

Committee(s):		Date(s):
Hampstead Heath Consultative Committee	For discussion	2 June
Hampstead Heath, Highgate Wood & Queen's Park Committee	For decision	9 June
Projects Sub Committee	For decision	17 June
Subject:		Public
Gateway 4c – Detailed Design: Hampstead Heath Ponds Project		
Report of:		For Decision
Joint report of the Director of Built Environment and the Director of Open Spaces		
Summary		
<p>Having previously approved Preferred Options for public consultation, that public consultation having been duly undertaken and the Design Team having received the preliminary results of the Ground Investigations, Members are now asked to approve a Chosen Option for each chain of ponds and to authorise officers to submit a planning application on this basis.</p> <p>It is recommended that Option 6 on the Highgate Chain, which concentrates works at the Model Boating Pond thereby reducing the height of the dam at Men's Bathing, is approved as the chosen option; and that on the Hampstead Chain, Option M which has the lower dam height at the Mixed Bathing Pond but puts an additional tree at risk at Hampstead No.2, is approved as the chosen option.</p> <p>The design development is a highly iterative design process based on dialogue between engineers, landscape architects and the constructor. At the very start of the design process it was determined that the designs should satisfy the industry standard engineering requirements set out in <i>Floods and Reservoir Safety</i>¹ whilst minimising as far as possible any negative impact on the Heath's landscape, amenity and ecology in compliance with the Hampstead Heath Act 1871. Option 6 and Option M are recommended because they meet the said engineering requirements and are considered to preserve the natural aspect and state of the Heath in the most effective manner.</p> <p>The designs have been continually developed to reduce the impact on the Heath environment. In particular it has been possible to make progress in terms of minimising tree loss. The tree loss indicated within this report is a worst case scenario so Members can be fully cognisant of the potential impact while noting that designs continue to be refined and construction techniques considered to minimise tree loss.</p>		

¹ *Floods and Reservoir Safety*, (3rd edition, 1996) Institution of Civil Engineers

It is important to understand that the Ponds Project is a response to the City's statutory duties under reservoir legislation, and it is specifically concerned with preventing dam breach. The primary concern is that in a flood event, water could overtop the dams causing erosion and ultimately failure. To prevent overtopping a combination of increased dam heights and the introduction of reinforced grass-covered spillways is proposed. Spillways transfer water either around the crest of the dam or over the top (where it has been purposely reinforced). The provision of spillways which transfer water downstream means that water still flows off the Heath from the bottom of each chain of ponds in some flood events. However as an additional outcome of the proposed works, the frequency of surface water flooding during extreme rainfall events and the volume of the flow is reduced. The Preferred Options for both chains of ponds would provide a standard of protection against surface water flooding from at least a 1:1,000 year flood event (i.e. the spillways would not come into use during a lesser flood event). This reflects the fact that the scheme is concerned with dam breach rather than preventing surface water flooding.

Members are asked to note the current budget position. As the designs have not yet been finalised, we are not yet in the position of having an "Agreed Maximum Price". There are also a number of project risks at Ladies' Bathing Pond, Men's Bathing Pond, and also with Japanese Knotweed and the availability of materials, all of which have cost implications (up and down) which have not yet been finalised. Final costs will be reported to Members at Gateway 5 – Authority to Start Work in January 2015.

The possibility that the City's decision today will be the subject of a Judicial Review by those opposing the scheme, in particular the Heath & Hampstead Society remains. While acknowledging this potential delay to the project, officers continue to recommend that the City adopt the recommendations set out below because of the continued possibility that our Panel Engineer will otherwise issue a Section 10 Notice, and the agreed need for the City to mitigate the risk to lives and property downstream from dam collapse (Strategic Risk 11).

A glossary has been included at Appendix 6.

Recommendations

It is recommended that Hampstead Heath Consultative Committee considers this report, and the views and comments of the Hampstead Heath Consultative Committee be conveyed to and received by the Hampstead Heath, Highgate Wood & Queen's Park Committee.

It is recommended that the Hampstead Heath, Highgate Wood & Queen's Park Committee and Projects Sub Committee:

- Approves the selection of Option 6 on the Highgate Chain (crest restoration works at Stock Pond and Ladies' Bathing; a 2.5m raising of

the dam at Model Boating Pond; 1m raising of the dam at the Men's Bathing Pond, 1.25m raising of the dam at Highgate No.1; spillway works at all ponds and associated environmental mitigation measures)

- Approves the selection of Option M on the Hampstead Chain (crest restoration and spillway works at the Vale of Health and Viaduct Ponds; a new 5.6m flood storage dam at the Catchpit; 1m dam raising at the Mixed Bathing Pond; installation of culvert spillways at Hampstead No. 2 Pond and Hampstead No. 1 Pond and associated environmental mitigation measures)
- Authorises the submission of a planning application to Camden Council for these works (due for submission on 4th July 2014)
- Notes that detailed design will continue in preparation for construction
- Notes the current budget position of a provisional estimated outturn cost of £17.39M (which remains within the agreed budget of £15.2M +/- 20% at 2010 prices) and further notes that a more accurate estimated outturn will be reported together with the approval Agreed Maximum Price at Gateway 5 – Authority to Start Work
- Approves an increase in the fees budget of £428,500
- Delegates authority to the Director of the Built Environment to release up to £500,000 from the construction phase of the budget to fund enabling works prior to approval of Authority to Start Work by your Committees
- Delegates authority to the Town Clerk in consultation with the Chairman and Deputy Chairman of your Committees to approve the option for the Ladies' Bathing Pond facility
- Delegates authority to the Town Clerk in consultation with the Chairman and Deputy Chairman of your Committees to approve any substantive changes to the scheme in advance of the submission of the planning application
- Delegates authority to the Director of the Built Environment to take such steps as maybe necessary to give effect to the Recommendations

Main Report

Background

1. The Ponds Project was initiated following hydrological studies² that revealed that in the event of a severe storm, there was a risk that the reservoirs on Hampstead Heath could overtop, potentially leading to erosion and dam failure. Following the approval of the Court of Common Council in July 2011, Atkins, the City's design and engineering consultancy, has been developing

² The first study was undertaken by the City's then Supervising Engineer, CARES in 2009. A further study was undertaken by Haycocks Associates in 2010, which was subsequently peer reviewed by Aecom in 2011. Most recently Atkins conducted their own Design Flood Assessment in March 2013. All reports are available at cityoflondon.gov.uk/ponds project under "Reports"

options for both the Highgate and Hampstead chains of ponds. The aims of the Ponds Project as set out in July 2011 are to reduce the risk of pond overtopping, embankment erosion and failure; to comply with the Reservoirs Act 1975 and the Flood and Water Management Act 2010; and to improve water quality. The City's existing obligations under the Reservoirs Act 1975, and expected additional obligations under amendments introduced by the Flood and Water Management Act 2010, are explained in more detail later on in this report. It has in addition always been recognised that the City has statutory obligations under the Hampstead Heath Act 1871 that are relevant to the Ponds Project. The relationship between these different pieces of legislation is again examined in more detail later on in this report.

2. Since July 2011 an iterative process has been followed which included:
 - 17 meetings of the Ponds Project Stakeholder Group since July 2012, including three full day workshops to refine the options
 - The appointment of a Strategic Landscape Architect to work with the Ponds Project Stakeholder Group to champion the interests of the Heath within the project
 - Design Review Method Statement (December 2012)
 - An initial public consultation in January-February 2013 about what was most important to protect during the project
 - Design Flood Assessment (May 2013)
 - Constrained Options Report (June 2013)
 - Shortlist Options Report (August 2013)
 - Interim Quantitative Risk Assessment (August 2013)
 - Strategic Landscape Architect Review (October 2013)
 - Preferred Options Report (October 2013)
3. This iterative process started with the establishment of key objectives that any option for either chain of ponds would:
 - Improve the safety of all dams within the chain
 - Maintain (or increase) the standard of protection downstream in other flooding scenarios (where there is no dam failure)
 - Not increase the rate of flow discharged from the last dam in the chain in any flood event compared to the flows expected in the existing scenario
 - Preserve the natural aspect of the Heath as far as possible
4. The objectives set out in the second and third bullet points do not arise from the City's statutory obligations under the Reservoirs Act 1975. However a decision was taken very early on that it would be unacceptable to increase the risk of surface water flooding to communities downstream as a result of the Ponds Project. This approach should also avoid any possibility of the City incurring tortious liability for damage caused by surface water flooding.

However, although all of the Preferred Options do increase the level of protection from surface water flooding, it is important to note that fundamentally the Ponds Project is concerned with protecting those downstream from the potential for dam breach – it is not a flood alleviation scheme. The City is acting in its capacity as a reservoir undertaker whereas the London Borough of Camden is the Lead Local Flood Authority for the area with statutory responsibilities in relation to surface water flooding. The City would also have to consider its legal obligations under the Hampstead Heath Act 1871 before sanctioning any additional engineering works on the Heath solely for the purpose of alleviating surface water flooding.

5. As part of the design development process, a number of design principles were then established following consultation with the Ponds Project Stakeholder Group to ensure the integration of the Ponds Project into the character of the Heath. These principles are set out in Atkins' Preferred Solution's report (Appendix 1), and can be summarised as follows:
 - Each chain of ponds to be considered as a whole system so that increases in storage capacity can be focused in the least sensitive locations in order to minimise increases in dam heights at more sensitive ponds and reducing residual works required elsewhere
 - Each dam must be able to pass the design flood inflow safely, in accordance with Table 1 of 'Floods and Reservoir Safety' (ICE, 1996). For all dams, this is the Probable Maximum Flood (PMF) as the three current large raised reservoirs are all Category A dams where "a breach could endanger lives in a community downstream" and it is anticipated that all of the ponds in the two chains will be designated as high-risk once the Flood and Water Management Act 2010 is fully implemented. A community is defined in 'Floods and Reservoir Safety' as 10 people or more;
 - Tree loss to be minimised³
 - The creation of a passive system without reliance on any mechanical system or human intervention
 - To balance the various aspects of the engineering intervention to minimise impact on the landscape – taking into account of the need to develop spillways, to prevent overtopping where it would not be tolerable and recognising the trade-off between dam heights and spillway widths
6. A passive system (bullet point 4) is proposed to avoid the risk of system failure and is a requirement of the Supervising Engineer as the City does not have appropriately qualified or experienced staff to manage a system that would require intervention.
7. The Atkins' Preferred Solution Report which is appended to this report at Appendix 1 summarises the options development process and explains how the designers responded to the aims of the project; how these aims were translated into deliverable outcomes (the key objectives); and how in consultation with stakeholders and officers design principles and a design

³ Potential tree loss is illustrated at Appendix 3

philosophy was developed which would enable the necessary works to be integrated within the character and natural aspect of the Heath. One of the key relationships between engineering and landscape was that the flow of water over a spillway should be sufficiently slowed to allow a softer engineering design for the spillways, so they could be grass covered rather than plain concrete, better in keeping with the natural aspect of the Heath.

8. The risk posed by the possibility of overtopping leading to dam breach is reflected in Corporate Risk 11 on the Corporate Risk Register. As previously reported to the Audit & Risk Committee, a number of measures are in place, including telemetry, weather monitoring and an on-site plan, to mitigate the risk as far as practically possible until the conclusion of the Ponds Project. These measures should assist in a faster identification of possible problems thereby allowing the City to take appropriate steps, including contacting the London Borough of Camden and Police so they can initiate their own off-site emergency plan if appropriate. These measures however fall short of the requirement to ensure that the dams are not at risk from breach and so the City is continuing with the Ponds Project in line with the recommendations of our Supervising Engineer.

Options

9. Following Committee approval in November 2013, the two Preferred Options for each chain of ponds were subject to public consultation. These options were:

Highgate Chain

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

Hampstead Chain

Option M	Option P
Crest Restoration works and spillway works at Vale of Health and Viaduct Ponds	
Build a new 5.6m high flood storage dam (with a 300mm pipe) at the Catchpit area	
1m dam raising at Mixed Bathing Pond	2m dam raising at Mixed Bathing Pond

Install letterbox culvert spillways and Hampstead No.2 Pond and Hampstead No.1 Pond	0.5m dam raising at Hampstead No.2 Pond with wall Install letterbox culvert spillways and Hampstead No.2 Pond and Hampstead No.1 Pond
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Proposals

10. Having conducted public consultation on the two options (the results of which were considered by the Hampstead Heath Consultative Committee and the Hampstead Heath, Highgate Wood & Queen's Park Committee in April 2014), undertaken further design work and started to receive the results of the Ground Investigations it is now recommended that Members approve the selection of a Chosen Option for each chain of ponds and authorise the submission of a planning application.
11. The Preferred Options for each chain of ponds were very similar due to the design principles and philosophy followed. Both options on each chain were felt to meet the original objectives of the project and the agreed design principles. The main difference on the Highgate Chain was in the balance of the heights of the dams at Men's Bathing Pond and the Model Boating Pond. On the Hampstead Chain the difference was between the height of the dams at the Mixed Bathing Pond and Hampstead No.2, and the risk to trees by the width of culverts required at Hampstead No.1.
12. In considering our recommendation to Members regarding the Chosen Option for each chain of ponds, officers considered the following hierarchy of factors:
 1. Works are concentrated at the least sensitive locations, so that the impact on the more sensitive ponds and Heath ecology is minimised
 2. Dam heights are minimised
 3. As few trees as possible are lost – with consideration given to age, condition, quality and the contribution to landscape made by particular trees
13. In considering the preservation of the natural aspect and state of the Heath, officers have decided to recommend that minimising increases in dam heights is of a higher priority than minimising tree loss because:
 1. Dam heights are permanent changes to the landscape of the Heath; even long-living trees are impermanent and part of the ever changing character of the Heath
 2. Dam heights will have a greater visual and landscape impact
14. Full details of the recommended chosen options are appended to this report as the Atkins' Preferred Solutions Report (Appendix 1) . The environmental mitigation measures are illustrated on the appended Environmental Masterplans (Appendix 2). The potential tree loss is illustrated at Appendix 3.

Highgate Chain

15. On the Highgate Chain it is proposed that Option 6 is selected. This option concentrates the works at the Model Boating Pond which reduces the works required at the Men's Bathing Pond. This is felt to be an appropriate balance as the Men's Bathing Pond is considered to be a more sensitive location than the Model Boating Pond, which has the most formal appearance of any of the ponds on the Heath and will be softened and naturalised as part of the project. The Model Boating Pond is also less ecologically sensitive than the Men's Bathing Pond and has greater potential for landscape mitigation due to the ability to merge the dam form into the landscape. Consultation with stakeholders demonstrated support for concentrating works in less sensitive locations and revealed the very strong desire of the Men's Pond users to minimise works at that location.

	Dam	Spillway and overflow pipes	Trees Loss (worst case scenario)⁴	Ecological impact and mitigation
Stock	Crest restoration by up to 500mm.	New grass lined spillway at the western end, 21m wide at the base, with side slopes of 1:12. Two new 900mm overflow pipes to run parallel with the existing overflow pipe	A: 0 B: 11 C: 15 U: 0	Pond to be de-silted. New marginal planting on eastern bank Woody debris to be used to construct check dams Japanese Knotweed to be managed
Kenwood Ladies' Bathing	Crest restoration by up to 300mm	New grass lined spillway at the western end, 24.6m wide at the base, with side slopes of 1:3	A: 0 B: 3 C: 12 U: 0 (Trees loss will not)	Pond to be de-silted A number of trees will need to be removed on the path of the spillway.

⁴ Trees are categorised as being A: large, high quality, veteran trees; B: smaller, not particularly high quality trees. However these trees still make a significant impact on the environment and have a significant life expectancy; C: smaller trees or those considered of low quality; they may have a limited life expectancy of contribute little to amenity; U: poor condition. Tree loss is illustrated at Appendix 3.

			impact on screening)	Potential to enhance screening of the pond along the western perimeter through under planting with holly.
Bird Sanctuary	Crest restoration	No spillway but the slope downstream to the Model Boating Pond is to be smoothed and lined with a turf reinforcement mat. Relocation of the two overflow pipes	None	Additional channel to be dug to enhance wetland area. Development and extension of existing reed bed New wetland scrapes
Model Boating	Dam raised by 2.5m with an earth embankment upstream of the existing dam	New upper spillway over the raised dam and lower spillway over the existing at the western end	A: 0 B: 3 C: 6 U: 0	Partial de-silting New island with a causeway to be formed around the preserved lime trees New marginal planting Continued access to the water's edge by a new footpath across the upstream face of the raised dam and a footpath along the new western edge
Men's Bathing	Raising of the dam by 1m, using sheet piling, clad according to Heath stakeholder preference	New reinforced grass spillway at existing ground level at the western end, 25m wide.	A: 0 B: 0 C: 15 U: 0	Wetland scrapes, marginal planting and a small reed area in the North West corner
Highgate No.1	Raising of the dam with a 1.25m high wall	New grass lined spillway at the western end, 64m wide. Return wall	A: 0 B: 4 C: 1	Extension of the existing reed beds on the

		along one side	U:0	Northern bank
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Stock Pond

16. Further ecology surveys have identified the presence of Japanese Knotweed in the area of the proposed spillway. The Design Team are currently working with BAM Nuttall to establish a plan for the management of the Knotweed during construction. However, due to its location it is possible that the Knotweed will have to be removed from site, with potential cost implications. Although the quantity of Knotweed is small, any removal would increase cost and possibly impact on the construction programme.

Model Boating Pond

17. There have been a number of design iterations of the Model Boating Pond. Early in the process an island was proposed to reflect stakeholder desire to preserve the lime trees. There have been a number of discussions as to whether the retained lime trees should be on an island or a causeway and what the access arrangements to this area should be. Having considered these issues with designers, stakeholders and staff, it is proposed that the lime trees be retained on an island with a causeway. This reflects stakeholder preference for the island to be accessible to allow people to retrieve model boats. It also reflects a concern by the stakeholders that an inaccessible but close to the shore island would encourage people to attempt to jump across.
18. Consideration has also been given to the alignment of paths around the extended pond. The latest design iterations include paths on top of the new raised dam, as well as in front of it by the water's edge, enhancing access to the water as currently but also providing new views both up the chain and across London looking south.

Ladies' Bathing Pond Facility

19. In the early stages of the project, it was assumed that it would be necessary to replace the facilities at the Ladies' Bathing Pond as they are located on top of the dam crest. Provision was therefore made in the budget for a full replacement of the facilities, including the replacement or extension of the existing concrete slab. However as designs progressed and the spillway was moved on to the edge of the dam, it became clear that it may be possible to keep the existing slab in place, and potentially the existing facilities. It will be necessary to make some changes in layout and refurbishment due to the removal of part of the concrete apron behind the main building in order to open up the dam crest for ongoing monitoring. In addition the positioning of the spillway creates a new access to the water which is not visible by lifeguards from the existing building as the building itself blocks the view of the water.
20. Two further options for the facility are now being developed: 1) a refurbishment with an extension of the existing building on the existing

concrete platform and 2) the provision of a new building on the existing concrete platform.

21. The previous two options which had been developed were to provide a new building and new concrete slab in the current location and a new building and new concrete slab to the western end of the dam have now been discounted due to buildability, sustainability and cost implications. In order to build a new slab it would have been necessary to crane building materials over the trees and into the pond. The crane required to do this would have been large and expensive and would have required a temporary access road which could have caused damage to the Heath.
22. In order to keep this part of the project on track for submission with the rest of the planning application on 4 July, it is requested that authority be delegated to the Town Clerk in consultation with the Chairman and Deputy Chairman of the Hampstead Heath, Highgate Wood & Queen's Park Committee and Project Sub Committee to approve the option for the Ladies' Bathing Pond facility.

Men's Bathing Pond

23. There has been a leak in the Men's Bathing Pond dam for some time. Preliminary Ground Investigation results have revealed that this is likely to be because the top 2.5m of the core of the dam contains mixed building waste materials (loose aggregates and bricks) rather than the high quality clay required for dam construction. Further investigations are underway to understand why this has occurred but the design is being changed to integrate the repair of this leak with the construction of the new wall along the dam. This is likely to be done using sheet piling which will provide hydraulic "cut-off" between the new wall and the better quality dam core below. The sheet pile could be clad with timber as so to appear like a wall where it forms the 1m raising of the dam.
24. A further design iteration is required to reflect the need to install this sheet piling, and the cost implications of the piling works required need to be ascertained.

Hampstead Chain

25. It is proposed that Option M is selected on the Hampstead Chain. This option has a lower dam at the Mixed Bathing Pond and has crest restoration rather than a 0.5m raising at Hampstead No. 2 but puts an additional London plane tree at risk. In accordance with the previously stated hierarchy of factors, officers are recommending that dam height be prioritised above tree loss because it is considered that dam heights will have a greater visual and landscape impact.

	Dam	Spillway	Trees Loss (worst case scenario)⁵	Ecological mitigation

⁵ Trees are categorised as being A: large, high quality, veteran trees; B: smaller, not particularly high quality trees. However these trees still make a significant impact on the environment and have a significant life

Vale of Health	Crest restoration up to 560mm achieved by 300mm of fill and 260mm containment kerb	New spillway at the western end where the dam is currently lower, 5m wide. Additional overflow pipe, 500m to run parallel to the existing pipe	A: 0 B: 1 C: 0 U: 0 Robinia removed to protect the Redwood	Marginal planting on South-eastern bank
Viaduct	Crest restoration up to 180mm	New spillway at the eastern end, 4m wide, 1:12 slide slop New overflow pipe 500mm diameter	A: 0 B: 0 C: 4 U:1	Removal of silt Marginal planting on the Eastern edge
Catchpit	New flood storage dam 5.6m high at the lowest point in the valley and 40m wide at the widest point. Crest of the dam approximately 100m. Slopes 1:3 upstream and 1:4 downstream	Spillway along the whole crest of the dam. 900mm pipe under the dam to pass normal flows. Second pipe running parallel to existing pipe but this could be omitted in favour of establishing an overland flow (stream) and the creation of a wetland area	A: 0 B: 12 C: 49 U:10	Two new silt collection ponds upstream of the dam. Reed beds to be planted to gravel beds. Tree removal within footprint of the dam – approximately 60 non-mature, self-seeded trees at risk. Scrub to be planted on upstream face
Mixed Bathing	Dam raised by 1m, creating a new crest surface path 4m wide. 1:1 slope of the upstream face, 1:3 on the downstream	Spillway over the majority of the crest of the dam Existing overflow pipe extended further	A: 0 B: 0 C: 7 U: 0	Silt removal New marginal planting on the north pond edge and along the crest of the dam

expectancy; C: smaller trees or those considered of low quality; they may have a limited life expectancy of contribute little to amenity; U: poor condition. Tree loss is illustrated at Appendix 3.

	slope. Downstream slope to be reinforced with a mat.	in to the pond		
Hampstead No. 2	Crest restoration with a 0.2m high edging (this is a change since the preferred options and was introduced to allow a reduction in the width of the box culvert, reducing risk to trees)	A new overflow formed with two precast concrete box culverts at the western end with a drop inlet	A: 2 B: 0 C: 0 U: 0 Culvert route & width redesigned so that the London Plane trees on the dam, visible from Mixed Bathing Pond are preserved	Marginal planting on West pond bank
Hampstead No. 1	No raising	New box culvert overflow over the embankment at eastern end	A: 0 B: 0 C: 5 U: 1	Marginal planting on Southern and Eastern pond banks

Catchpit

26. Over the course of the design, the location and shape of the new Catchpit dam has been modified in order to protect veteran trees, reduce visual impact and to minimise materials. The current location over the current Catchpit and with a slightly curved shape is felt to be the optimum location for the dam, protecting the veteran trees to the South.
27. A more recent design iteration has been the treatment of water under natural flow conditions from the dam into the Mixed Bathing Pond. Currently there is a pipe which takes water from the Catchpit to the next pond but it is now proposed to abandon the pipe and allow a natural overland flow. The route of this flow will follow the path of one of the original tributaries to the River Fleet. This will create new wetland areas through the creation of new pools and scrapes which will enhance ecological diversity on the Heath and improve water quality downstream through bio-filtration.

Hampstead No.2

28. Substantial progress has been made to the designs for the culverts on Hampstead No.2 with the aim of reducing the landscape impact of tree loss.

When the designs were originally subject to public consultation it was thought that a number of the London plane trees across the top of the dam were at risk. As these trees make a significant landscape contribution to the Heath, the landscape architects and engineers worked closely together with the constructor to consider innovative construction methods to reduce the potential impact on these trees. It is now proposed that curved culverts be introduced and innovative construction methods utilised. While this will still result in the loss of two London plane trees (the only Category A tree loss associated with the scheme) those trees along the crest of the dam in an avenue which provide an important view will be preserved. There will be minimal impact on the line of trees visible from the Mixed Bathing Pond.

Impact on the Heath

29. Throughout the project consideration has been given to the preservation of the landscape, ecology and recreational value of the Heath in accordance with the City's duties under the Hampstead Heath Act 1871, and its wider statutory management functions under The London Government Reorganisation (Hampstead Heath) Order 1989. The Ponds Project Stakeholder Group highlighted the importance of Heath users being able to access the water – whether in terms of walking close to it, feeding ducks, angling, model boat sailing or dog swimming – and this has been recognised in the designs.

Benefits and ecological mitigation

30. From the outset of the project, a key objective has been to improve water quality in order to meet the requirements of the EU Bathing Directive. This will be achieved through de-silting five ponds and increasing bio-filtration through planting of reed beds as part of the mitigation strategy.
31. As part of the mitigation strategy required for the planning application, a diverse range of high quality habitats are being provided to mitigate tree loss associated with the project. All the pond enhancement designs have been developed in liaison with Heath Staff in terms of the management of the Heath, and consideration given to the various pond uses. The design is built on a detailed understanding of the baseline conditions, environmental constraints, stakeholder and user requirements. Management and maintenance of the pond habitats will be included in a new section of the Hampstead Heath Management Plan, the cost of which is met from North London Open Spaces Local Risk Budget.
32. The decision was taken to provide diverse habitats including wet woodland, scrub and vegetation along pond edges rather than re-planting trees, in line with the Hampstead Heath Management Plan which highlights the fact that removal of trees can enhance biodiversity by allowing light through and encouraging diverse ecological regeneration. These solutions will maintain and importantly improve the existing ecological value of the Heath. The Heath has approximately 20,000 trees, and while trees are precious, the ecological impact of providing diverse habitats will be greater. Overall the scheme puts 162 trees "at risk". The Design Team will be working to reduce this number – but Members should be aware of this potential tree lost, which will be included in the Environmental Impact Assessment.

33. As part of the sustainable design approach the pond enhancement works have been designed to provide:
- 'system wide' effective management of factors e.g. water quality and sediment ingress, that are currently acting to constrain the ecology of the ponds within each chain
 - opportunities to increase the complexity and range of habitats and species supported on the Heath.

The sustainable design approach includes the following key components:

34. De-silting of key ponds in the upper chains and bathing ponds to remove nutrients, which have accumulated in the sediment, thus reducing the likelihood of water quality deterioration associated with periods of low dissolved oxygen concentrations.
35. The reuse of materials within the proposed marginal planting areas and pond margins is integral to the design. This includes the use of silts from pond dredging works and brushwood arising from required scrub clearance and tree management activities to form the marginal planting platforms. In addition, it is proposed to use reclaimed timbers (i.e. from re-cladding works at Viaduct Pond) and woody debris from tree felling to create valuable hibernacula and material for use in check dams. This will act to reduce the carbon footprint of the works through the reduced need for material imports/exports and vehicular movements.
36. The ecological benefits of the pond enhancement works will be maximised through design, including such components as the use of hazel faggots at the front of the planting platforms to provide cover for juvenile fish and aquatic invertebrates and egg laying sites for amphibians. The planting palette will include a diverse array of native wetland species.
37. The protection of existing pond habitats and species and plants, where possible, that ensures improvements in ecological value, such as the landward extension of the reed beds on Bird Sanctuary Pond and the creation of a new wetland channel.
38. The creation of new, and the maintenance of existing reed bed margins, at key locations in the ponds to control the delivery of sediment to the ponds and to provide uptake of nutrients to improve water quality at the point of inflow e.g. at the top end of Stock Pond and Viaduct Pond. This will also over time create additional habitat of intrinsic ecological value as well as providing habitat/cover for breeding birds, fish, invertebrates and other biota.
39. The installation of measures along feeder streams e.g. wetland pools, washland areas, online reed beds and check dams, to provide control of sediments and improve water quality prior to the point of pond entry i.e. as proposed at Bird Sanctuary Pond, Ladies' Bathing Pond and Men's Bathing Pond. These features will provide multiple benefits through the additional habitat that is created.
40. The establishment of marginal planting areas with only native wetland planting to maintain ecosystem integrity, whilst also increasing the diversity of plant species supported on Hampstead Heath and the aesthetic value of the ponds.

The use of local provenance seed and plant stock will reduce the risk of failure of establishment within newly created habitat areas.

41. Provision will be made to ensure that all valuable marginal plants which could be affected by the works will be translocated to a suitable receptor site on the pond chain. The wider environmental measures will provide significant compensatory measures for the loss of habitats associated with the wider design.

Wildlife preservation during works

42. Full consideration is being given to the protection of wildlife (such as fish, swans and geese) during the works. Further details will be provided at Authority to Start Work, but Members may like to note that officers have already started to make contact with relevant agencies in preparation.

Current Position

Stakeholder engagement and consultation

43. Since the approval of two Preferred Options for each chain of ponds for public consultation in November 2013, the City has conducted a non-statutory consultation exercise, completed Ground Investigations and continued the iterative design process. The results of the consultation exercise⁶ were reported to the Hampstead Heath Consultative Committee and Hampstead Heath, Highgate Wood & Queen's Park Committee in April 2014. Unsurprisingly, there was a quite high degree of dissatisfaction with the proposed options – with only 8-12% stating that they were most satisfied with any of the options and 60-66% stating that they were dissatisfied with the options, with a number of respondents questioning the basis of the project. The most frequent comments related to: interpretation of the law and the necessity of the project; the visual impact; ecological impact and impact on amenity and recreation.
44. While there was no clear preference between the various options consulted upon, there were a number of themes about design which emerged from the comments received and these have been fed into the design process to date and will be taken forward as part of detailed design:
 - Preference for earth banks over walls
 - Preference for natural style landscaping of dams and features over 'man-made' constructions.
 - Paths to have proper surfacing
 - The importance of accessibility and safety for children and families, especially but not exclusively for the Model Boating Pond
 - The need to maintain the present visual rural / countryside landscape and current (or improved) amenity across the Heath

⁶ The results of the consultation exercise are available on the Ponds Project website: <http://www.cityoflondon.gov.uk/things-to-do/green-spaces/hampstead-heath/ponds-project/Documents/HHPP%20Information%20and%20Consultation%20Report%2019%20March%202014COMBI.pdf>

- Opportunities to create and enhance wildlife habitat should be taken where possible
 - As far as possible views should be maintained.
45. The project has continued to engage with local stakeholders both through the Ponds Project Stakeholder Group and by meeting particular interest groups. Recently officers met with the Hampstead Heath Angling Society, representatives of the Kenwood Ladies' Bathing Pond Association and representatives from Brookfield Mansions (located immediately adjacent to Highgate No.1).
 46. Members will be aware that there has been significant local media interest in the project at various points. A number of local politicians have also expressed a variety of views on the project.

Contractor appointment and Early Contractor Involvement

47. BAM Nuttall have been appointed as constructor and the partnership agreement between them, the City (client), Capita (cost consultants) and Atkins (designers) was signed on 14th March 2014. Project management has been transferred from Capita to an experienced project manager already employed on the project.
48. The Ground Investigation was started on site at the end of March 2014. This was undertaken to inform the designers of the existing dam construction and their ability to accommodate the proposed works and to establish the suitability of soil on the Heath for use in construction (reducing the amount of material that would need to be brought in, thereby reducing the environmental/amenity impact of truck movements on the Heath and our neighbours) and the size and location of the borrow pits for this material. The aim is to reinstate the borrow pits using material removed from the ponds during de-silting. An Environmental Permit to Work scheme was established to ensure the protection of wildlife. Reinstatement has been carefully monitored and weekly meetings were conducted between BAM Nuttall and Heath staff. The Ground Investigation has also been a useful opportunity to familiarise the constructor with the Heath environment and staff.
49. As highlighted by Atkins in their Preferred Solutions Report, BAM Nuttall have been contributing to the design development process since their appointment. They have already proposed innovative methods for de-silting the ponds and have provided challenge to the engineers in terms of new construction techniques. One of their aims is to minimise the use of in-situ concrete. For example, where new walls need to be constructed, they have proposed options to use precast segments or plastic sheet piling to minimise the construction disruption on the Heath. At Hampstead No.2 Pond they have proposed a new way of installing a culvert which will reduce the working area and required area for excavation, thereby reducing the impact on tree roots (which would put the trees "at risk").
50. The full results of the Ground Investigation are not yet available, but the early indications from the contractor are that the results have been positive in terms of being able to source material on site, as both the boreholes and trial pits

have found clay. The GI also revealed that the construction of the Men's Bathing Pond dam is not clay – it is rubble (which may explain the persistent leak) and a solution to the leak is being developed as part of the design process.

51. Alongside the results of the public consultation and emerging Ground Investigation results, City officers, the Design Team at Atkins and BAM Nuttall have continued to refine the options. This is outlined in the appended Atkins' Preferred Solutions Report.

Next steps

52. The City's Design Team will complete and submit a full planning application for the Ponds Project with an Environmental Impact Assessment by 4 July 2014. The City has signed one Planning Performance Agreement with Camden and is negotiating the second. Assuming that Camden are able to fulfil the agreed timetable and that no external factors impinge on the timescales, it is expected that a determination of the planning application can be made at the end of October 2014. This would enable the contractor to mobilise to start preparatory works at the beginning of 2015 before the bird nesting season and to commence works in Spring 2015.
53. Due to the bird nesting season, the July submission date is critical as missing this would push determination of the planning application back to December 2014 due to the intervention of the summer recess. This would result in the programme being delayed by a season. Similarly, any refusal of planning permission or significant delay in determining the planning application would severely impact on the programme.
54. A programme is attached at Appendix 4. This programme is based on a submission of the planning application in July 2014 and its determination as outlined in the Planning Performance Agreement signed with Camden. Officers acknowledge that there are a number of external risks to the project – principally the manner of Camden's determination of the planning application and the possibility of Judicial Review. These two external factors are interrelated, as although the institution of Judicial Review proceedings would not as a matter of law by itself prevent Camden from determining the planning application (unless an application for interim relief were successful), this may raise issues which prompt them to seek additional information. It is also possible that Camden's planning determination could be subject to a separate Judicial Review.
55. Officers anticipate bringing a Gateway 5 – Authority to Start Work report back to your Committees in January 2015. This will include a confirmation of the Agreed Maximum Price with the constructor as well as details of any additional planning conditions.

Enabling Works

56. In order to start the main works on site to programme, it will be necessary to carry out a degree of enabling works to avoid significant programme delays from environmental constraints such as the bird nesting season. By carrying out this work between December 2014 and February 2015, it will allow the

contractor to complete the main works as efficiently as possible, minimising the disruption to the Heath. The exact extent of these works will not be known until the completion of the detailed design.

57. It is proposed that the Director of the Built Environment be given authority to release up to £500,000 from the works budget to undertake enabling works including tree clearance.

Opposition to the project

58. Members will be aware that the Ponds Project has caused some controversy with communities local to the Heath and regular Heath users. There are two organised anti-Ponds Project Campaigns: "Protect Our Ponds" - <http://www.protectourponds.org.uk/> and "Dam Nonsense" - <http://www.damnonsense.org.uk/> which is the campaign organised by the Heath & Hampstead Society. In broad terms, these campaigns assert that the Ponds Project is not required by law and if implemented would be in contravention of the Hampstead Heath Act 1871. These stakeholders believe that a range of lesser measures such as dam strengthening and an Emergency Action Plan are sufficient to ensure safety.
59. The City has undertaken dialogue with the Heath & Hampstead Society, including two meetings with both parties' legal representatives in attendance and more recently a meeting between representatives of the Society and the Chairman of the Policy & Resources Committee and the Chairman of the Hampstead Heath, Highgate Wood & Queen's Park Committee. There has been an exchange of letters between the Society and the City on the legal issues involved and the most appropriate mechanism for determining those issues. The parties now agree that Judicial Review appears to be the most appropriate mechanism should the Society wish to bring the matter before a court.
60. Conversely, there are other groups of local residents downstream of the dams who are urging the City to do more. They would like to see a higher standard of protection from the bottom dam – Highgate No.1 (i.e. that the spillway should come into action less frequently than an 1:1,000 year event as per the recommended chosen options) and would also like to see additional flood storage capacity introduced on the Heath to help alleviate surface water flooding in Camden. The City has also conducted dialogue with these residents.

Risk

61. The top project risks relate to traffic movements, the potential for legal challenge, the planning process and swimming capacity. Officers have to date been impressed by the initial performance of BAM Nuttall on-site and their understanding of the Heath environment. This gives the Project Board confidence in their ability to manage the project risks that have transferred to them.

62. Of those risks which remain with the City, these are divided between those which are external factors (planning and legal challenge), design risks and those which are related to the management of the Heath during the project.
63. The Risk Register is a live document and a risk workshop is due to take place shortly to reflect the changes that have occurred now that the contractor has been appointed and the Design Team are moving towards detailed design.

Planning application

64. The City has signed one Planning Performance Agreement (PPA) with Camden and is currently negotiating the second. The PPA sets out an agreed timescale in relation to the consideration of the application. Officers are particularly keen to ensure that a Panel Engineer (as requested by Camden) is appointed promptly by Camden to review the scheme to ensure that the application is progressed without delay.
65. Officers have been meeting Atkins weekly to monitor progress on the preparation of the application, and we are on programme to submit a planning application and Environment Impact Assessment on 4 July 2014.

Judicial Review

66. The potential for Judicial Review is discussed more fully under legal implications. Officers have been aware of this risk for some time and accordingly the Partnership Contract includes a clause which would allow us to halt works if necessary. However due to the need to mitigate the risk of dam overtopping, officers recommend that design works continue while any legal proceedings are resolved.

Swimming capacity

67. Since the inception of the project, officers have been aware that the project has the potential to impact upon the availability of the swimming ponds. There is a particular operational concern that this could lead to unauthorised swimming in ponds which are not lifeguarded. BAM Nuttall stated in their bid that they would keep at least one swimming pond open at all times and consideration will be given to minimising the impact upon swimming in programming the works.

Traffic movements

68. Traffic movements will be minimised as part of the Construction Management Plan and strict controls will be in place to minimise conflict between Heath users and construction vehicles. All vehicles will adhere to the Heath's safety standards which include moving at walking pace with hazard lights on. Officers were satisfied with BAM Nuttall's performance during the Ground Investigation works and believe that adequate controls for this risk are in place.

Japanese Knotweed

69. Japanese Knotweed has been found at a number of locations on the Heath, including on one of the dam crests where the spillway will be located. Any earth containing knotweed is classed as Category A (the highest

classification) hazardous/contaminated waste and needs to be managed accordingly. Officers are currently exploring options with BAM Nuttall and Atkins and will need to include the costs for this disposal within the Agreed Maximum Price at Gateway 5.

Clay and other materials

70. The early results from the Ground Investigations have been positive but there is still a significant challenge to retain a neutral cut/fill balance across the Heath. It is hoped that most of the clay required for the catchpit dam and the raising of Model boating will be sourced from areas adjacent to the worksite, minimising logistics costs and disruption to the Heath. However, the balance of clay and silt will only be truly apparent when the clay is excavated during the works. The results of the Ground Investigation will inform the earthworks strategy and will feed into the Agreed Maximum Price at Gateway 5.
71. There is currently a significant provision within the budget for “armorflex” – a type of reinforced concrete cell mat used to line spillways, which can then be covered with grass. As we move into detailed design, the final amounts of “armorflex” required will be defined and this will impact on costs.

Ladies’ Bathing

72. As indicated earlier in the report, the provision of facilities at the Ladies Bathing Pond has not yet been defined. However, following Atkins’ design development; it became apparent that the new spillway could be constructed without the need for the existing building slab to be altered. The contractor’s input also identified that the two options previously considered would have significant constructability issues.
73. The Design Team is now looking at the option of retaining the existing slab and carrying out significant improvement works to the existing facility. Although officers suspect that the costs of provision or refurbishment of the facilities on the existing concrete slab will be cheaper than the original options of a new concrete slab we are not yet in a position to give a fuller indication on cost as the architects are still outlining their designs. The Ladies have so far been presented two options for new buildings on the site which would accommodate the hydraulic requirements and enhance the operational function.

Men’s Bathing

74. There has been a leak on the Men’s Bathing Pond for some time which the City has continued to monitor as part of the regular inspection programme. The early results of the Ground Investigation have shown that the top section of the dam is made up from demolition material which is not suitable for dam construction. It is thought that this is likely to be the cause of the ongoing leakage. Atkins are currently working closely with BAM to refine the design solution for this dam. It is expected that the design of the wall will change, from a clad pre-cast concrete wall to clad sheet piling. This will allow the leakage to be stopped, whilst raising the level of the crest to cope with the design flood. The updated design solution will be included in the budget and programme at Gateway 5.

Budget

75. The current budget position is attached at Appendix 5 (Non-Public). Below is a summary of the proposed budget adjustments and revised estimated cost:

	Estimated Cost At Issue Report, January 2014 (£)	Proposed Budget to be Approved at this Gateway (£)	Revised Estimated Total Project Cost (£)
Preliminary Evaluation Costs	271,000	271,000	271,000
Works^b	12,293,000	-	12,293,000
Fees	2,935,000	3,434,000	3,434,000
Staff Costs	802,000	802,000	802,000
Pre-construction	663,000	593,000	593,000
Total	16,964,000^a	5,100,000	17,393,000

a. Of these total costs, only the Preliminary Evaluation Cost, Fees, Staff Costs and Pre-construction works have been approved.

b. The works cost remains an estimate

76. The Project Team is working towards an "Agreed Maximum Price" (AMP) with BAM Nuttall, the contractor. This depends on the finalisation of the detailed design which is still on going and may be impacted by any additional conditions imposed as part of the planning process. Officers expect to be able to report back on the AMP as part of the Gateway 5 – authority to start work report in December 2014/January 2015.
77. Members will note that the approved budget for this project has been £15.2m +/-20% at 2010 prices since July 2011. Officers had been hoping to provide a greater clarity on the expected outturn at this point, but as illustrated in this report, there are a number of issues outstanding that may impact on budget: the Ladies' Bathing Pond, the presence of knotweed on site and an outstanding question on the quantity and quality of clay across the Heath. The total revised estimated cost remains within the tolerance granted in July 2011.
78. To ensure that the project continues to progress following the planning approval process, it is proposed that some enabling works be brought forward from the so far unapproved works budget to cover these costs. This is to allow some of the early work such as tree clearance to be completed before the bird nesting season in March 2015. It is therefore proposed that the Director of the Built Environment be authorised to release a sum up to £500,000. If the clearance work is not completed before March 2015, there is a high risk of significant programme delays as a result of the environmental constraints.
79. The anticipated cost of fees has increased since the last report. This is mainly due to the extension of the programme as a result of the prolonged

consultation previously reported. The second tranche of these costs was not previously recommended for approval as it relates to the programme delay associated with the period now being reported on.

80. Within the increased fee budget is also the ongoing cost of maintaining the Document Management System until project completion. An initial £11,000 had been approved for the initial set up of the system. The system has now been fully adopted and is proving to be a valuable tool for sharing project information. An additional £36,500 is requested to pay for the system and further training for staff members until the end of the project.
81. An additional figure of £15,000 has been included for the assessment fees associated with entering the project for a CEEQUAL award (the equivalent of BREEAM for buildings). CEEQUAL is an industry-wide sustainability assessment for Civil Engineering projects and we have asked all parties in the Project Team to sign up to the process. It is a demonstration of the City's determination to deliver the project in the sensitive and sustainable way that the Heath requires. The assessment of the project will start immediately and continue until project completion.
82. It is proposed that a figure of £70,000, previously approved for additional survey work is transferred from BAM Nuttall's pre-construction services to Atkins' design budget. As a result of the slight delay in BAM's appointment, it was necessary for us to instruct Atkins to carry out the work in order for the surveys to be carried out within the environmental time constraints.
83. There is an outstanding Early Warning Notice from Atkins relating additional fees of £71,000 as a result of a perceived change in design effort from what was tendered for. The City has rejected this claim and discussions with Atkins are ongoing. This figure has not been included in the anticipated total project cost.
84. There are also some opportunities emerging for making some savings in the fees budget which have not yet been quantified. Firstly the pre-construction services contract with BAM Nuttall was slightly delayed. Although most of the tasks required of BAM remain, the timeframe has been truncated. We are therefore in discussions with BAM to quantify the savings which the City should experience as a result.
85. The Client Representative Role has now been taken away from Capita and brought back to the City's Project Team. Whilst there are several aspects of this role which the City will continue to require Capita's assistance in and an inevitable increase in staff costs, there should also be a saving as a result of this move. We are currently working with Capita to agree the value of this saving.

Legal Implications

The Reservoirs Act 1975 ("the 1975 Act")

86. Under the provisions of the 1975 Act, the Hampstead No 1, Highgate Men's Bathing Pond and Model Boating Pond are designated as large raised reservoirs due to the volume of water (more than 25,000 cubic metres) stored above natural ground level.

87. The 1975 Act requires that all large raised reservoirs must be inspected and supervised by a panel engineer. Panel engineers are a group of specialist civil engineers appointed to particular panels by the Secretary of State. It is the responsibility of the undertaker (the City) to appoint a panel engineer (at its own cost). There are three types of panel engineer relevant to this project – inspecting, supervising and construction. The Supervising Engineer is retained to monitor, report and advise on the condition and safety of the dams. The City’s Supervising Engineer is an ‘all panels’ engineer and therefore qualified to carry out all three panel roles.
88. The Supervising Engineer can call for an inspection by the Inspecting Engineer at any time under section 12(3) of the 1975 Act. Under section 10(3) of the 1975 Act the Inspecting Engineer can make any recommendations he sees fit in the interests of safety. If the City fails to comply with the recommendations of the Inspecting Engineer, the enforcement authority (the Environment Agency) have the power to issue an enforcement notice under section 10(7) of the 1975 Act, and to carry out the works in default and to recharge the City under section 15 of the 1975 Act. Failure to comply with a recommendation of the Inspecting Engineer is also a criminal offence under section 22 of the 1975 Act. It is possible for an undertaker to refer a disputed recommendation to an independent qualified civil engineer under section 19 of the 1975 Act, and to appeal a requirement in an enforcement notice to the First-tier Tribunal in accordance with regulations made under section 19A of the 1975 Act.
89. There are currently no outstanding recommendations under section 10 of the 1975 Act, but the Supervising Engineer has stated that if the necessary works pursuant to the Ponds Project are not progressed he will call for a statutory inspection, with the resulting recommendations in the interests of safety. The duties of the City under the 1975 Act to comply with the recommendations of the Inspecting Engineer are only triggered by such a report. However Leading Counsel has advised that the City can properly and ought to do that which the Supervising Engineer states to be required for other reasons e.g. to avoid the risk of tortious liability, or if it reasonably anticipates that an inspection would result in recommendations equivalent to those made by the Supervising Engineer.
90. In making this assessment it is important to note that the City’s Supervising Engineer is highly qualified and experienced. To date the City has decided to follow the expert advice of this specialist, retained for that purpose – it might well be found to be unreasonable not to do so. The City has sought a second opinion regarding the works that are necessary, from another panel engineer, and his views are in agreement. The City’s own engineer confirms these views. The Supervising Engineer is also following standard industry guidelines that have been applied to large raised reservoirs nationwide, in the form of *Floods and Reservoir Safety*, (3rd edition, 1996) Institution of Civil Engineers (“ICE”). Leading Counsel has advised that it would be difficult to criticise the Supervising Engineer for following professional guidelines as to what safety requires, unless good reason existed for doing less than the guidelines proposed – which it does not. The authoritative nature of ICE guidance is recognised by DEFRA in its report on Reservoir Safety in England and Wales dated 19 July 2013.

91. If the City were to wait for a section 10 inspection, compliance with the resulting recommendations might require much cruder interventions relating only to the three existing large raised reservoirs, and on a tighter timescale. This might prove even more disruptive to Heath users, especially to water-users, and leave the Heath with less landscape-friendly dams. By taking the initiative, the City has been able to consider each chain of ponds as a whole. Opting for a scheme which upgrades all the ponds (as opposed to one which only includes improvements to the three ponds currently designated as large raised reservoirs) additionally mitigates against the risk of dam failure at all of the ponds. It also reduces the visual impact of the works at any one pond by spreading the impact across all of the ponds rather than concentrating an engineering solution on just the three large raised reservoirs designated under the 1975 Act. This spreading of the impact means that the solution proposed better preserves the natural aspect and state of the Heath in accordance with the City's obligations under the Hampstead Heath Act 1871.

The Flood and Water Management Act 2010 ("the 2010 Act")

92. Under amendments to the 1975 Act enacted in the 2010 Act, but not yet fully brought into force, the minimum size of a large raised reservoir will be reduced to 10,000 cubic meters. It is anticipated that new regulations will also provide for all ponds in a chain that have a combined volume of 10,000 cubic metres to be classed as large raised reservoirs, which would include all of the ponds in the Hampstead and Highgate chains. It is also anticipated that these ponds will be assessed as high-risk reservoirs - the new designation for large raised reservoirs that are subject to the most rigorous safety and inspection regime.
93. Although not yet fully in force, the Ponds Project being pursued by the City is intended to satisfy the anticipated safety requirements arising from the 2010 Act, relating to all of the ponds in the two chains, as well as the current requirements under the 1975 Act, relating only to the three existing large raised reservoirs. "Future proofing" the Ponds Project ensures that further works will not be required at a later date. This is more cost efficient and means less disruption for Heath users. Leading Counsel has advised that the City can take account of these anticipated legislative requirements in carrying out the works, especially given the other advantages of doing so.

The Hampstead Heath Act 1871 ("the 1871 Act")

94. The City exercises functions under the 1871 Act by virtue of The London Government Reorganisation (Hampstead Heath) Order 1989. Under section 16 of the 1871 Act the City "...shall at all times preserve, as far as may be, the natural aspect and state of the Heath, and to that end shall protect the turf, gorse, heather, timber and other trees, shrubs, and brushwood thereon." Leading Counsel is of the view that the ponds were considered by the draughtsman in 1871 to be part of the natural aspect and state of the Heath. However he has also advised that the City's duty under section 16 of the 1871 Act is a qualified duty – note the words "as far as may be" – which does not prohibit works that are necessary; for example under another statutory duty, or in the interests of safety. Clearly however, if there are two design options, equally efficacious from the safety perspective, then the section 16 duty

requires the selection of that option which better preserves the natural aspect and state of the Heath.

Other relevant legislation and potential liabilities

95. The City's potential liability is not limited to the 1975 Act and those ponds classed as large raised reservoirs or high risk reservoirs. If the dams for any of the ponds were to fail, leading to injury or loss of life, there would be the possibility of a criminal prosecution under other legislation: for example such as the Health and Safety at Work etc Act 1974 ("the 1974 Act"), if the City failed to take all reasonably practicable steps to protect the public; or even under the Corporate Manslaughter and Corporate Homicide Act 2007 ("the 2007 Act"), if there was found to be a gross breach of a relevant duty of care. Leading Counsel has advised that, so long as the City takes the planned works forward with reasonable expedition, it should avoid criminal liability. However, mere reliance on the absence of an obligation under the 1975 Act, in the form of extant safety recommendations from an Inspecting Engineer, would not necessarily by itself provide a defence. If the City proceeds with the upgrades approved, pursuant to fully reasoned recommendations in July 2011, it will in Leading Counsel's view have satisfied the test of reasonable practicability for the purposes of the 1974 Act. Similarly, in relation to the 2007 Act, if the City did nothing in the face of advice received, and the hypothesised catastrophe occurred, then the offence might be made out, but if it acts as planned he does not consider that it could be said to have been grossly negligent, if indeed negligent at all. His advice to the City remains – continue to implement the approved recommendations with all deliberate speed.
96. In terms of civil liability the Rule in *Rylands v Fletcher* provides that, "The person who for his own purpose brings on his lands....anything likely to do mischief if it escapes, must keep it at his peril and is prima facie answerable for all the damage which is the natural consequence of its escape." This Rule would apply to all of the man-made ponds on the Heath, and strict liability would attach to the City if a dam breached and water escaped and caused damage to property. This means that the City would be liable without any need to prove there had been a wilful act, default or negligence in tort, provided that the damage caused was reasonably foreseeable. Other types of civil suit could also be pursued against the City in appropriate circumstances in the event of dam failure, for example actions in negligence or nuisance.

Judicial review and other legal challenge

97. The Heath & Hampstead Society have indicated since the inception of the Ponds Project that they may pursue a legal challenge. They have confirmed in recent correspondence with the Comptroller & City Solicitor that they are intending to proceed with a judicial review application. It is agreed between the parties that an early resolution of the legal issues would be preferable. The Comptroller & City Solicitor has indicated to the Society that, if a decision is taken as a result of this report to approve the Chosen Options, and to grant authority to submit a consequential planning application, this may be an

appropriate decision against which, if still so minded, the Society could direct its challenge.

98. Based on previous statements, it is likely that such a challenge would focus on the relationship between the Reservoirs Act 1975 and the Hampstead Heath Act 1871, and the assessment of risk and appropriate safety standards under ICE guidelines, on which the project is based. The Society contend that a court would hold that the safety standard envisaged by the 1975 Act is one of reasonable safety only. They further contend that such a standard is not compromised by considering during the process of the design of the works how to reduce the adverse consequences of dam collapse by taking into account practicably available measures such as early warning; and the balancing of the scale of the proposed works against their impact on the Heath, its users, the local community and the environment. The view of the Society is that the duties of the City under the 1871 Act must influence at an initial stage any decision as to the works that are required under the 1975 Act. The City is proceeding on the basis that the 1871 Act should not influence any decision as to the works that are required in the interests of safety under the 1975 Act although, as previously stated, any works should be undertaken in the way that is most sympathetic to the natural aspect and state of the Heath. Any legal challenge may also focus on perceived shortcomings in the decision-making process.
99. Any grant of planning permission by Camden could also be the subject of legal challenge by way of a judicial review application.

Advice from the Panel Engineer

100. As previously stated, the Supervising Engineer has not called for a section 10 inspection because, in his opinion, the City is progressing the necessary works in a sensible way within a realistic timescale – he continues to indicate that, if the works are not progressed, he will call for such an inspection.
101. The last 10 year inspection report in 2007 recommended a downstream impact assessment and flood study be carried out to establish whether any increase in overflow capacity would be necessary. Accordingly a Flood Risk Assessment was produced in 2009⁷. A further study in January 2011⁸ established the probable maximum flow which the ponds should be designed to cope with and considered what measures would be necessary to mitigate the downstream impact identified by the Flood Risk Assessment. The probable maximum flow was higher than previously estimated and resulted in the pond overflows and embankments being identified as inadequate to meet current requirements under the 1975 Act. The embankments are deemed highly vulnerable to erosion as a result of predicted overtopping which may result in collapse. It was further discovered that if there were to be a failure of the pond embankments during a major storm and no public warning had been given, the likely loss of life on the Hampstead Chain would be in the region of 400 people and around 1000 people on the Highgate Chain. There would

⁷ The CARES report

⁸ The Haycock report, which was peer reviewed by Aecom

also be inundation and damage to local properties, roads and the railway lines to Kings Cross.

102. The three current large raised reservoirs are all classed as Category A (highest risk). In relation to Category A dams, page 7 of *Floods and Reservoir Safety* states, "It is considered that public opinion will not accept conscious design for a specific threat to a community, even though it tolerates to an extent both random and accidental loss of life. Consequently, no dam above a village or town should be designed knowingly with a finite chance of a disastrous breach due to the under-provision of spillway capacity. A community in this context is considered to be not less than about 10 persons who could be affected."
103. On page 8 of *Floods and Reservoir Safety* it is made clear that, "Table 1 sets out the standards which are appropriate for the wide variety and scale of dams in Britain." Page 9 goes on to explain that, "Table 1 is designed to take account of those factors which are weighed together by panel engineers both for the design of new dams and for dam inspections. Its main intentions are to ensure that, where a community could be endangered by the breach of a dam, the risk of any breach caused by a flood is virtually eliminated. However, where there is no community at risk, expenditure on safety works should be kept to a scale justified by the risk." In other words, safety comes first. It is only where no community is at risk that economic factors, and possibly other factors such as environmental factors, may be taken into account.
104. It is only in relation to Category D (lowest risk) dams that *Floods and Reservoir Safety* states on page 8 that, "Many small reservoirs with low earth dams may cause no real problem, except that of replacement, if they wash out. These special cases, many of which are ornamental lakes kept full for aesthetic reasons, are given a separate category where they pose no significant threat to life or property. A flood intense enough to cause failure of a dam would create some damage even if the valley were still in its natural state; the additional damage caused by the release of stored water may well be insignificant if the lake is small."
105. Therefore the design flood for Category A reservoirs as set out in Table 1 is the Probable Maximum Flood ("PMF") and the dam is required to pass the routed outflow of the PMF. The PMF has been used as the benchmark for Category A dams since, if this extreme low probability event can be safely accommodated, it is reasonable to state that the probability of collapse has been virtually eliminated. The PMF is just that – a calculation of the maximum flood that could occur, based on the maximum amount of water that can be stored in the atmosphere, the size and topography of the catchment area, ground conditions, etc. It is difficult to predict the probability of such an extreme event – the Interim Quantitative Risk Assessment estimated this to be 1:400,000 years. This has attracted a lot of public comment and, from some quarters, criticism. However this is simply another way of saying that dams that pose a high risk must not be allowed to fail as a result of any flood event. The PMF is simply the extreme end of the graph.
106. It should be noted that the recently implemented part of the 2010 Act has revised the categorisation of reservoirs to those that are "high-risk" and those

that are not “high-risk”. One of the criteria for designating a large raised reservoir as high-risk is that at least one person could be endangered by an uncontrolled release of water. It is anticipated that all of the ponds in the Hampstead and Highgate chains will in due course be designated as high-risk. The ICE guidelines are currently being updated to reflect the new high-risk designation and it is anticipated that the new safety standards will be in line with current Category A standards.

107. Overtopping, with the associated risk of embankment erosion and failure, currently begins to occur on the Hampstead chain in a 1:100 year flood event at Mixed Bathing Pond and Hampstead No.2, and on the Highgate Chain in a 1:5 year flood event at Stock Pond and a 1:20 year flood event at Ladies Bathing Pond and Bird Sanctuary Pond. This is an unacceptably high risk of overtopping and failure of the dams and thus the need for remedial works.

Corporate & Strategic Implications

108. The Ponds Project supports Key Policy Priority 5: Increasing the impact of the City’s cultural and heritage offer on the life on London and the nation by supporting the provision of “safe, secure and accessible Open Spaces”. The Ponds Project will ensure compliance with the current and anticipated requirements of the Reservoirs Act 1975 and deliver the concluding mitigation of Strategic Risk 11. The project also supports the City Together Strategy – “supports our communities”, “protects, promotes and enhances our environment” and “is vibrant and culturally rich”.

Conclusion

109. The options recommended to your Committees (Option 6 and Option M) represent the culmination of a highly iterative process, reflecting a careful and considered response to the risk of dam erosion and collapse at Hampstead Heath caused by overtopping. The options recommended met the engineering requirements set out in *Floods & Reservoir Safety* and are considered to preserve the natural aspect and state of the Heath in the most effective manner. Members should take into account all relevant matters, as set out in this report.

Appendices

- Appendix 1 – Atkins’ Preferred Solutions report
- Appendix 2 – Environmental master plans
- Appendix 3 – Tree loss plans
- Appendix 4 - Programme
- Appendix 5 – Budget (non-public)
- Appendix 6 – Glossary

Ponds Project Background Papers:

- CARES Flood Risk Study report
- Haycock Hydrology Improvements Detailed Evaluation Process (HiDEP): Hydrology and Structure Hydraulics and Recommendations Report
- Aecom Peer Review
- Design Review Method Statement
- Design Flood Assessment
- Constrained options report
- Shortlist Options report
- Interim Quantitative Risk Assessment and accompanying Position Paper
- Preferred Options report
- Strategic Landscape Architect Review
- Ponds Project public consultation report

All background papers are available at www.cityoflondon.gov.uk/pondsproject

Previous committee reports are available at: www.cityoflondon.gov.uk/committees

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