

# Hampstead Heath Ponds Project



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

25th October 2013

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

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

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

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

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

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

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

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

Source	Comment Number	Comment
<p>Heath &amp; Hampstead Society (Cont.)</p>	<p>2</p>	<p>Page 31. We note that most of the advantages and disadvantages quoted for Option 3 are changes that are irrelevant to dam height, and apply therefore to all the options, not just to Option 3.</p> <p>Page 37. Errors. Option 5 on lines 4 and 14 should read <b>Option 6</b></p> <p>Page 55. Error. Viaduct Pond 'Existing Environmental Considerations' is a repeat of that for the Vale of Health Pond</p> <p>Page 55. Error. ...grass surfaced spillway at south EASTERN end of the dam.</p> <p>Page 59. Error. Existing Environmental Considerations bullet 2 should read South Hill Park [NOT Gardens]</p> <p>Page 85. Error. Bullet 2 should read Land drops away to the EAST</p> <p>Page 86. Why no 'Indicative private ownership boundary' marked? What is meaning of red dotted line?</p> <p>Page 95. What is meaning of red dotted line?</p> <p>Page 97. Error. Captions should read South Hill Park [NOT Road]</p> <p>Page 98. What is meaning of red dotted line?</p> <p>Page 99. Error. Photo captions B and C are transposed. Description B should also read View looking south EAST. Error. Captions should read South Hill Park [NOT Road]</p> <p>Page 102. Errors in photo captions. B should read View looking south EAST..., C should read View looking EAST..., and D should read View looking south EAST..</p> <p><b>CONSIDERATION OF OPTIONS – HIGHGATE CHAIN</b> (see particularly pages 9-10, 25-46)</p> <p><b>Key Principles and Selected Options</b> In assessing these options, we have considered the following key principles:-</p> <ol style="list-style-type: none"> <li>1. Store/attenuate as much of the PMF as possible at the Boating pond, but minimise landscape impact. <b>This implies Option 3 [3.0m raising], but we have reservations, and suggestions as below. We would like to limit the apparent height to approx 1.5m</b></li> <li>2. <b>On Highgate 1, minimise any loss of trees and vegetation</b> that screen the Heath from residential buildings, particularly Brookfield Mansions and the intrusive white blocks of West Hill Court [see comment on page 31]. Page 34 indicates that a 0.5m or 1.25m dam raising on Highgate 1 could be accommodated with a wall on the crest which would have less impact on the vegetation than an earth dam. However, this is partly contradicted by page 33, which implies that an earth dam might have to be built for the 1.25m dam raising, and any higher raising. <b>This therefore implies Option 3, or perhaps Option 6, but we have queries.</b></li> <li>3. <b>Carry out the minimum possible work on all other dams</b></li> </ol> <p>We detail these principles on the following review of the proposals for each pond, based on Option 3 stored volume, but with a Boat Pond dam raising of much less than 3m if our suggestions are incorporated:-</p> <p><b>Highgate Chain – pond by pond review</b> <b>Spillways generally</b> Spillways are described in outline on all the dams, dimensions are stated, but locations are rarely given. Consequently, the visual impact is difficult to assess. It is essential that we be provided urgently with simple plans showing the locations, with any significant tree and vegetation loss described. Where 'natural' spillways can be routed to avoid the dam slopes and toe, then we urge that no reinforcement is needed, and no trees, bushes or fences need be removed on the route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway, as proposed on some dams.</p> <p><b>Stock Pond – crest restore 0.5m to 1.0m</b> We presume that this height of dam raising is principally to allow a spillway to be inserted into the crest without unduly lowering the normal water level, rather than for crest restoration. Please clarify. We would prefer timber facing to the proposed retaining wall which we consider more visually appropriate than brick. There could be planting in front as screening. English Heritage screened the raised Wood Pond dam like this, which seems visually acceptable. This remark also applies to the proposed walls at the Men's Pond and Highgate No 1. We note that two [pond side?] trees may be lost in building the retaining wall [page 38] and query if this can be avoided through design As the proposed spillway is to be reinforced, with topsoil and grass cover over, could there be some bushes or shrubs on its downstream slope? Is it intended that this pond be dredged as part of the works [p44], as there is deep silt in this pond?</p>

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

Source	Comment Number	Comment
<p>Heath &amp; Hampstead Society (Cont.)</p>	<p>2</p>	<p>We are concerned at suggested tree loss for the proposed spillway works on the downstream slope of the existing dam [p28/29]. It is <b>essential</b> that a detailed plan be provided showing tree loss. P29 states that a low earth bund would train the [water] flow away from the dam and therefore avoid the need to line[reinforce] a wider area or cut into the ground to form a spillway chute. Excellent! However, we therefore feel that there should be no need to touch any trees on this spillway route, and we contest that two London planes have to be felled to form this corridor for the lower spillway.</p> <p><b>Men’s Swimming Pond – raise dam 0.5m</b> We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable, screened with marginal vegetation.</p> <p>We request a plan showing the layout of the proposed spillway, and then have a joint review on site. We are surprised at the large width [25m/43m]. However, if it is sited partly on the west bank, by the rangers’ bothy, we believe that it could follow a natural slope over shallow ground down to the next pond and no reshaping of the ground would be needed. As this natural route completely avoids the dam toe, no reinforcement of the spillway is needed, except at the dam crest and spillway mitres. Also, no trees, bushes or fences need be removed on this route. During a PMF spill, trees, bushes and fences may suffer some damage during this extremely rare event, but this would be acceptable, rather than unnecessarily clear and reinforce the spillway as proposed.</p> <p><b>Highgate No 1 Pond – raise dam 0.5m</b> We prefer timber facing for the proposed wall on the dam crest rather than brickwork which would be unacceptable. We urge that this wall be hand constructed so that there is no tree loss on the crest or dam slopes which would expose West Hill Court and Brookfield Mansions from the Heath. As the wall is on the crest with a sloping upstream face, we urge that it be concealed with vegetation and shrubs on both sides.</p> <p>We are greatly surprised that the spillway is proposed to be 60m/74m long, and ask that calculations be provided to substantiate this extraordinary width. This spillway [p30] would be partly on the west end of the dam and partly along the natural ground to the west of the dam. At this position two large trees [including a very large horse chestnut adjacent to the path,] and a smaller lime and two alders would be felled. There is also a veteran oak adjacent, about which the report is silent [except for mention on page 33].</p> <p><b>We consider this tree loss to be unacceptable</b>, and query if fewer trees would be lost if the raised dam is continued round the waters edge almost to the dog swimming area. The west bank from this point northwards would then form a ‘natural’ spillway which could flood across the path to the low lying area to the west, and then fill up before overflowing south through a natural depression broadly along the line of the existing footpath. As most of this natural route, which is further to the west than proposed in the report, would avoid the dam toe, then little or no reinforcing may be required. It may also slightly reduce any impact of the flood to Brookfield Mansions</p> <p>We request a plan showing the layout of the proposed spillway with trees that would be lost, and a detailed level survey and plan of our alternative proposal above. There should then be a joint review on site. On these plans, please indicate the general direction this overtopping surface water will take after leaving the dam</p> <p>Please clarify what is intended by - new spillway could be planted as a bioswale feature [p43]</p> <p><b>Environmental Management Options [p44/45]</b> We note the extensive toolbox of options for pond, water quality and ecology, but feel that we cannot offer any opinions at this stage. <b>It is essential that</b> every pond is visited and detailed discussions held on site before any options can be supported or discarded.</p> <p><b>CONSIDERATION OF OPTIONS – HAMPSTEAD CHAIN</b> (see particularly pages 11-12, 47-61)</p> <p><b>Key Principles and Selected Options</b> In assessing these options, we have considered the following key principles:-</p> <ol style="list-style-type: none"> <li>1. To minimize tree loss on Hampstead No 2 pond</li> <li>2. To attenuate/store more flood water than proposed in the report, <b>provided that this would reduce the tree loss on Hampstead No 2. We particularly query if more storage is possible at the Catchpit, the Mixed pond, and at Hampstead No 2</b></li> <li>3. To minimize the visual impact of the works at all ponds</li> </ol>



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

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

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

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

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

Source	Comment Number	Comment
Brookfield Mansions and EGOVRA (Cont.)	6	<p><b>Appendix</b></p> <p><b>Outstanding Questions Re Highgate No1 Pond</b></p> <p><b>Existing pond</b></p> <ol style="list-style-type: none"> <li>1. What is the existing standard of protection for Highgate No1 Pond (HGNo1)? The Assessment of Flood Design specifies this falls between 50 and 100 years. Please provide this with greater accuracy.</li> <li>2. Does the determination of the standard of protection include the utilization of all pipes (Overflow Pipe and the Scour Pipe) leaving HGNo1?</li> <li>3. What are the flood management procedures that have been used to manage the floodwaters of HGNo1 including both through existing drainage systems and any other means e.g. surface water?</li> <li>4. Who owns or is responsible for each pipe leaving HGNo1 including their maintenance?</li> <li>5. What is the existing height of the dam above the normal water level?</li> <li>6. What are the dimensions, maximum discharge flow rate and volume of each pipe (Overflow and Scour Pipes) that leaves HGNo1?</li> <li>7. Please provide figures for the existing volume and discharge flow rates of water passing through the overflow pipe during 1) normal conditions (i.e. when there isn't any rain) and 2) storm events of 1 in 10, 20, 30 and 50 and at the point when overtopping begins? This is to establish the current conditions for comparison with the expected conditions after the proposed works have been completed.</li> <li>8. Provide details of the existing total volume, peak discharge flow rate, depth of overtopping and overtopping duration in 50, 75 and 100 year storm events.</li> </ol> <p><b>Proposed Scheme</b></p> <ol style="list-style-type: none"> <li>1. Provide a topographical map of HGNo1 identifying the location dimensions and design of the proposed spillway, the pond area that would be inundated by a flood prior to water coming down the spillway, where the spillway will discharge water and the expected direction of water flow off the City of London (CoL) property</li> <li>2. Is it proposed that there will be any earthworks (bund or otherwise) to manage the direction and speed of water flow once it has come down the spillway?</li> <li>3. Is it proposed to change the flood management procedures in future and if so why are these changes being introduced and what are the proposed new flood management procedures including through existing drainage and surface water systems? Is any consideration being given to a system that pre-empts periods of expected high rainfall by increasing the water discharged from the pond in advance of the storm?</li> <li>4. At what height above normal water level will the proposed spillway begin passing water?</li> <li>5. What are the proposed public facilities that are to be made available on HGNo1? Are there plans to introduce angling on this pond?</li> <li>6. What dam raising can be achieved on this pond without affecting the tree cover of the pond?</li> <li>7. The Design Philosophy states "...the works to the ponds will not make the flooding situation downstream worse". Is this the case for all storm events and how will this be demonstrated/verified?</li> <li>8. It is proposed to "...improve the discharge capacity..." at HGNo1 pond. How is this to be achieved and why? Our concern is that surface water will be discharged sooner than is currently the case and at a faster rate.</li> <li>9. Please provide us with a map of the drainage pipe system around the Heath and advise us how it is envisaged that water will drain through this system in different storm events.</li> <li>10. In the Assessment of Design Flood it anticipates 276,996 m<sup>3</sup> total PMF volume entering the Highgate Chain and total available storage in the Highgate Chain of 42,518 m<sup>3</sup>. This means the Highgate Chain can only currently store 15% of the PMF. What is the proposed impact of the proposed scheme on the storage of the PMF in the Highgate Chain Ponds?</li> <li>11. What is the impact of the scheme on the smaller storm events? The implication is that they will overtop less frequently as more storage exists in the system.</li> <li>12. What is the impact of the scheme on the available storage in HGNo1?</li> </ol>

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

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



## Shortlist Options Report – Schedule of Questions and Answers 147 - 214

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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



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

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



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