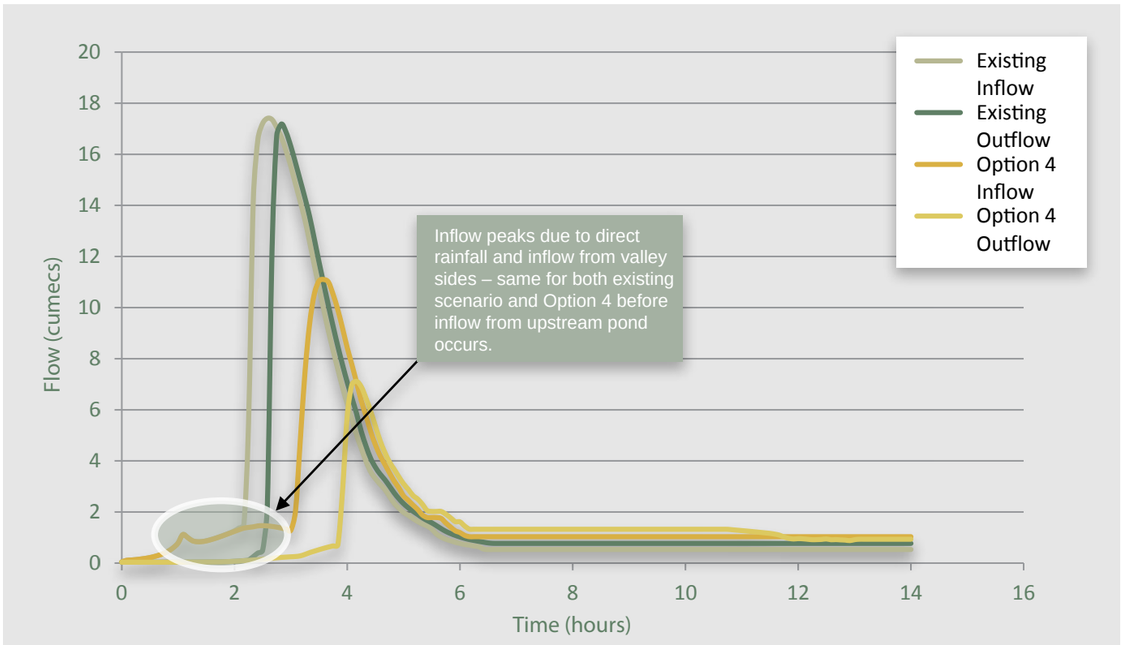
Model Boating Pond - 1:10,000 year event

Model Boating Pond - PMF



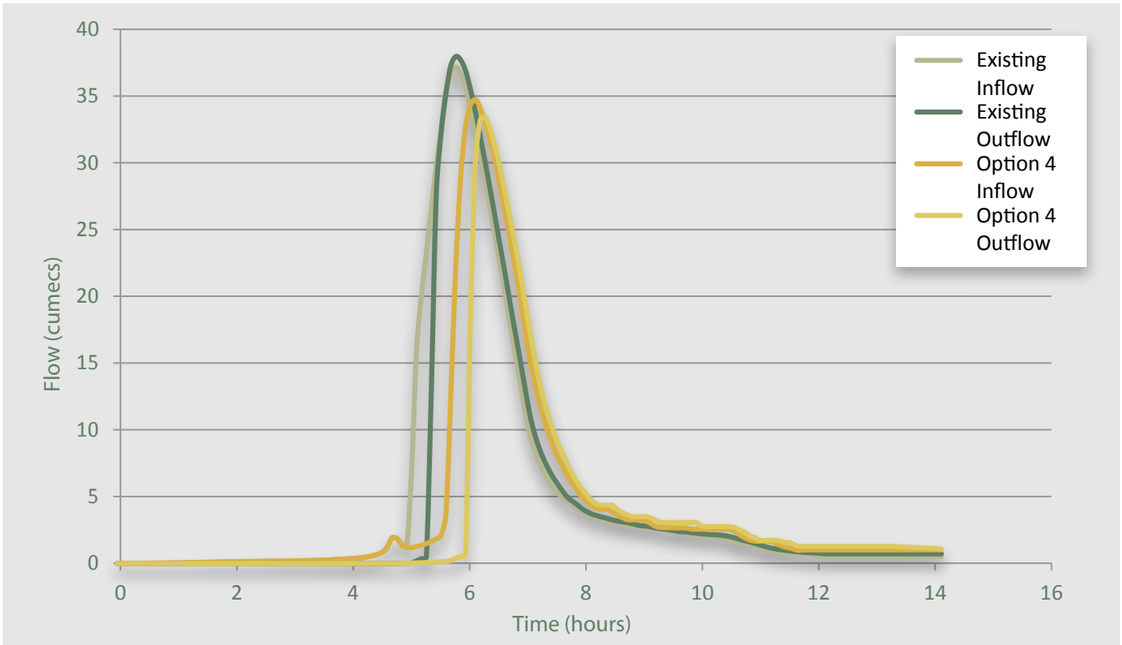
Model Boating Pond - PMF event

Highgate No.1 Pond - 10,000yr



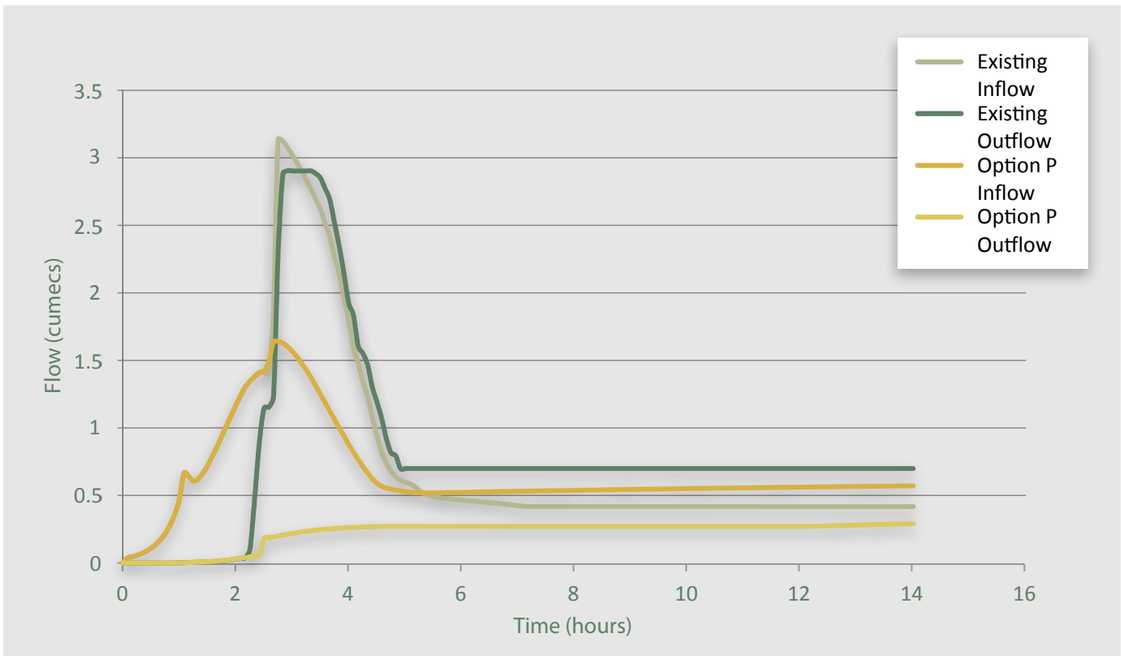
Highgate No.1 Pond - 1:10,000 year return period event

Highgate No.1 Pond - PMF



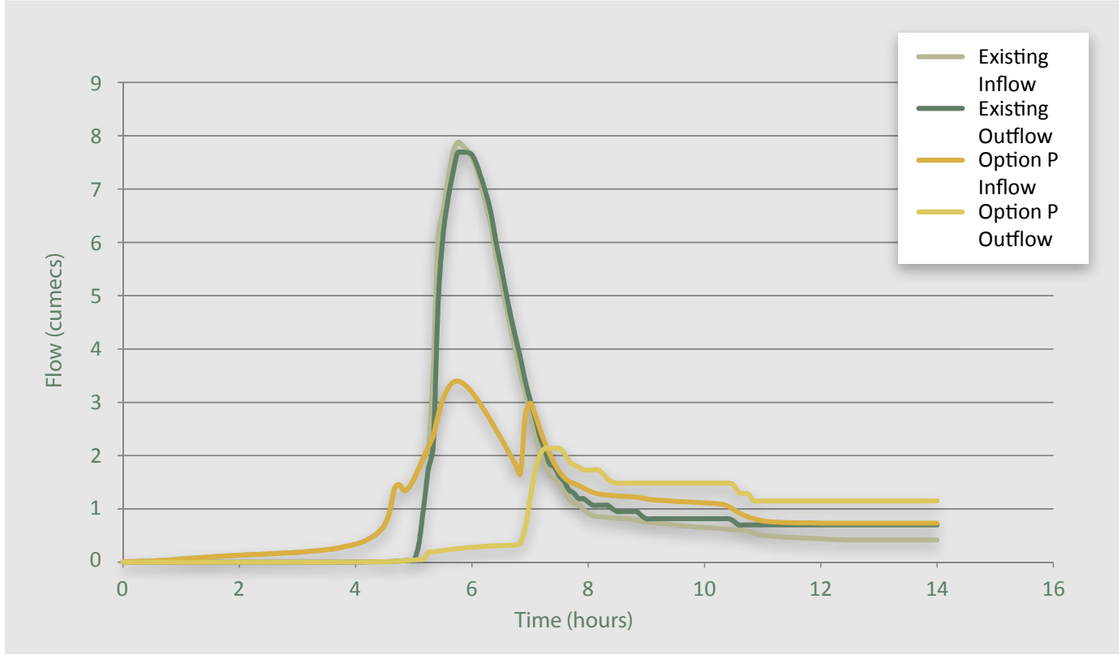
Highgate No.1 Pond - PMF event

Mixed Bathing Pond - 10,000yr



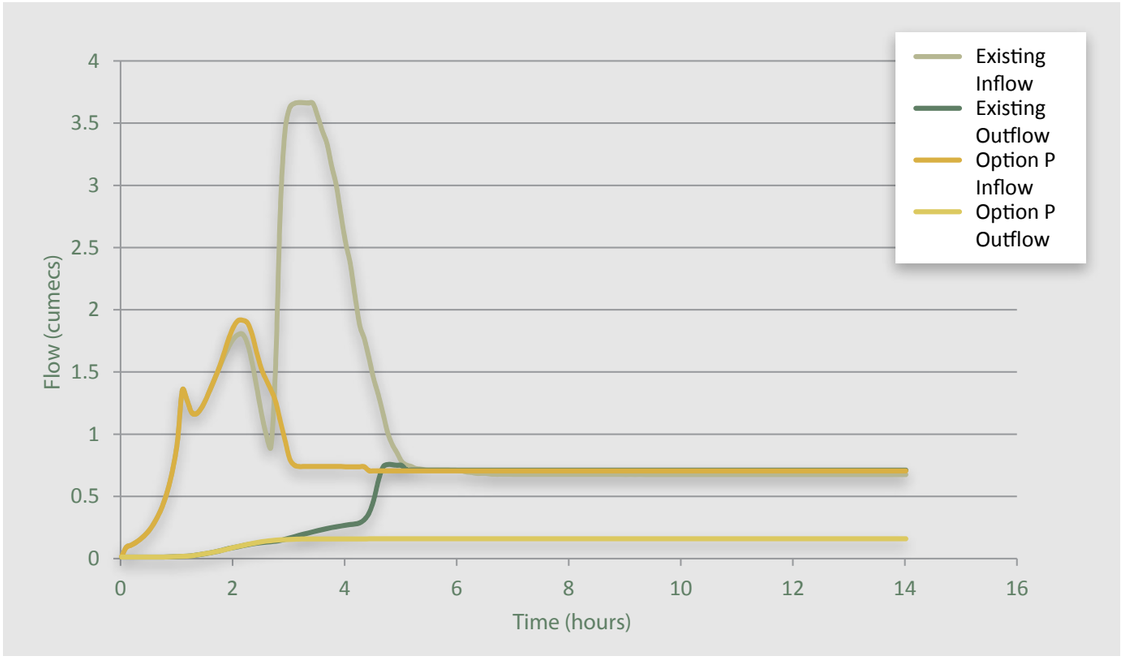
Mixed Bathing Pond: 1:10,000 year return period event

Mixed Bathing Pond - PMF



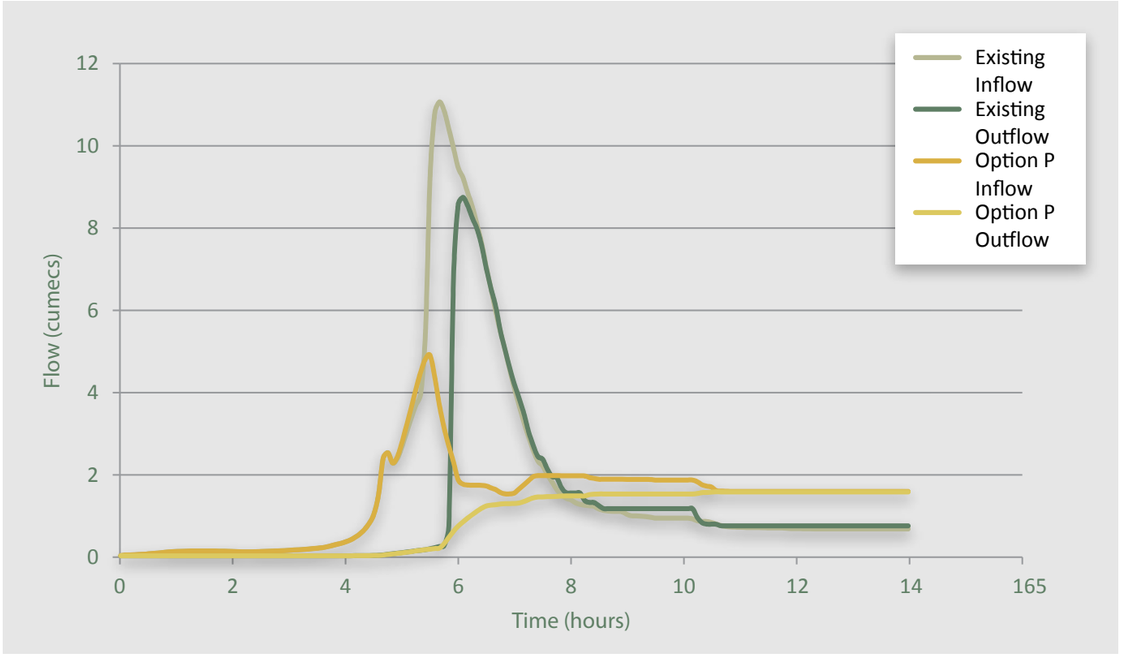
Mixed Bathing Pond: PMF event

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 PPSG 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 PPSG 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 PPSG 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 PPSG.
- 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 PPSG 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.

- 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

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.

- 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 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	1in 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.

- 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.

- 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	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. 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. 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.
Highgate Society 18 October 2013	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. 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: 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 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. 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. 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. 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: - 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
	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.
Hampstead Heath Anglers Society 18 October 2013	Page 3/1. Summary. 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. Page 4/2. Overview of decision-making process and options development. 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. 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. Page 4/2. Brief summary of problem definition. 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.

Source	Comment
	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. 2.9. As already said. The reservoirs act 1975 has already been complied with. 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. Page 5/2. Key objectives 2.11.See previous comments on reservoirs act 1975 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 to steep. Page 6/2. Design philosophy. 2.15. The design philosophy includes: 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. This gives the impression that you are trying to turn an animal/bird sanctuary on the lines of the Barnes reservoirs. 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

Source	Comment
	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. 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. Page 9/4. Incorporation of suggestions from stakeholders. 4.4. Desilting of ponds. Both number one ponds should also be desilted as they are now very shallow compared to what they used to be. 4.5. Retaining the group of trees on the West Bank of model boating pond and turning the area into a peninsula. 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. 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. 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. 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 bought 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. Page 16/21. Model boating pond. 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.

Source	Comment
	Page 22. Men's bathing pond. 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. 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. 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. 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. Page 28. Options 6. All the comments above also applies to this option. Page 34/6. Preferred options-Hampstead chain. page 35. Vale of health pond. 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. Any hibernacula's should be restricted to the ponds that have the original iron fencing around. Page 36. Viaduct pond. 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.

Source	Comment
	Page 43**.** Mixed bathing pond 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. Page 46. Hampstead number 2 pond. Any planting to the West Bank should give consideration to access by anglers. Again no hibernacula's should be considered. Page 47. Hampstead number 1 pond. 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. 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. **Page 48.** Option P works description. All above comments to the above option, apply to this option P. Volume 2-comments on shortlist options report 11th of October 2013 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. 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. **Summary** 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? 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.

Source	Comment
	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. 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. 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
Kenwood Ladies Pond Association 20 October 2013	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. 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.

Source	Comment
	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 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. 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. 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.

Source	Comment
Heath & Hampstead Society **2O October 2013**	**FINAL** **Hampstead Heath Ponds Project – Proposed ['Preferred'] Options Report dated 4.10.2013** **Comments by the Heath & Hampstead Society** **jw / Revision E / 19.10.13 / hs1150e** **WITHOUT PREJUDICE** **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.** 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.

Source	Comment
	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. **General Comments on the Design Development Procedures** In this document, we will refer throughout to this latest report as the **'Proposed Options Report'**, rather than the '*Preferred' Options Report*. **Concerns re the Consultation Process** 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. 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. **Concerns re the Programme from now to the Start of Public Consultation on the Proposed Options** 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

Source	Comment
	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. 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!** 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 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 '*we have consulted'.* **Concerns re the Programme from the end of Public Consultation until Submission of a Planning Application** 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. We therefore urge that a detailed Method Statement and Programme be issued for this stage without delay

Source	Comment
	Concerns re the Public Consultation Process 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. 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. As there are no public meetings planned by the City, the Society will be holding a public meeting on 25 November. **General Comments on Project Programme** 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 Comments on Quantified Risk Assessment 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. **Comments on the Highgate Chain Engineering Proposals** 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

Source	Comment
	2. We consider the least worst option is Option 4, being | | 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 | 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. 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 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

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Comments on the Hampstead Chain Engineering Proposals

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.

6. We consider the least worst option is Option P, being

<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>
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.

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.

Photographic Visualisations of Works on both Chains

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:-

• 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)

• 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

Comments on the Landscape and Environmental Management Proposals for both chains

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

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
</td></tr>
<tr><td>Brookfield and EGOVRA
20 October 2013</td><td>
It's crucial that all stakeholders, authorities, residents and insurance bodies understand how HG1 will respond in any size flood.

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.

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).
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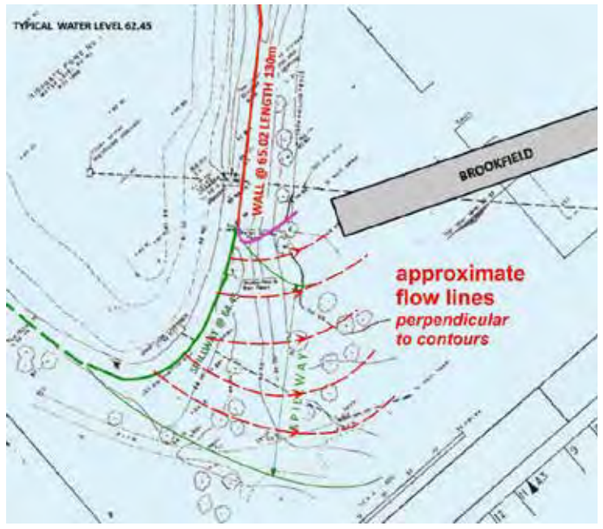
</table>

Source	Comment
	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 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. We understand that the Standard of Protection (SoP) applies only to dam overtopping, not to delivery of water down the spillway. Please confirm this. 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. 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. 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. 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. **2 Existing:** 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. 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. 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. 2.4 The cumulative % of peak inflow that can be stored in HG1 at present is estimated by Atkins to be 5.2%.

Source	Comment
	2.5 The cumulative peak inflow that can be stored in the chain at present is: ? **3 Options 4 and 6** 3.1 Atkins has confirmed the following for both Options 4 and 6: existing minimum dam crest 63.77 top of proposed wall 65.02 spillway weir level 64.45 TWL (and overflow invert) 62.45 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? 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? 3.3 Please confirm the cumulative peak inflow that can be stored in the Highgate chain both for existing and for the proposed options. 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. 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. 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). 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. 3.8 Please provide an update of Table 5.7 both for existing and Options 4 and 6.

Source	Comment
	4 Comments 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. 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. 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: 

Source	Comment
	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. 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. 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. 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. 

Source	Comment
Mixed Pond Association 20 October 2013	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. 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 th e 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. 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. 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!" ?

Source	Comment
	Once the above points have been answered satisfactorily, we offer the following comments on the area that most affects our members: 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.] 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 upsteam 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.]
South End Green Association 20 October 2013	We confine our responses to the lower ponds on the Hampstead Chain. We wholly support the 'CATCHPIT' proposed intervention on the following basis. 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. 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. 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

Source	Comment
	absolute stability of the Causeway, (it being free of significant trees), ought to be able to be proved to suffice in a PMF. 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. 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. 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).
Vale of Health Society 21 October 2013	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. 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. This should be come self-evident upon site surveys.
Fitzroy Park Residents Association 21 October 2013	**PRINCIPLES** 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. 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.

Source	Comment
	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 Mansions, who have never suffered a flood. Indicative diagrams without contours showing local topography are potentially misleading. 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. 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. 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'. 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. 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.

Source	Comment
	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. 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). 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… HAMPSTEAD CHAIN - 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
	HIGHGATE CHAIN - 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	**West Hill Court comments on the Preferred Options Report** 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. 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. Our points are as follows: 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. 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. 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. 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.

Source	Comment
	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. 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. 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. 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." 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. 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.

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