ATKINS

Hampstead Heath Ponds Project

ENVIRONMENTAL STATEMENT

MAIN REPORT (VOLUME 2)

July 2014





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This Environmental Statement and the Environmental Impact Assessment (EIA) carried out to identify the significant environmental effects of the proposed development have been undertaken in line with our commitments as members of the EIA Quality Mark.

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Contents

Noti	ce	i
	Document History	i
Cont	tents	ii
Glos	sary of terms	v
Defi	nitions	vi
1.	Introduction	1
	Background	1
	Purpose of the Environmental Statement	2
	Structure of the Environmental Statement	2
2.	The site and surrounding environment	4
	Hampstead Heath	4
	The Highgate chain of ponds	5
_	The Hampstead chain of ponds	6
3.	The Proposed Development	8
	Proposal outline	8
	The Hampstead chain of ponds	8
	Construction phase	12
4.	Alternatives	. 16
	Design process	16
	Main alternatives	17
5.	Approach to the assessments	. 19
	The EIA process	19
	Scoping	19
	Introduction to the assessment chapters	20
	Consultation	21
c		
0.	Landscape and visual assessment	. 22
	Scope of the assessment	22
	Method of assessment	22
	Baseline conditions	26
	Impact assessment	36
	Impact assessment Mitigation measures	36 39
	Impact assessment Mitigation measures Summary	36 39 40
7.	Impact assessment Mitigation measures Summary Ecology	36 39 40 .41
7.	Impact assessment	36 39 40 41 41
7.	Impact assessment	36 39 40 .41 41 41

	Baseline conditions
	Impact Assessment
	Mitigation Measures
	Summary
8.	Water environment
	Scope of the assessment
	Relevant legislation
	Method of assessment
	Baseline conditions
	Impact assessment
	Mitigation measures
	Summary
9.	Historic Environment
	Scope of the assessment
	Legislative and planning framework
	Method of assessment
	Baseline conditions
	Impact assessment
	Mitigation measures
	Summary
10.	Community
	Scope of the assessment
	Relevant legislation
	Method of assessment
	Baseline conditions
	Impact assessment
	Mitigation measures
11.	Traffic and transport
	Scope of the assessment
	Relevant legislation
	Method of assessment
	Baseline conditions
	Impact assessment
	Mitigation measures
	Summary
12.	Air Quality
	Scope of the assessment
	Relevant legislation
	Method of assessment
	Baseline conditions
	Impact Assessment
13.	Noise and Vibration
	Scope of the assessment

 43
 51
 64
 64
 65
 65
 66
 66
 67
 70
 76
 76
 77
 77
 77
 79
 82
 90
 92
 92
 93
 93
 93
 93
 94
 95
 96
 97
 98
 98
 98
 99
 102
 106
 109
 109
 110
 110
 110
 112
 113 114
 110
 119
 101
 1 24
 IZI

	Relevant Legislation	121
	Method of Assessment	122
	Baseline Conditions	126
	Impact Assessment	127
	Mitigation Measures	131
	Summary	131
14.	Cumulative effects	132
14.	Cumulative effects	 132
14.	Cumulative effects	132 132 132
14.	Cumulative effects Scope of the assessment Method of assessment Impact assessment	132 132 132 132

Figures

Figure 1.1 Location of the Hampstead Heath Ponds	1
Figure 2.1 Surrounding environment	4
Figure 2.2 View of Stock Pond the existing dam looking north	5
Figure 2.3 View of Kenwood Ladies Bathing Pond from open area looking south east	5
Figure 2.4 View of Bird Sanctuary Pond from dam looking north	5
Figure 2.5 View of Model Boating Pond from south east corner looking north west	5
Figure 2.6 View of Highgate Mens Bathing Pond from the dam looking north	6
Figure 2.7 View of Highgate No.1 Pond from the west bank looking east	6
Figure 2.8 View of Vale of Health Pond from south bank looking north	6
Figure 2.9 Viaduct Pond from the south bank looking north	6
Figure 2.10 Catchpit Area from open area to the north looking south	7
Figure 2.11 View of Mixed Bathing Pond from the dam looking north	7
Figure 2.12 View of Hampstead No.2 Pond from south west corner looking north east	7
Figure 2.13 View of Hampstead No.1 Pond from the west bank looking east.	7
Figure 3.1 Worksites, compounds, borrow pits and site access routes	13
Figure 4.1 Overview of the option development process	16
Figure 5.1 Key stages of the EIA process	19
Figure 5.2 Mitigation hierarchy	20
Figure 6.1 Zone of theoretical visibility and study area	24
Figure 6.2 Landscape designations	28
Figure 6.3 Landscape features	29
Figure 6.4 Landscape character areas	31
Figure 6.5 Visual receptors and verified views	35
Figure 7.1 Phase 1 habitat map	45
Figure 9.1 LIDAR data for Hampstead Heath	80
Figure 9.2 Historic environment features	83
Figure 9.3 Archaeological potential	89
Figure 11.1 Construction Routes	100
Figure 11.2 Access Points	101
Figure 11.3 Surrounding Roads	102
Figure 11.4 Cycling Routes within the vicinity of the Site	104
Figure 11.5 Bus Routes within the Vicinity of the Site	104
Figure 12.1 Air Quality Monitoring Sites and SSSIs	114

Figure 12.2 Windrose for London City Airport Meteorologica Figure 13.1 Noise Monitoring Locations

Tables

Table 1.1 Location of ES requirements under Schedule 4 of the EIA Regulations	3
Table 3.1 Approximate dimensions of proposed borrow pits	12
Table 3.2 Provisional dates and duration of main construction activities	15
Table 6.1 Landscape and visual scoping responses	
Table 6.2 Landscape Sensitivity	23
Table 6.3 Visual Sensitivity	23
Table 6.4 Landscape Magnitude	25
Table 6.5 Visual Magnitude	25
Table 6.6 Landscape Effects	25
Table 6.7 Visual Effects	
Table 6.8 Landscape Sensitivity	32
Table 6.9 Visual Receptors	32
Table 6.10 Visual Effects Construction	
Table 6.11 Visual Effect Operation	
Table 6.12 Visual Effect Year 15 Operation	
Table 7.1 Scoping Response	41
Table 7.2 Criteria to Evaluate the Significance of Effects to Ecology	43
Table 7.3 Construction phase ecological impact assessment	51
Table 7.4 Operational Phase Ecological Impact Assessment	61
Table 8.1 Scoping Response	65
Table 8.2 Determining Significance of Potential Effects on Flood Risk Receptors	67
Table 8.3 Existing volume of water discharged from the Hampstead Heath catchments	68
Table 8.4 Existing volume of water discharged from the Hampstead Heath catchments	68
Table 8.5 Average frequency of flood currently causing water to flow over the dam crests	
Table 8.6 Baseline and Projected Water Quality Conditions	69
Table 8.7 Construction phase Flood Risk Impact Assessment	70
Table 8.8 Construction phase Water Quality Impact Assessment	71
Table 8.9 Operational phase Flood Risk Impact Assessment	72
Table 8.10 Operational phase Water Quality Impact Assessment	75
Table 9.1 Scoping Response	77
Table 9.2 Examples of the Significance of Designated and Non-Designated heritage assets	81
Table 9.3 Magnitude of Change	81
Table 9.4 Significance of Environmental Effect	
Table 9.5 Significance of Residual Effect	82
Table 10.1 Scoping Response	93
Table 10.2 Sensitivity values of the receptors	93
Table 10.3 Magnitude of impact – land	94
Table 10.4 Magnitude of impact – amenity	94
Table 10.5 Assessment matrix	94
Table 11.1 Scoping Response	
Table 11.2 - Magnitude of Impact Criteria	100
Table 11.3 Two Way AADT Traffic Impact	105
Table 11.4 Speed Data for the Surveyed Roads	106
· · · · · · · · · · · · · · · · · · ·	

al Station,	2003-2007	7	 115
			 123

Table 11.5 Access points during the Construction Phase	107
Table 11.6 Access point swept path analysis	107
Table 11.7 Two way AADT traffic impact	107
Table 12.1 Scoping Response	110
Table 12.2 Air Quality Criteria	111
Table 12.3 Examples of Sensitive Receptors	112
Table 12.4 Risk of Dust Impacts - Demolition	112
Table 12.5 Risk of Dust Impacts – Earthworks and Construction	112
Table 12.6 Significance of Effects for Each Activity with Mitigation	112
Table 12.7 Monitored Concentrations at LAQN Continuous Monitoring Sites	113
Table 12.8 Bias Adjusted Annual Mean NO_2 Concentrations at Relevant Diffusion Tube Monitor ($\mu g/m^3)$	ing Sites 115
Table 12.9 Annual Mean Background Concentrations (µg/m ³)	115
Table 12.10 Summary of Dust Risk for All Construction Works Areas	117
Table 13.1 Scoping response	121
Table 13.2 Noise measurement position details	122
Table 13.3 Example threshold of significance effect at dwellings	124
Table 13.4 Guidance on effects of vibration levels perceptible to humans	125
Table 13.5 Transient vibration guide values for cosmetic damage	125
Table 13.6 Classification of magnitude of noise impacts in the short term	125
Table 13.7 Summary of continuous noise level measurements	126
Table 13.8 Summary of measured day time sample measurements	126
Table 13.9 Summary of measured noise levels at noise sensitive receptors	126
Table 13.10 Distance between noise sensitive receptors and the Highgate pond chain of works	ite
areas	127
Table 13.11 Distance between noise sensitive receptors and the Hampstead pond chain of wor areas	ksite 128
Table 13.12 Maximum noise levels predicted over the period of construction	129
Table 13.13 Predicted PPV levels from vibratory piling	129
Table 13.14 Construction traffic noise assessment	130
Table 14.1 Cumulative effects scoping table	132
Table 5.15.1 Summary of significant effects and proposed mitigation measures	134

iv

Glossary of terms

- AQMA: Air Quality Management Area. •
- ATC: Automatic Traffic Counter
- AQS: Air Quality Strategy. •
- **BWD:** EU Bathing Water Directive.
- **CEMP:** Construction Environmental Management Plan, this document outlines the measures required for • environmental management at the construction stage.
- **CMP:** Construction Management Plan. •
- **CMS:** Continuous Monitoring Station. •
- **CoL:** City of London Corporation. •
- **Culvert spillway:** formed by a concrete box culvert set within the dam so that the top of the dam crest can be reinstated.
- DMRB: Design Manual for Roads and Bridges.
- Emergency draw down pipe: also known as a 'scour pipe', this is the lower pipe in a reservoir that • allows the controlled draining of a reservoir.
- EIA: Environmental Impact Assessment as defined by the Town and Country Planning (Environmental Impact Assessment) Regulations 2011.
- ES: Environmental Statement which reports on the findings of the EIA. .
- FRA: Flood Risk Assessment.
- HHPP: Hampstead Heath Ponds Project.
- **HDV:** Heavy Duty Vehicle •
- HGV: Heavy Goods Vehicle. •
- **IAQM:** Institute of Air Quality Management. •
- LAQN: London Air Quality Network.
- **MEA:** Manual of Environmental Appraisal
- Nitrogen dioxide (NO₂): is a secondary pollutant produced by the oxidation of nitric oxide (NO). Just • over a third of the UK NO_x emissions are from road transport.
- **OGV1:** Ordinary Goods Vehicle 1 All larger rigid vehicles with two or three axles which have double rear wheels.
- OGV2: Ordinary Goods Vehicle 2 All rigid vehicles with four or more axles and all articulated vehicles. .
- **Outlet:** the downstream end of a pipe carrying water from a reservoir.
- PM2.5: Particulate matter measuring less than 2.5 µm in diameter.

- PM₁₀: Particulate matter in vehicle exhaust gases consists of carbon nuclei onto which a wide range of compounds are absorbed. These particles are generally very small (1-10 µm), and include those in the size range referred to as PM₁₀. Diesel engines produce the majority of particulate emissions from the vehicle fleet.
- **PMF:** Probable Maximum Flood the largest flood that the dams are required to accommodate.
- **PPG:** Pollution Prevention Guideline.
- **PPSG:** Ponds Project Stakeholder group.
- **Proposed Development:** Development which would be the subject of the planning application.
- **PTAL:** Public Transport Accessibility Level
- **Site:** Area that would be the subject of the planning application.
- SMI: Site of Metropolitan Importance for nature conservation, an ecological designation of local importance.
- Spillway: an overflow structure that is provided to allow excess water to flow out of a pond or reservoir without flowing over the dam crest.
- SAC: Special Area of Conservation
- **SPA:** Special Protection Areas
- SSSI: Site of Special Scientific Interest, an ecological designation of national importance.
- UKTAG: UK Technical Advisory Group.
- WFD: EU Water Framework Directive.
- WHO: World Health Organisation.
- WQBA: Water Quality Baseline Assessment.

Definitions

For ease of reference, the following terminology has been used throughout this Environmental Statement:

Term	Definition
The Proposed Development	As specified in The Application which is the subject of this Environmental Impact Assessment
The Site	Land area of the Proposed Development (see Figure 1.1)
The Application	Proposed engineering works to the Hampstead and Highgate chains of ponds comprising dam raising at Model Boating Pond (2.5m) and Mixed Bathing Pond (1m), new walls along dam crest to increase the height of the dams at Men's Bathing Pond (1m) and Highgate No.1 Pond (1.25m), a 190mm kerb along part of the crest at Hampstead No.2 Pond, a new flood storage dam (5.6m) in the catchpit area, grass-lined spillways at most ponds, dam crest restoration, pond enlargement at Model Boating Pond, a replacement changing room building at Ladies Bathing Pond and associated landscaping, habitat creation and de-silting.
The Applicant	The City of London Corporation
The Environmental Impact Assessment (EIA)	Assessment of the environmental effects of the Proposed Development
The ES	Environmental Statement. This document
The TA	Transport assessment as presented in an accompanying document
The FRA	Flood risk assessment as presented in an accompanying document
The PDAS	Planning, Design and Access Statement as presented in an accompanying document
The SCI	Statement of Community Involvement which accompanies this application
The Core Strategy	Core Strategy and Development Plan Policies Development Plan Document

vi

1. Introduction

Background

- 1.1 The City of London (CoL) is seeking to secure full planning permission for the construction of improvements to the ponds on the Hampstead and Highgate chains of ponds within Hampstead Heath.
- 1.2 The objective of the Works is to ensure compliance with the Reservoirs Act 1975 and the Hampstead Heath Act of 1871 and, by consequence, the likely requirements of the Flood and Water Management Act 2010. The Hampstead Heath Act of 1871 includes clauses for the preservation of the natural aspect and state of the Heath. The works are also to improve the water quality, reducing the current very occasional non-compliance with the EU New Bathing Water Directive of 2006.
- 1.3 An extensive review of the catchment hydrology and performance of the ponds on Hampstead Heath has been completed. Following this, an options appraisal and consultation process has been undertaken to produce a design that minimises the risk of dam breach so as to avoid risks of loss of life and property damage to downstream communities. Works are proposed over both the Highgate and Hampstead chains of ponds rather than only at the three statutory reservoirs, namely Model Boating Pond, Highgate Men's Bathing Pond and Hampstead No.1 Pond. This is to ensure the softest solutions possible are used, resulting in the minimum impact on the landscape.
- 1.4 The City of London Corporation has undertaken stakeholder engagement and non statutory consultation with the wider public at key stages during the option development process.
- 1.5 A Screening Opinion has been issued by Camden Council on the 29th November 2013 which confirms that the Proposed Development is to be considered Environmental Impact Assessment (EIA) development. As such, an Environmental Statement (ES) is required to be submitted to accompany the planning application. The ES comprises three volumes as shown below. This document constitutes Volume 2 of the ES.



1.6 The Hampstead and Highgate chains of ponds are both located on Hampstead Heath in the London Borough of Camden as shown on Figure 1.1 below



1.7 The description for the planning application is shown in the box below.

Proposed engineering works to the Hampstead and Highgate chains of ponds comprising dam raising at Model Boating Pond (2.5m) and Mixed Bathing Pond (1m), new walls along dam crest to increase the height of the dams at Men's Bathing Pond (1m) and Highgate No.1 Pond (1.25m), a 190mm kerb along part of the crest at Hampstead No.2 Pond, a new flood storage dam (5.6m) in the catchpit area, grass-lined spillways at most ponds, dam crest restoration, pond enlargement at Model Boating Pond, a replacement changing room building at Ladies Bathing Pond and associated landscaping, habitat creation and de-silting.

Purpose of the Environmental Statement

- 1.8 Camden Council consider that the proposals fall within Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (the EIA Regulations), as they constitute 'Dams and other installations designed to hold water or store it on a long-term basis' and are over 1 hectare in area. Camden Council advised that the Proposed Development was EIA Development as it "could be considered to be likely to have significant effects on the environment by virtue of factors such as its nature, size or location. More specifically, this is owing to the nature of the location and the potential effects on the surrounding ecology and hydrology in particular". (See Appendix A.1 for EIA Screening Opinion).
- 1.9 Under the EIA Regulations Camden Council, when determining the planning application, is required to take into account the likely significant environmental effects that could arise as a result of the proposals. The EIA Regulations require the City of London to submit the necessary information for Camden Council to fulfill these requirements in the form of an ES.

Structure of the Environmental Statement

- 1.10 The ES is presented in three volumes as follows:
 - Volume 1 Non Technical Summary (NTS)
 - Volume 2 Main Report (this volume)
 - Volume 3 Appendices
- 1.11 This volume, the main report comprises fourteen chapters as follows:
 - 1 Introduction Introduces the proposals and provides the rationale and structure for the ES and how it relates to the other documents submitted as part of the planning application.
 - 2 The site and surrounding environment Describes the Hampstead and Highgate chains of ponds and Hampstead Heath more broadly as they currently are. This chapter also identifies notable sensitive receptors such as residential properties that are situated close to the ponds.
 - 3 The Proposed Development Describes in detail the project proposals which are assessed in the environmental topic chapters.
 - 4 Alternatives Describes the alternative proposals which were considered to the development proposals set out in Chapter 3.
 - 5 Approach to the assessments Introduces the environmental topic chapters and explains why certain environmental topic areas have not been included within the ES.
 - 6 Landscape and visual amenity Describes the landscape character and identifies key viewpoints and visual receptors, and identifies where significant effects to these receptors would arise and how they would be mitigated.
 - 7 Ecology Describes the terrestrial and aquatic ecological baseline, where significant effects to this baseline would arise and how they would be mitigated.

- 8 Water environment Describes the water quality and flood risk baseline, where significant effects to these baselines would arise and how they would be mitigated.
- 9 Historic environment Describes the archaeological potential of the Site and any designated historic assets that could be affected by the proposals, how significant any effects would be and how they would be mitigated.
- 10 Community Describes how the local and wider community use the ponds and Hampstead Heath, how members of the community would be affected by the Proposed Development, and how the effects would be mitigated.
- 11 Traffic and transport Describes the effects of construction traffic on the local road network and how any significant effects would be mitigated.
- 12 Air quality Describes the existing local air quality, how this would be affected by construction dust, and how any significant effects would be mitigated.
- 13 Noise Describes the noise baseline, where significant effects to this baseline would arise during construction and how they would be mitigated.
- 14 Summary of mitigation Provides a summary of all the measures that would be implemented to mitigate the significant environmental effects that are likely to arise as identified in the environmental topic chapters.
- 1.12 Schedule 4 of the EIA Regulations sets out the information that needs to be included in the ES. Table 1.1 sets out where in this ES the specific information requirements can be found.

Table 1.1 Location of ES requirements under Schedule 4 of the EIA Regulations

Schedule 4 requirements	Location within the ES
 Description of the development, including in particular: a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases; a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development. 	Volume 2, Chapter 3
An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects.	Volume 2, Chapter 4
A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors.	Volume 2, Chapters 6-13 inclusive
 A description of the likely significant effects of the development on the environment, which would cover the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development, resulting from: the existence of the development; the use of natural resources; the emission of pollutants, the creation of nuisances and the elimination of waste, and the description by the applicant or appellant of the forecasting methods used to assess the effects on the environment. 	Volume 2, Chapters 6-13 inclusive
A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	Volume 2, Chapters 6-13 inclusive and Chapter 14
A non-technical summary of the information provided under paragraphs 1 to 5 [the information contained within Table 1.1] of this Part.	Volume 1
An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant or appellant in compiling the required information.	Volume 2, Chapters 6-13 inclusive

3

2. The site and surrounding environment

Hampstead Heath

- 2.1 Hampstead Heath is a large public open space covering approximately 320 hectares in the north of London as shown on Figure 1.1 above. Hampstead Heath is divided in two by Spaniards Road (B519) into the main body of the Heath and the West Heath. The project site is located within the main body of the Heath.
- 2.2 Hampstead Heath lies across the Hampstead-Highgate ridge of permeable Bagshot Sands which forms a high ridge running approximately north-east to south-west through the centre of the Heath. Spaniards Road broadly follows the axis of the ridge and is the high point of Hampstead Heath. The main body of the Heath falls away from Spaniards Road fairly steeply in a south easterly direction and there are two shallow valleys that broadly run in the same direction. The northernmost of the two valleys has the Highgate chain of ponds situated along the valley floor and the southernmost valley has the Hampstead chain of ponds situated along the valley floor. Separating the two valleys is a ridge culminating at the southern end in Parliament Hill.
- 2.3 In addition to the ponds, Hampstead Heath broadly comprises a mix of wooded areas and grassland areas and is intersected by multiple formal and informal footpaths. Two areas of woodland situated in the northern half of the main body of the Heath called the Hampstead Heath Woods (managed by English Heritage) are designated as a Site of Special Scientific Interest and cover an area of approximately 16.6 hectares.
- 2.4 The grade I listed Kenwood House and Kenwood Estate are located in the north of the main body of the Heath and are currently managed by English Heritage. The current building dates from the 1760s when it was remodelled from an earlier probably 17th Century house. There are a number of structures and buildings associated with Kenwood House that are designated as grade II and II* listed buildings. In the centre of the Heath on the ridge separating the two chains of ponds is Bell Barrow designated as a Scheduled Monument.
- 2.5 Hampstead Heath is bound entirely by built development. To the south and west are the Hampstead suburbs of Gospel Oak and Childs Hill respectively. To the north and east are Highgate and Dartmouth Park respectively. The small hamlet of Vale of Health comprising approximately fifty residential dwelling is located within the main body of the Heath in the south west corner and immediately west of the Vale of Health Pond.
- 2.6 Most of the built development backing onto the main body of the Heath comprises residential properties, but other notable land uses that could be sensitive to the Proposed Development include the Heath Life Education Centre and Lido located in the southeast corner of the main body of the Heath. To the north of the Lido are a number of formal sports facilities including an athletics track and field, and cricket pitches. The William Ellis secondary school is located adjacent to the cricket pitches. There are a number of additional schools located a short distance from the Heath in the surrounding suburbs. Figure 2.1 below shows the location of the key environmental features and receptors surrounding the Site.



Figure 2.1 Surrounding environment

The Highgate chain of ponds

2.7 The Highgate chain of ponds was constructed in the 17th Century as a secure water source for the expanding city of London. The ponds are no longer used as a water source and now primarily valued for their historic, aesthetic and amenity value. The Highgate chain of ponds is the north easterly of the two pond chains and comprises eight ponds. The upper two ponds; Wood Pond and Thousand Pound pond, are located within the SSSI and not part of the Proposed Development. The lower six ponds are described in more detail in the following sub-sections.

Stock Pond

2.8 Stock Pond is the uppermost pond in the Highgate chain that is part of the Proposed Development. The pond covers an area of 0.44 hectares and is the smallest of the six lower ponds in the chain. The pond is completely surrounded by a belt of mature trees that screen the pond from the rest of the Heath. Natural earth banks bound the pond with vegetation such as reeds growing at the margins. Stock Pond is separated from the Kenwood Ladies Bathing Pond by an earth dam with a paved footpath and metal fence running along the crest. Metal railings surround the pond prevent public access to the water's edge.





Kenwood Ladies Bathing Pond

Kenwood Ladies Bathing Pond is one of three ponds on Hampstead Heath designated for use by the public for 2.9 bathing and measures 0.68 hectares in area. Changing facilities are located in a single storey timber building constructed on piers at the southern edge of the pond and a grassed sunbathing area is located on the east bank. Metal railings surround the pond and sunbathing area limiting access for ladies only via two gates at the southern end of the pond. The pond and sunbathing area is well screened in all directions by mature trees and thick vegetation. An earth dam separates the Kenwood Ladies Bathing Pond from the lower Bird Sanctuary Pond.



Figure 2.3 View of Kenwood Ladies Bathing Pond from open area looking south east

Bird Sanctuary Pond

2.10 Bird Sanctuary Pond is a dog legged shaped pond measuring 0.75 hectares in area. As with Stock Pond and Kenwood Ladies Bathing Pond, the Bird Sanctuary Pond is enclosed and surrounded by mature trees except along the southern edge. The Bird Sanctuary Pond has softened and natural appearing banks with marginal vegetation. The western extent of the dog leg is shallow and marshy and dominated by a reed bed. Access to the pond is restricted by a 19th Century cast iron railing that surrounds the pond. A footpath crosses the earth dam separating Bird Sanctuary Pond from the Model Boating Pond.



Figure 2.4 View of Bird Sanctuary Pond from dam looking north

Model Boating Pond

2.11 Model Boating Pond measures 1.62 hectares in area and is the most open pond in the Highgate chain. There are a few mature trees present particularly adjacent to the southern edge, but there are generally clear views to and from the pond across the main body of the Heath. The banks of Model Boating Pond are hard engineered with steel sheet piling capped with timber and a formal stone and dirt path around the entire pond. This gives the pond a more ornamental feel than the other ponds on the Heath. An earth dam separates Model Boating Pond from Highgate Men's Bathing Pond which has a footpath running along the crest. The dam is faced with the same steel sheet piles as elsewhere in the pond, but is a grassed bank on the downstream face. An existing grass lined spillway is located in the south west of the pond flowing to the Highgate Men's Bathing Pond.



Figure 2.5 View of Model Boating Pond from south east corner looking north west

Highgate Men's Bathing Pond

2.12 Highgate Men's Bathing Pond measures 1.83 hectares in area and is enclosed by mature trees. The pond is the second of three ponds designated for public bathing use. Men's changing facilities are located on the eastern bank in a single storey building and there are two piers that extend into the pond from this building. One of the piers has a diving board on the end. The pond banks are relatively natural in appearance with the exception of the southern edge where the upstream face of the dam separating the pond from Highgate No.1 pond is hard engineered with steel sheet piling capped with timber. A fence runs along the crest of the dam and a grassed slope down to Highgate No.1 Pond has a hard standing footpath running along the bottom of the slope. The dam creating the Highgate Men's Bathing Pond currently has a leak which is believed to be caused by the dam's construction of gravel and brick fill.



Figure 2.6 View of Highgate Mens Bathing Pond from the dam looking north

Highgate No.1 Pond

2.13 Highgate No.1 Pond is the lowermost pond in the Highgate chain and measures 1.36 hectares in area. The pond banks are earth banks that are natural in appearance. There are two areas on the west bank with large timber steps down to the water's edge to allow dogs to swim in the pond. There is also a small wooden platform protruding from the west bank over the pond. The pond is surrounded by a thick belt of mature trees to the east and south, and a thinner belt of less mature trees to the north and west which afford obscured views across the main body of the Heath. Highgate No.1 Pond is the closest pond in the Highgate chain to any residential properties located approximately 35m to the east of the pond.



Figure 2.7 View of Highgate No.1 Pond from the west bank looking east

The Hampstead chain of ponds

2.14 The Hampstead chain of ponds is the earlier of the two chains, dating back to the 16th Century when an Act of Parliament established the chain to facilitate a controlled supply of water via the River Fleet to London. The Hampstead chain comprises 5 ponds with the upper two ponds being significantly separated from the lower three.

Vale of Health Pond

2.15 The Vale of Health Pond is the upper and western most pond in the Hampstead chain. The pond is triangular shaped and measures 0.85 hectares in area. The earth banks are natural in appearance with marginal vegetation and trees overhanging the water's edge. In some areas the banks are supported by wooden stakes. The pond is surrounded by mature trees to the north, south and east. Residential properties along the Vale of Health road are set above the pond and back onto it. The properties' rear gardens run down the slope to the banks of the pond. The eastern edge of the pond is an earth bank with a footpath running along the crest.



Figure 2.8 View of Vale of Health Pond from south bank looking north

Viaduct Pond

2.16 Viaduct pond is located approximately 275m east of the Vale of Health Pond and measures 0.30 hectares in area. The pond is characterised by a grade II listed viaduct which carries a footpath across the pond in a north west to south easterly direction. The pond is set within woodland and is enclosed on all sides by thick belts of mature trees apart from the south west corner of the pond where there is a small clearing. The southern bank of the pond is hard engineered comprising steel sheet piling with timber stakes providing a veneer. The rest of the pond banks are earthen and natural in appearance with marginal vegetation and overhanging trees.



Figure 2.9 Viaduct Pond from the south bank looking north

Catchpit area

2.17 Between Viaduct Pond and Mixed Bathing Pond is a small wooded valley. At the southern end of the valley is a concrete silt trap structure designed to remove silt from water flowing downstream before it reaches Mixed Bathing Pond. This area is enclosed by mature and semi-mature trees and thick vegetation. A watercourse flows along the bottom of the valley from Viaduct Pond and enters Mixed Bathing Pond via a brick culvert.



Figure 2.10 Catchpit Area from open area to the north looking south

Mixed Bathing Pond

2.18 Mixed Bathing Pond is an elongated triangle shape measuring 0.70 hectares in area and is located approximately 270m south east of Viaduct Pond. The pond is enclosed by thick woodland to the north, east, and west but is open to the south where the narrow earth dam separates the pond from Hampstead No.2 Pond. The earth banks are natural in appearance with thick vegetation and trees overhanging the water's edge. The southern bank along the dam face is hard engineered with uncapped steel sheet piling. A wide footpath crosses the crest of the dam and is fenced on both sides. Mixed Bathing Pond is the third of three ponds on the main body of the Heath designated for public bathing use. Male and female changing facilities are located in a series of small single storey timber buildings on the north eastern bank of the pond. A jetty structure extends into the pond from the changing facilities.



Figure 2.11 View of Mixed Bathing Pond from the dam looking north

Hampstead No.2 Pond

2.19 Hampstead No.2 Pond measures 1.08 hectares in area. The banks are mainly earth with a natural appearance, marginal vegetation and overhanging trees. The southern bank comprising the upstream dam face is hard engineered with steel sheet piling capped with timber. The pond is well enclosed by trees apart from the south eastern corner where large Victorian town houses located on South Hill Park Gardens back on to the pond. The back gardens of six of these properties extend down to the water's edge. An avenue of veteran Plane trees has been planted across the dam which extends along the western bank of the Hampstead No.1 Pond.



Figure 2.12 View of Hampstead No.2 Pond from south west corner looking north east Hampstead No.1 Pond

2.20 Hampstead No.1 Pond is the lowermost and largest pond in the Hampstead chain of ponds measuring 1.51 hectares in area. The earth banks of the pond are natural in appearance with overhanging trees and marginal vegetation. The eastern bank of the pond is bound by the rear gardens of approximately 25 large Victorian town houses. The southern bank of the pond is a large grass covered earth bank.



Figure 2.13 View of Hampstead No.1 Pond from the west bank looking east.

3. The Proposed Development

Proposal outline

- The purpose of the project is to virtually eliminate the risk of dam failure at any of the ponds in the Highgate 3.1 and Hampstead chains of ponds that could result from severe flooding and the consequential risk of loss of life and damage to property. This is to ensure that the City of London as custodians of Hampstead Heath comply with the Reservoirs Act 1975 and the Flood and Water Management Act 2010. In broad terms the key elements of the Proposed Development are as follows:
 - Increase flood storage capacity by raising some of the dams and constructing a new dam in the catchpit • area;
 - Reinforce dams where required;
 - Construct spillways to prevent any overtopping which could erode the dams; •
 - Mitigate ecological and landscape impacts by softening pond edges and improving marginal habitat; and •
 - Improve the water quality of the ponds.
- Each chain of ponds is considered as a whole system so that significant works are located in the least sensitive 3.2 locations, limiting tree loss around ponds and reducing works required elsewhere. Specific proposals at each of the ponds are detailed in the following sections.
- 3.3 The sensitivity of the Site has been recognised throughout the design process and an environmental masterplan has been developed for both chains of ponds to mitigate any impacts. The proposed environmental measures integrated into the design of each pond are described below, but the overall environmental masterplan can be found in Appendix A.1, in Volume 3. Pond aerators would be installed where appropriate.

The Highgate chain of ponds

3.4 With the exception of Bird Sanctuary Pond, all of the ponds in the Highgate chain would have new spillways to allow flood waters to flow to the next pond in the chain in a controlled way. The majority of the dam works would occur at the three lowermost ponds in the chain with crest restorations to the three uppermost dams in the chain. The water levels at all of the ponds in the Highgate chain would be retained.

Stock Pond

- A new open channel spillway measuring 21m wide at the base, 500mm deep and with 1:12 side slopes would 3.5 be constructed at the south western corner of Stock Pond that would allow flood waters to flow to the Kenwood Ladies Bathing Pond without overtopping the dam. The spillway would be set above the top water level and would be dry in normal conditions. The spillway would be lined with geotextile and overlaid with topsoil and grass. This would give the spillway a natural appearance and would enable the footpath access across the dam crest to be maintained.
- 3.6 Two new 900mm diameter overflow pipes, to run parallel with the existing overflow pipe, set at the top water level would be constructed that would follow the same path as the spillway and would discharge into Kenwood Ladies Bathing Pond.

- The dam retaining Stock Pond is uneven which creates weak points in the structure. Dam crest restoration 37 would be undertaken to raise the low point by up to 500mm above the current levels which would require approximately 17m³ of fill material. Trees along the dam would be retained where possible. The construction and maintenance of the spillway would require the removal of eight trees defined as moderate quality and fifteen trees defined as low quality under BS 5837:2012¹.
- In order to mitigate the loss of trees and disturbance caused during construction, a package of environmental 3.8 measures is proposed comprising the following:
 - Sediment to be dredged from the pond bed to improve water quality;
 - Creation of a new marginal shelf from dredged sediment planted with common reed and other marginal emergent species on the east bank;
 - Removal and management of Japanese knotweed; and
 - New tree and shrub planting.
 - Replacement of the existing fence to control access to the pond.

Kenwood Ladies Bathing Pond

- 3.9 The existing changing rooms would be replaced with new facilities in the same location. The existing concrete slab and piers would be retained and the new changing facilities constructed on the slab at the same level as the existing facilities.
- 3.10 The concrete slab currently on the dam crest would be removed and a new grass lined open channel spillway would be constructed at the western part of the dam adjacent to the building platform. This would allow flood waters to flow to the Bird Sanctuary Pond without overtopping the dam. The spillway would be 870mm deep with side slopes of 1:3 and would have an upper width of 24.6m. The spillway would be lined with a concrete cellular mat, which can be covered with topsoil and grass seeded, except along the existing footpath which would have the same stone surface as it does now. After the spillway passes the bottom of the downstream slope of the dam, an area of topsoil would be lined with shallow reinforcement matting as floodwater runs down to Bird Sanctuary Pond. A reinforced concrete stilling basin approximately 5m wide would extend from the downstream toe of the dam at the bottom of the spillway. The basin would be covered in topsoil and grassed.
- 3.11 The dam retaining Kenwood Ladies Bathing Pond is uneven which creates weak points in the structure. The crest of the dam would be restored by raising the low points by 300mm which would require approximately 59m³ of fill material. Trees and vegetation on the downstream slope of the dam would be retained where possible. The construction and maintenance of the spillway would require the removal of three trees defined as moderate guality and fifteen trees defined as low guality under BS 5837:2012¹.
- 3.12 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Use of prefabricated above and below ground structures to minimise construction time and the time • required for the closure of the bathing pond;
 - Character of historic entrances and approaches including Meadow Gate to be retained; •
 - Woodland or scrub grassland to be planted along the western edge in the meadow to reinforce existing • planting, provide further enclosure to the pond and improve habitat value;

¹BS 5837:2012, Trees in relation to design, demolition and construction – Recommendations

- Sediment to be removed from pond bed to improve water quality;
- Realignment of existing stream with creation of excavated washlands and associated large woody debris • check dams to control sediment input and improve water quality of discharge to pond; and
- Footpath reinstatement along the dam crest. •

Bird Sanctuary Pond

- 3.13 No spillway would be constructed at Bird Sanctuary Pond. The dam retaining Bird Sanctuary Pond would be re-graded (smoothed) on the downstream face and lined with a shallow turf reinforcement mat.
- 3.14 The visible part of the existing overflow pipe and concrete slab between Bird Sanctuary Pond and Model Boating Pond would be removed and replaced with a new overflow pipe at the western end of the dam to discharge to the widened area of Model Boating Pond. The rest of the existing overflow pipe would be left in its current position and blocked.
- 3.15 No trees would require removal but there would be some scrub clearance required on the downstream face of the dam. In order to mitigate any vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Existing fence to be replaced to maintain existing access restrictions; •
 - Landward extension of existing reed bed at the south west of the pond through ground excavation; •
 - New channel excavated to form wet woodland and habitat for reed bed expansion, with selective tree removal and thinning on the western bank of the pond;
 - Creation of a series of four online pools to improve wetland ecology and reduce sediment input from • stream entering south west corner;
 - New amphibian and reptile hibernacula around the pond margins; •
 - Existing kingfisher nesting site retained and protected; and •
 - Existing eastern bank retained as existing. •

Model Boating Pond

- 3.16 Model Boating Pond would be subject to the most extensive works in the Highgate chain of ponds. The existing dam would be raised by 2.5m. This would be achieved by constructing an earth embankment on top of the existing dam crest and over the existing sheet piles on the upstream face of the dam. This would extend the dam by between 21 - 28m northwards into Model Boating Pond so that the existing dam crest becomes part of the new dam downslope. Two trees would need to be removed to accommodate the new embankment. Raising the dam would require approximately 12,000m³ of fill material.
- 3.17 A new open channel spillway would be constructed across the new embankment broadly following the path of the existing spillway. The new spillway would be 20m wide at the base and 1.1m deep relative to the raised dam crest, but would be above the existing ground level. After passing the downstream toe of the new embankment, the new spillway is formed by shallow turf reinforcement matting across the natural ground and down the downstream slope of the existing dam. A low training bund running down the downstream slope of the existing dam would guide the flow towards the natural ground to the west in order to minimise lining works.

- 3.18 The west bank of the pond would be excavated up to 65m inland from the existing pond edge to provide the required fill material for the dam raising and would include the removal of the existing sheet piles. This would create a new slope varying in gradient between 1:5 and 1:7 where the existing slope is 1:10. The existing sheet piles would be removed and the footpath around the pond would be reinstated further up the new slope. The existing trees on the west slope would be retained and material excavated around the trees to create an accessible island connected to the Heath via a causeway. The shallow channel forming the new island would be planted with marginal wetland planting which would extend round to the north bank of the pond to soften the hard engineered edges. The existing sheet piling and pond banks on the north and east banks would be retained. The lower footpath at the water's edge would be re-routed to encircle the widened pond and connect with a new footpath on the raised dam crest. The upper footpath on the west bank would be rerouted to pass above the new spillway and the island.
- 3.19 Trees and vegetation would be retained where possible. The construction and maintenance of the spillway would require the removal of three trees defined as moderate quality and six trees defined as low quality under BS 5837:2012¹
- 3.20 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Naturalise the appearance of the dam with new planting to reflect the open character of the pond including species rich grassland on the upstream dam face;
 - Amenity use of the 'sunny bank' on east side extended to upstream dam face;
 - Dam crest raising limited to upstream face of the dam to retain existing trees and minimise the impact to views across to Highgate Men's Bathing Pond;
 - Creation of new margin along the new dam edge with high and low planting to screen the new embankment;
 - Access extended along upstream dam face;
 - Pond enlarged and naturalised along western bank with tress retained;
 - New footpath on upstream face of the raised dam and along realigned west bank providing continuous access to pond edge;
 - New tree and shrub planting; and
 - Sediment to be removed from pond bed at Southern end of pond.

Highgate Men's Bathing Pond

- A low earth bund measuring 750mm in height would be constructed west of the dam. A new wall measuring 3.21 1m high would be constructed along the line of the existing fence on the dam crest. The wall would be constructed from steel or plastic sheet piles driven sufficiently deep to reduce the current leak in the dam. The sheet piling would be clad with timber.
- 3.22 A new open channel spillway 25m wide at the base would be formed by levelling and lining the gap between the earth bund and the new wall. The spillway would widen once it has passed the dam to 43m width at the base. The base of the spillway would mostly be at the existing ground level with some lowering of the natural ground at one end to form a 25m wide flat area. The spillway would be lined with a shallow turf reinforcement mat. A training wall would be constructed to train flows over the spillway. To minimise effects on a tree on the dam, this wall could be formed with H-section posts filled with timber sleepers, so that the posts miss the structural roots of the tree.

- 3.23 Trees and vegetation would be retained where possible. The construction and maintenance of the spillway would require the removal of fifteen trees defined as low quality under BS 5837:2012¹.
- 3.24 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Closure of the pond for bathing would only be required for the remedial works to the dam and silt • removal. The pond could remain open for all other proposed works;
 - Creation of a new margin along the existing sheet piling of the dam to provide fishing access and planting • to soften the appearance of the sheet piles;
 - Extension of the existing reed bed through ground excavation and piped culvert removal to trap sediment at the inflow from the stream entering north west corner to be combined with the creation of two small check dams in stream to control sediment input; and
 - New tree and shrub planting •

Highgate No.1 Pond

- 3.25 A new open channel spillway 64m wide at the base would be constructed by filling in the low spot between the west end of the dam and the hill to the west. The spillway would have a shallow lining of turf reinforcement mat which would be laid just below the topsoil. The footpath to the west of the pond would be raised by around 300mm with a gently sloping ramp. A return wall would form one side of the spillway following the existing fence down the slope. This wall would be formed of H-posts and timber sleepers to avoid tree loss on the other side of the fence line.
- 3.26 A new sheet pile wall would be constructed along the crest of the dam which would raise the effective dam height by 1.25m. The wall would be timber clad to soften the appearance.
- 3.27 Trees and vegetation would be retained where possible. The construction and maintenance of the spillway would require the removal of, four trees defined as moderate guality twelve trees defined as low guality and one tree defined as being in poor condition with limited life expectancy and risk of premature failure under BS 5837:2012¹. A veteran oak present (reference: 0140) would be retained and protected throughout construction.
- 3.28 In order to mitigate any vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Extend the existing margin along the north west bank through localised bed level raising;
 - New marginal shelf along dam face created from removed sediment planted with marginal emergent • species;
 - New tree and shrub planting; •
 - Retention of woodland screening along the north east bank

The Hampstead chain of ponds

3.29 The existing water levels of all the ponds would be retained. The bulk of the dam works would occur at the Catchpit area, and overspill from the ponds would be controlled by a mixture of open channel spillways and box culverts. Detailed proposals for each pond are outlined below.

Vale of Health Pond

- 3.30 A new open channel spillway measuring 5m wide at the base 100mm deep and with 1:12 side slopes would be constructed at the southern end of the dam. One tree would require removal. The spillway would be constructed from concrete or geotextile and lined with topsoil and grass to give a natural appearance and to maintain the footpath along the crest. A new 500mm diameter outlet pipe would be installed in the dam to augment the existing overflow pipe and would run parallel to the existing pipe.
- 3.31 The dam retaining Vale of Health Pond is uneven which creates weak points in the structure. Dam crest restoration by a maximum of 560mm would be undertaken along just over half of the dam. This would be achieved in two sections. The lower section would comprise 300mm of fill added to the crest and the top section would comprise a 260mm containment kerb. The kerb could be buried under topsoil or clad to suit stakeholder preferences. Trees along the dam would be retained.
- 3.32 Trees and vegetation would be retained where possible. The construction and maintenance of the spillway would require the removal of one tree defined as moderate quality under BS 5837:2012¹.
- 3.33 In order to mitigate any vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - New reed bed created in the south west corner in front of the existing inflow; and
 - Marginal planting on the south east bank.

Viaduct Pond

- 3.34 A new shallow open channel spillway measuring 4m wide at the base and 300mm deep with side slopes of 1:12 would be constructed at the south eastern corner of the pond. The spillway would be located at the east end of the dam. The slope of the spillway as it crosses the dam crest footpath would be 1:12 on the west side, to maintain access across the spillway base. The east slope of the spillway merges into the existing ground at a slope of around 1:3. Currently, access to the area near the east end of the dam from the viaduct footpath is down a set of steps which stop short of the dam crest. There is a possibility of continuing these steps down the valley sides and into the spillway, to improve the connectivity of access onto the dam from that side. The spillway would be constructed from concrete or geotextile and lined with topsoil and grass to give a natural appearance.
- 3.35 A new 500mm overflow pipe would be installed underneath the new spillway to augment the existing overflow pipe. Works to the existing overspill pipe would improve the inlet structure.
- 3.36 The dam retaining Viaduct Pond is uneven which creates weak points in the structure. Dam crest restoration would be undertaken to raise the low point by up to 190mm by infilling the low points and would require a nominal amount of fill material.
- 3.37 Trees and vegetation would be retained where possible. The construction and maintenance of the spillway would require the removal of five trees defined as low quality and one tree defined as defined as being in poor condition with limited life expectancy and risk of premature failure under BS 5837:2012¹.
- 3.38 In order to mitigate any vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Sediment to be removed from pond bed to improve water quality;
 - Creation of new margin using removed sediment with marginal planting along the east bank;
 - New tree and shrub planting;

- Reinstate the existing timber clad sheet piling in front of the new spillway; and •
- Stabilisation of marginal wetland area in northern section of pond to facilitate reed bed development. •

Catchpit area

- 3.39 A new dam would be constructed in the Catchpit area at the lowest point of the valley, partially located over the existing concrete lined pond. The new dam would not retain any water under normal conditions. The dam would measure 5.6m in height which would require approximately 8,600m³ of fill material. The dam slopes would be 1:3 on the upstream face, 1:4 on the downstream face and would be 40m wide at the widest part of the base. The crest of the dam would be approximately 100m long.
- 3.40 The dam would be of earth construction with a grass surface. Most of the crest would be one large spillway designed to be overtopped along the entire length. The dam is designed to provide a new flood storage area and the pond created by the new dam would only fill up with water in heavy rain events. Most of the time the pond would be 'dry' with an open meandering stream running along the valley floor supporting marshy habitats.
- 3.41 A 750mm wide pipe in the dam would allow the meandering stream to flow unimpeded and would allow the slow release of captured flood water to the downstream Mixed Bathing Pond. The upstream end of the pipe would have a small concrete inlet structure with a debris screen, allowing the raking out of debris from standing above the headwall. The downstream end of this pipe would connect into an open chamber which would be connected to the existing chamber that feeds into the existing pipe which discharges into Mixed Bathing Pond. In large floods, some floodwater would spill out from the open chamber and flow across the path. Two new silt collection ponds formed by two low stone (or log) check dams 1m deep would be constructed upstream of the main flood storage dam. Reedbeds would be planted on gravel beds on the upstream ends of the ponds and small (200mm diameter) pipes would pass low flows through the check dams to avoid stagnation in the small ponds.
- 3.42 Trees and vegetation would be retained where possible. The construction of the new dam would require the removal of twelve trees defined as moderate quality, 49 trees defined as low quality, and ten trees defined as being in poor condition with limited life expectancy and risk of premature failure under BS 5837:2012¹.
- 3.43 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Replacement of existing concrete lined sediment trap through the creation of two wetland pools with • check dams and associated reed beds designed to control sediment input to Mixed bathing Pond and improve water quality.
 - Creation of a wet woodland / marsh area.

Mixed Bathing Pond

- 3.44 The crest of the dam would be raised by 1m by raising the upstream face by 0.5m with sheet piles and placing a 0.5m earth bund on top of the dam. The upstream slope would be 1:1 and the downstream slope would be 1:3 to match the existing downstream slope gradient. The road would be reinstated along the top of the new dam crest and would be 4m wide. The downstream slope of the dam would be reinforced with a turf reinforcement mat.
- 3.45 There would be no new spillway for Mixed Bathing Pond and the raised dam is to be designed to be overtopped along the whole length. The existing overflow pipe would be extended further into the pond.

- 3.46 Pedestrian access across the causeway would be maintained throughout construction. This could be achieved either by building up the fill in two halves, or by providing a temporary walkway on a platform supported off the downstream slope, with the works to install top soiled and seeded, turf reinforcement matting left until the raised footpath is surfaced.
- 3.47 Trees and vegetation retained where possible. The construction and maintenance of the proposed works would require the removal of seven trees defined as low quality under BS 5837:2012¹.
- 3.48 In order to mitigate any vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Sediment to be removed from pond bed to improve water quality;
 - Naturalise the appearance of the dam with new planting to include species rich grassland on the new upstream dam face;
 - Creation of a new marginal shelf from dredged sediment planted with common reed and other marginal emergent species on upstream side of dam face;
 - New amphibian and reptile hibernacula;
 - Removal of scrub at the northern end of the pond and creation of reed bed to provide treatment of inflow;

Hampstead No.2 Pond

- 3.49 The dam crest would be restored by installing a small kerb measuring 190mm in height along 70m of the dam crest.
- 3.50 A new box culvert measuring 2.1m wide and 900mm deep would be installed in the western end of the dam which would discharge spill water to Hampstead No.1 Pond via an open channel spillway. The opening of the culverts would be a drop-shaft inlet structure. This inlet would extend approximately 1.5m out from the existing sheet piles into the pond and would be 6m wide. The structure would be concrete, but could be clad to suit local preferences. A security screen would be fitted across the top to stop entry. The existing overflow pipe would be re-routed.
- 3.51 The culvert would require the removal of up to two plane trees which are both defined as high quality trees and form part of an avenue of plane trees down the west bank of Hampstead No.1 Pond.
- 3.52 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - Proposed semi mature tree planting to replace 2No.-plane trees removed during construction;
 - Creation of wetland margins along west bank;
 - Platform designed to screen drop inlet to provide potential area for disabled fishing access; and
 - New tree and shrub planting;

Hampstead No.1 Pond

- 3.53 Four new reinforced concrete box culverts measuring 2.1m wide would be installed through the upper dam crest at the eastern end of the dam with the invert 840mm below the dam crest level. Topsoil would be reinstated above the box culvert, and planting of native shrubs either side of the box culvert inlet could substantially hide the inlet from the view of the public footpath on the west side of the pond.
- 3.54 The culvert would discharge to an open channel spillway on the downstream face of the dam. The spillway would be lined with a turf reinforcement mat. A stilling basin may be required at the downstream toe of the dam which would be constructed from reinforced concrete and buried under a sacrificial layer of topsoil. The excess floodwater would spill out over the footpath and onto the road, however this would only happen in extreme flood events (larger than a 1:1000 year event) which would overtop the dam in the existing scenario.
- 3.55 Trees and vegetation would be retained where possible. The construction and maintenance of the culvert would require the removal of five trees defined as low quality and one tree defined as defined as being in poor condition with limited life expectancy and risk of premature failure under BS 5837:2012¹.
- 3.56 In order to mitigate vegetation loss and disturbance caused during construction, a package of environmental measures is proposed comprising the following:
 - New planting to integrate the spillway with native shrubs plus species rich grass on the downstream face • of the dam:
 - New tree and shrub planting; •
 - Creation of a new marginal shelf from locally removed sediment planted with common reed and other marginal emergent species along the dam face

Construction phase

- 3.57 BAM Nuttall has been appointed as the Contractor for the Proposed Development and would be undertaking all construction works. The Contractor would be working with the design team to ensure the design is buildable with minimum disturbance to the Heath, users of the Heath, neighbouring residents, and other sensitive receptors. The following sections outline the construction proposals. It should be noted that the specific details of the construction works are currently not available and would be developed as the detailed design progresses. The following sections provide a good overall description of the construction works that are unlikely to change significantly and are sufficient to form the basis of the environmental assessments.
- 3.58 A key guiding principle for the construction works is that the works for each chain of ponds are distinct from each other. This minimises impacts to users of the main body of the Heath by ensuring that there would be minimal movement of construction plant, vehicles, or materials across the Heath between the two pond chains.

Borrow pits

- 3.59 Two borrow pits are required for the Highgate chain of ponds and two for the Hampstead chain of ponds. The borrow pits are areas where the fill material required to raise the dams would be obtained from. In order to minimise construction traffic movements across the heath, the borrow pits would be located as close to each pond chain as possible. Figure 3.1 shows the indicative location of the proposed borrow pits.
- 3.60 Approximately twice the amount of fill material would be extracted from the borrow pits as would be required for the dams. This accounts for material settlement and the discard of unsuitable material and topsoil and is a worst case and conservative estimate.

- 3.61 At the Highgate chain of ponds approximately 13,000m³ of fill material would be required primarily for the Model Boating Pond dam. Approximately 8,000m³ of this would be obtained from extending the Model Boating Pond into the west bank, and up to a further 18,000m³ would be obtained from a second borrow pit located at the top of the hill overlooking and to the west of Model Boating Pond. This accounts for the unsuitable material. If all material is suitable, the borrow pits would be smaller.
- 3.62 At the Hampstead chain of ponds approximately 9,000m³ of fill material would be required primarily for the new Catchpit dam. This would all be obtained from a borrow pit at Pryor's Field. Proposed approximate dimensions of the borrow pits are shown in Table 3.1 below.

Borrow pit	Average depth	Approximate area	Maximum volume of fill material available		
West bank of Model Boating Pond	Varies	ТВС	8,000m ³		
Top of hill overlooking Model Boating Pond	1.7m	10,700m ²	18,000m ³		
Pryor's Field	2m	5,000m ²	10,700m ³		
Sports Ground(for stockpiling material)	ТВС	ТВС	7,400m ³		

Table 3.1 Approximate dimensions of proposed borrow pits

- 3.63 Apart from the West bank of the Model Boating Pond, which is to remain open water with a re-graded upper slope, the borrow pits in other areas would be reinstated as close as possible to the original level and appearance.
- 3.64 At the Highgate chain, the borrow pits would be back filled with any unsuitable excavated material and dewatered silt removed from Stock Pond, Kenwood Ladies Bathing Pond, Model Boating Pond, and Highgate Men's Bathing Pond. This is likely to be less than the volume of material excavated from the borrow pit resulting in slightly reduced levels. After reinstatement the borrow pit area is likely to be temporarily wetter and more marshy than the present amenity grassland area.
- 3.65 At the Hampstead chain, the ground underlying the Catchpit dam comprises soft silt and made ground from an old Victorian era rubbish tip. This would need to be excavated prior to construction of the dam and stockpiled at the Sports Ground to the north of the Catchpit dam. This stockpiled material would be used to backfill the borrow pit at Pryor's Field along with the de-watered silt removed from Viaduct Pond and Mixed Bathing Pond. The final ground level at the Sports Ground would be adjusted as necessary to ensure that the final level of the Pryor's Field borrow pit is reinstated to the same as existing. After backfilling the borrow pit would be reinstated by covering in topsoil and planted with grass.



Dam raising works

- 3.66 Won material from the borrow pits would be transported to the dam worksites and unloaded. The dams would be raised by moving the won material into place on top of the existing dam structures. The material would be compacted and graded to ensure the correct gradient for the dam slopes.
- 3.67 For the Model Boating Pond, a portable dam would be used in front of the existing dam. The space between the two dams would be dewatered to provide the necessary working area to construct the upstream dam on the exposed reservoir bed. Once the dams have been raised to the correct levels, any footpaths, fences or other street furniture would be reinstated and the new dam faces re-grassed.
- 3.68 The Highgate No.1 Pond would be raised by constructing a new concrete wall along the dam crest instead of raising the dam height using fill material. The concrete wall would be constructed using pre-cast sections which are produced offsite and transported to Hampstead Heath, where they would be installed. The walls would then be clad in timber or alternate material to be agreed on the upstream face. On the downstream face, the sheet piles would be unclad and covered in ivy as requested by local residents.
- The sheet piled walls would be constructed using a 4 tonne piling hammer. The size of the plant to be used on 3.69 the dam crest would be assessed to ensure that the integrity of the dams is maintained.

Worksites and compounds

- 3.70 There would be a single works compound located at the Site of the Kenwood House nursery at the northern extent of Main body of the Heath, adjacent to and south of Hampstead Lane. The works compound would be used to store stockpiled materials. All materials and most construction plant would be brought to the Site along Hampstead Lane via the work compound. Larger plant would access the Site via the most suitable site entrance to minimise the distance over the Heath which it would need to be transported.
- 3.71 A series of small worksites would be established at each of the ponds where the construction works would take place. Only plant and materials being used at the time would be located at the worksites and there would be no storage of any unused plant or materials at these worksites. The worksites would be optimised to minimise the construction footprint. Welfare facilities would be located at each of the worksites. The location of the construction compound and worksites are shown on Figure 3.1. The worksites and construction compound would be surrounded by solid hoardings to protect members of the public and ensure the worksites and construction compound are secure.

Construction plant and traffic

- 3.72 The anticipated plant required for the construction works includes the following:
 - 10 tonne lorry •
 - 13 tonne excavator
 - 18 tonne sheepsfoot roller •
 - 20 tonne excavator •
 - 250 cfm compressor •
 - 26 tonne concrete pump •
 - 3 tonne vibratory roller
 - 3" vibrating pokers

- 3.4 KVA generator
- 4 tonne hydraulic piling hammer
- power pack for hydraulic hammer
- 5 tonne dumper
- 6" silt pump
- 8 tonne excavator
- 9 tonne dumper
- 90 tonne crawler crane
- concrete mixer lorry
- D4 blade
- excavator mounted breaker
- hammer drill
- impact wrench
- pickup trucks
- Selwood S150 super silent 6" pump
- 0.5m cold milling maching
- 3.73 All plant, and the remaining materials not to be found on the Heath, would be brought to site via the works compound at Kenwood House nursery. Plant and materials would then be transported to the worksites using a tractor and trailer similar in size to the plant already in use for maintenance of the Heath. Plant and materials would be transported to the worksites via designated access routes across the main body of the Heath which would make use of the existing hard standing paths and roads as shown in Figure 3.1. A temporary access route within the Heath would be required to access Stock Pond and Ladies Bathing Pond from the West to avoid use of Millfield Lane (on the east side of the Highgate chain ponds).
- 3.74 The Proposed Development is anticipated to generate:
 - A maximum of 10 construction vehicles arriving at any one access per day;
 - Less than 5 construction vehicles arriving at any one access on the majority of the days; and
 - Workers travelling to work via a sustainable mode of travel.
- 3.75 On most normal working days there would be up to five construction vehicles travelling to and from the Site which would include the two twin-cab pickup trucks, and small vans and flat bed lorries to deliver materials and supplies. Across the whole programme there would likely be up to three days where a maximum of ten construction vehicles could travel to and from the Site. This would likely be at the beginning and end of the construction programme when the construction compound and worksites are being established and decommissioned.
- 3.76 There would be up to 30 construction staff working on the Site at any one time. Most construction staff would arrive to site via public transport, but two twin-cab pickup trucks would also be used to transport staff to site.

- 3.77 There may be a requirement that some exceptional plant would be required. In such circumstances the delivery would be timed to cause minimal disturbance to the surrounding communities and Heath users. Alternative external access points have been agreed with London Borough of Camden and these are discussed further in Chapter 11.
- 3.78 Construction routes have been determined in order to reduce the number of vehicles travelling along the local roads within the vicinity of the Heath and to ensure vehicles are only travelling along suitable roads (avoiding more sensitive residential roads where possible). These are discussed further in Chapter 11 and the Transport Statement, they have been selected as they are the main roads which provide suitable links to the required access points.

De-silting

- 3.79 The ponds would be de-silted using suction pump dredgers. The pumps would be located on the banks of the pond and a large hose with a dredging head would extend from the pump into the pond. Consolidated silt would be agitated using a vibro-core which could then be suction pumped.
- 3.80 The pump would suck the silt from the pond bed up the suction hose to a discharge hose. The silt would have a high water content (up to 90%) and would be discharged into silt bags where the silt would settle. Water would be separated from the silt with the aid of flocculants and be filtered through the silt bags. The water would then be tested to ensure it is sufficiently clean to be returned back to the ponds or to infiltrate the Heath depending on the worksite topography.
- 3.81 During silt removal, turbidity levels would be monitored and if necessary silt screens would be deployed If and when necessary.

Construction programme and work hours

3.82 Vegetation clearance works are due to start in January 2015 with the main construction works starting in April 2015 and would finish in October 2016. Construction activities would be phased to minimise impacts. A provisional construction programme is shown in Appendix 3.1 in Volume 3. Normal work hours would be 0730hrs to 1800hrs Monday to Friday. A summary of the programme for the main construction phases is shown below in Table 3.2.

Table 3.2 Provisional dates and duration of main construction activities

Construction activity	Start	Completion	Duration
Vegetation clearance	January 2015	February 2015	2 months
Stock Pond	October 2015	January 2016	3 months
Kenwood Ladies Bathing Pond	October 2015	March 2016	5.5 months
Bird Sanctuary Pond	September 2015	October 2015	1 month
Model Boating Pond	April 2015	October 2015	6.5 months
Highgate borrow pit excavation and open	June 2015	March 2016	8.5 months
Highgate Men's Bathing Pond	May 2016	August 2016	3 months
Highgate No.1 Pond	March 2016	August 2016	5 months
Vale of Health Pond	July 2015	September 2016	2 months
Viaduct Pond	May 2015	June 2015	2 months
Catchpit area	January 2016	September 2016	9 months

Construction activity	Start	Completion	Duration
Hampstead borrow pit excavation and open	March 2016	September 2016	7 months
Mixed Bathing Pond	January 2016	March 2016	3 months
Hampstead No.2 Pond	July 2015	October 2015	4 months
Hampstead No.1 Pond	November 2015	February 2016	4 months
Ecological & environmental works	March 2015	October 2016	20 months
Desilting works Highgate Chain	October 2015	February 2016	5 months
Desilting works Hampstead Chain	March 2016	April 2016	2 Months

Environmental management

- 3.83 It is recognised that the Site is located in an environmentally sensitive area with the potential to disturb the existing users of the main body of the Heath, nearby residents and other sensitive receptors. The Contractor has prepared a draft Construction Environment Management Plan (CEMP) that details how the mitigation measures proposed in this ES would be implemented and who has responsibility for ensuring they are implemented satisfactorily. The CEMP would include construction method statements, and key performance indicators. The Contractor has committed to implementing the following measures as a minimum to minimise environmental impacts:
 - Worksite and compound hoardings to be covered with project information, decorative wraps and posters produced by school children from nearby schools;
 - Developing and implementing a 'Good Neighbour Construction Charter';
 - Works to the three bathing ponds would be programmed to minimise disruption to bathers. Each bathing pond would be closed during different periods, however there would be an overlap in closures, with all ponds closed during February and March 2016;
 - Use of portable dams to avoid completely dewatering any of the ponds; •
 - Delivery of materials outside of peak traffic times;
 - Using a 'just in time' approach to materials delivery to minimise stockpiling or material storage on site;
 - Construction staff would wear similar style uniforms to the Heath staff;
 - Use of hybrid / electric vehicles where possible;
 - Construction personnel would travel around the Heath by foot or bicycle unless transporting materials;
 - Access routes and worksites to be located away from the SSSI and other sensitive areas;
 - All works in the vicinity of any trees would conform with the requirements of BS5837:2012, Trees in relation to design, demolition and construction;
 - Adoption of 'landscape protection zones' for the most sensitive areas of the Heath that require protection;
 - All refuelling would be undertaken at the Kenwood House nursery construction compound by trained • operatives using drip trays and with spill kits on hand.

4. Alternatives

Design process

- 4.1 The design has been developed in an iterative manner with a number of options being discounted at different stages of the process. The starting point for the design process was the City of London's legal duties as custodian of Hampstead Heath and the ponds with regards to the Reservoirs Act 1975, Flood and Water Management Act 2010, and the Hampstead Heath Act 1871. These legal duties require the City of London to strengthen the dams and increase flood storage capacity, whilst maintaining the natural aspect and state of Hampstead Heath.
- 4.2 Figure 4.1 below shows the different design stages where options were considered and discounted leading to the preferred option described in Chapter 3 above. The initial stage was to define the project which included a high level consideration of all potential options.



Figure 4.1 Overview of the option development process

Main alternatives

- 4.3 The main alternatives to the Proposed Development include the options considered at the initial feasibility stage and subsequent suggestions made by various stakeholders. These are described under the subheadings below along with the reasons why the options were discounted.
- Most options have been discounted early on because they do not address the fundamental issue that the 4.4 Proposed Development seeks to address, namely the Standard of Protection (SoP) of the dams.

Do nothing

- 4.5 The 'do nothing' option consists of no intervention to any of the ponds. This would mean that the existing risk of dam overtopping and potential collapse and the corresponding risk to human life and property downstream remains. The risks and liabilities to the City of London are unacceptably high and would increase over time. Doing nothing is not a feasible option. The Supervising Engineer has advised that a Section 10 inspection would be called if these works are not progressed. Failure to comply with recommendations in the Section 10 inspection of the statutory dams would lead to prosecution by the Environment Agency who are the enforcement authority. This option has not been considered further.
- Assuming that the Environment Agency do not intervene, the 'do nothing' option would mean that the existing 4.6 environmental baseline would prevail. There would be no environmental impacts, but there would also be none of the environmental benefits of the Proposed Development including improved water quality through de-silting and removal of overhanging vegetation, and reduced flood risk to downstream properties.

Remove the dams

- Draining the ponds and removing the dams would mean that there would be no water bodies on the Heath 4.7 that need to comply with the Reservoirs Act 1975 or the Water Management Act 2010 which remove the City of London's liabilities under these Acts. The option is likely to be successfully challenged under the Hampstead Heath Act 1871.
- 4.8 This option would result in a negative change to the ecology and landscape of the Heath and would likely result in an increased flood risk downstream. This option has not been considered further.

Improvement works at the three ponds currently designated as large raised reservoirs

- 4.9 Works to strengthen the dams holding back Hampstead No.1 Pond, Highgate Men's Bathing Pond, and Model Boating Pond would satisfy the City of London's liabilities under the Reservoirs Act 1975. This option would not satisfy the Flood and Water Management Act 2010 and there would still be a risk of dam overtopping and failure at the remaining ponds.
- 4.10 A sub-option has also been considered which includes the above proposals but with additional works to the Bird Sanctuary Pond. This would reduce the extent of works required at the Model Boating Pond and Highgate Men's Bathing Ponds, but would not address the risk of dam failure at Highgate No.1 Pond.
- 4.11 This option would require substantially larger works at the three ponds than is being proposed under the Proposed Development and would result in greater adverse landscape and visual effects.

Lower pond water levels

- 4.12 Pond water levels could be reduced by lowering the overflow pipes connecting the ponds. This would effectively increase the amount of flood storage capacity at each pond. This option would have adverse effects on aquatic ecology, amenity, and the landscape.
- 4.13 This option would adversely affect the ecology in each pond by reducing the amount of aquatic habitat available to wildlife and reducing water quality. Lowering the pond levels would adversely affect the amenity of the ponds, particularly the three bathing ponds as infrastructure such as the changing rooms would be much higher than the water levels creating difficulties with bathing access. There would also likely be greater disturbance of the pond beds which would agitate silt and increase the turbidity of the water in the ponds. The aesthetics of each of the ponds would be adversely affected as more sheet piling and earth embankment would be exposed. This would have negative effects on the Heath landscape. For these reasons this option has not been considered further.

Raise pond water levels

- 4.14 Raising the water levels in each of the ponds would be achieved by raising the overflow pipes which would effectively reduce the flood storage capacity at each pond in direct conflict with the aims of the project. The increase height in the head waters would put increased pressure on the dams, increasing the possibility of dam failure and consequential downstream flooding. The dams would be overtopped in more frequent storm events than at present further increasing the risk of dam failure.
- The main environmental effect from this option would be the increase flood risk from dam failure. For this and 4.15 the above reasons this option has not been considered further.

Re-pile existing dam cores

- 4.16 This option seeks to reinforce the existing dams by adding new sheet piles to the dam core reducing the risk of dam collapse. The option would not protect the downstream slope if the dam is overtopped so there would still be a risk of dam failure.
- 4.17 The main environmental effect of this option is that the flood risk from dam failure would not be virtually eliminated. For this and the above reasons this option has not been considered further.

Re-pile existing upstream dam face

4.18 Sheet piles could be placed on the upstream face of the dams to strengthen them. As with the above option to re-pile the existing dam cores, this option would not prevent overtopping of the dam and flood risk would not be sufficiently reduced. There would also be a loss of some waterside trees.

Installation of new sustainable drainage on the Heath

4.19 Councillor de Souza has suggested that consideration be given to the installation of new sustainable drainage across the Heath as an alternative to the proposed scheme. Sustainable drainage is a type of drainage system that utilises a soft engineering approach as opposed to the more traditional hard engineering. This may include measures such as the installation of wetlands, increasing vegetation cover, permeable hard surfaces, and diverting surface water flows to swales. The purpose of sustainable drainage is to maximise the infiltration of rain water into the ground and attenuate surface water to reduce overland flows.

- 4.20 Two specific sustainable drainage options have been proposed by Stephen Myers (author of Walking on Water). The first option is the creation of a new offline storage pond just downstream of the Model Boating Pond which would intercept flood water that has overtopped the dam. The new pond would need to be 400m long and 50m wide and would follow the 60m contour around Parliament Hill. This option would still require the raising of Model Boating Pond dam by 0.6m and is an alternative to the Proposed Development which seeks to raise the dam by 2.5m. This option would still require the proposed works at the other ponds and dams but would result in landscape and ecological impacts to a much larger area of the Heath.
- 4.21 The second sustainable drainage option proposed by Stephen Myers is to attenuate storm runoff in the upper part of the Heath by constructing a series of low embankments up to 0.5m high which would create shallow basins. These would need to be located over permeable geology to allow infiltration of the attenuated water.
- 4.22 The volume of water required to be attenuated by sustainable drainage during a Probable Maximum Flood event would be 236,500m³. It is not possible to attenuate this volume of water using sustainable drainage.
- 4.23 Installing sustainable drainage across the Heath would result in the loss of large areas of grassy meadow which support important habitats and provide amenity value to the Heath users. Converting large swathes of the Heath to wetland areas would change the ecology and landscape and reduce amenity. This option has not been considered further.

Creation of additional flood storage area

- 4.24 There have been a number of suggestions to create additional storage areas including the construction of a new underground surface water storage tank to the west of Highgate No.1 Pond, additional flood storage next to the Ladies Bathing Pond or next to the Men's Bathing Pond. The tank would store excess flood water that could not be stored in the Highgate chain of ponds and slowly release the water to the sewer network. The tank would have to measure 250m long by 200m wide by 2m high.
- 4.25 Although such options would create additional flood storage, it would not achieve the core aim of the project, namely minimising the risk of failure to the dams. The construction works for this project would be disruptive to Heath users and would have large adverse landscape and visual effects.

Increase the capacity of the Thames Water sewer network

- 4.26 Stephen Myers has suggested that the money allocated for the proposed scheme would be better spent by increasing the capacity of the Thames Water sewer network downstream of the ponds and bring sections of the River Fleet back to life. Although these suggestions may have merit as separate schemes they would have no effect on dam overtopping or reduce the risk of dam collapse. The reason that the dams overtop during high rainfall events and increase the risk of dam collapse is because the existing overflow pipes have insufficient capacity to transfer the flood waters past the dams. The proposed alternative would not reduce surface water flows across the Heath, would not increase the overflow capacity at any of the ponds, and would not increase flood storage volumes at any of the ponds.
- 4.27 As any intervention downstream of the dams would have no effect on the dams themselves, this option has not been considered further.

Managed option

- 4.28 London Borough of Camden has requested that a managed option be considered as an alternative to the Proposed Development. The managed option proposed by the Council would consist of "a sophisticated managed response to the over topping through use of technology; an early warning water level rise system and pumping equipment which will not change the landscape of the ponds and can be managed by the applicant, rather than providing a standard dam approach used on largely unmanaged reservoirs."
- 4.29 The proposed alternative would be a departure from all standard guidance which recommends virtually eliminating the risk of dam failure.
- 4.30 It is not technically possible to provide such a system because the Meteorological Office has stated that they are not able to predict an extreme event, and it would be extremely difficult and disruptive to evacuate thousands of people with a few hours notice. The City of London has already prepared an On Site Action Plan and the Council has included incident response within their Multi-Agency Flood Plan. The City of London and the Council have conducted desk top exercises of the two plans. The City of London has appointed an emergency contractor, and installed a telemetry system to give early warning of weather or water level changes which could lead to a breach of the dams.
- 4.31 The adoption of the Emergency Action Plan and installation of the telemetry system does not change the City of London's liability for the loss of life and any damage to infrastructure and buildings as a result of dam failure, nor does it reduce the risk of dam failure. In the event of dam failure economic disruption would occur until the reconstruction effort is complete. The financial cost of this damage would far exceed the costs of the scheme.
- 4.32 The main environmental effect of this option is that the flood risk from dam failure would not be sufficiently reduced to acceptable levels. This option has not been considered further as an alternative to the Proposed Development as it has already been adopted.

5. Approach to the assessments

The EIA process

5.1 EU Directive 2011/92/EU (the EIA Directive) sets out the EIA process for all EU member states and defines what projects need to undergo EIA. For the Hampstead Heath Pond project, The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (the EIA regulations) transposes the EIA Directive and underpins the EIA process. The process set out in the EIA Regulations is summarised in Figure 5.1.

Scoping

- 5.2 Once it has been determined that a project is EIA development, the scoping stage is undertaken. City of London are entitled to request a Scoping Opinion from Camden Council which sets out the information that Camden Council would require in order to properly determine the planning application, taking into account the significant environmental effects.
- 5.3 A high level environmental appraisal has been undertaken to identify which aspects of the environment are likely to be significantly affected by the Hampstead Heath Pond project. This information was contained within the Scoping Report and was submitted to Camden Council on the 8th January 2014. A formal Scoping Opinion was received on the 8th April 2014 (Appendix XX). It was determined that assessment of the following environmental aspects should be included as part of the EIA:
 - Landscape and visual amenity;
 - Aquatic and terrestrial ecology;
 - Historic environment;
 - Water environment;
 - Community;
 - Traffic and transport (construction phase);
 - Air quality (construction phase); and
 - Noise (construction phase).

Screening

The first stage of the EIA is to determine if the project qualifies as EIA development. Broadly if significant environmental effects are likely to arise then it is probable that the project would be considered EIA development

Scoping

The second stage of the environmental assessment is to determine what are the likely environmental effects that need to be considered in detail. The scoping stage involves consultation with a variety of stakeholders to obtain their views on what would be assessed.

Identify existing conditions (baseline)

Once the scope of the environmental assessments has been agreed, the next stage is to identify and describe the existing environment. This is undertaken through a combination of desk based studies using existing information and field surveys.

Predict and assess likely environmental effects

The next stage is to determine what impacts would arise from the construction and operation of the proposed development, and whether any direct or indirect environmental effects from these impacts would be significant. In determining whether an environmental effect would be significant, published guidance has been used where available.



Develop mitigation measures

Once the environmental effects have been identified, mitigation measures are developed which would seek to minimise significant effects. This is done through either changing aspects of the proposed development design, or construction process, or by compensating for the loss of certain environmental receptors. The preference for mitigation is as follows:

- Preferably avoid the impact; or if not possible
- Reduce the magnitude or scale of the impact; or if not
- Compensate for any loss of environmental resources



Predict residual environmental effects

The environmental effects that would remain after the mitigation measures have been applied ,are called the residual effects. The predicted environmental effects that are reported in the Environmental Statement are the residual effects having taken into account the mitigation measures.

Figure 5.1 Key stages of the EIA process

possible

Introduction to the assessment chapters

Assessment chapter structure

- 5.4 A separate assessment chapter has been produced for each of the environmental aspects identified above in Section 5.3. Each assessment chapter follows the same structure for consistency and to help the reader identify the main issues. Each assessment chapter has the following sub-headings:
 - **Scope of the assessment** Sets out what was assessed. This is informed by the Scoping Opinion and the consultation responses undertaken at the scoping stage.
 - **Relevant legislation** Describes why the assessments have been undertaken by setting out the legislative basis for the assessment.
 - Method of assessment Describes how the assessments have been undertaken. This includes how baseline information has been obtained, a summary of any relevant guidance that has been followed, and a description of the process and criteria for identification and evaluation of the impacts.
 - **Baseline conditions** Provides a description of the existing environment in terms of the particular environmental aspect. Baseline conditions are continually changing, but for the purposes of this ES these sections describe the baseline conditions in the Spring 2014 unless otherwise stated.
 - **Impact assessment** This section describes all the identified impacts that would occur as a result of the Hampstead Heath Ponds project. The impacts are evaluated against the conditions described in the baseline conditions section. Each impact is described in the following format:
 - Description of the impact;
 - Brief description of any mitigation that would be implemented;
 - Evaluation of the impact after mitigation has been implemented using the criteria set out in the method of assessment section;
 - Statement of whether the impact would result in significant effects or not.
 - Mitigation measures A more detailed description of all the mitigation measures identified in the impact assessment section.
 - **Summary** A summary of the significant environmental effects resulting from the QEOP 2014-15 events programme with mitigation in place.

Impact assessment

- 5.5 Environmental impacts cause environmental effects and these should not be confused as the same thing. The impact assessment first identifies the impacts relevant to each of the environmental aspects and which receptors would be affected by the impact. An evaluation of the effect is undertaken to determine whether it would be significant or not. This is done by considering the following criteria:
 - Sensitivity of the receptor In general the more sensitive a receptor is to an impact the more significant • the effect is likely to be. The importance of the receptor is also considered as part of its sensitivity.
 - Magnitude of the effect – This is sometimes referred to as the scale of the effect. The larger the magnitude of the effect, the more likely the effect would be significant. Effect magnitude can refer to the spatial scale of the effect and the degree or severity of damage that is caused by the impact.
 - Duration of the effect This refers to how long the effect would last and is broadly characterised into permanent and temporary effects.

- Reversibility of the effect Some effects would overtime be reversible with or without mitigation, whilst other effects may be permanent and irreversible. There is a close relationship between effect duration and reversibility but they are not the same thing.
- Both primary effects (which are direct effects), and secondary effects (which are indirect effects that may 5.6 occur as a result of mitigating a primary effect) are considered.
- Effects can be adverse or beneficial, and both types of effect have been considered within the assessments. 5.7
- Broadly speaking effects are categorised as follows: 5.8
 - Major adverse / beneficial.
 - Moderate adverse / beneficial
 - Minor adverse / beneficial
 - Negligible / no effect.
- Major and moderate effects are generally regarded as being significant whereas minor and negligible effects 5.9 are not significant. The Method of assessment sections in each of the environmental aspect chapters provides further detail on how effects have been evaluated for the specific environmental aspect.

Mitigation measures

- 5.10 Mitigation measures have been identified where a significant adverse effect is likely to occur. Most effects can be mitigated, but sometimes mitigation would not be undertaken because it is technically very difficult, it is prohibitively expensive, or because it may result in undesirable secondary effects.
- 5.11 There is a hierarchy of mitigation as shown in Figure 5.2 below which shows the primacy of the mitigation for reducing environmental effects. The preference is to avoid any impact at all so that the existing baseline is maintained and there are no environmental effects. If this cannot be practicably achieved then mitigation measures from the next level down would be identified to reduce the magnitude of the impact. The least preferable options are to compensate and remediate the effect.



Figure 5.2 Mitigation hierarchy

Consultation

- 5.12 From the start of the project, City of London has worked closely with a variety of statutory and non-statutory consultees throughout the option selection and design process. Stakeholders were invited to attend a series of workshops held at key points in the option selection stage to enable them to influence the final design. Suggestions that were feasible have been incorporated in to the design and include the following:
 - Providing extra storage capacity by building a flood storage dam at the Catchpit Area in order to minimise • works at the most sensitive ponds;
 - Keeping the Kenwood Ladies' Bathing Pond changing rooms in the centre of the dam; .
 - Desilting ponds at the same time as the dam safety works. Complete desilting is currently planned for • Stock, Viaduct, Mixed Bathing, Ladies' Bathing and Men's Bathing Ponds. Partial desilting is planned for Model Boating Pond;
 - Retaining the group of trees on the west bank of the Model Boating Pond and turning the area into a peninsula;
 - Traffic management ideas, such as prohibiting the use of Millfield Lane or traffic across the Heath from one pond chain to the other;
 - Modelling of options to reduce the loss of Plane trees at Hampstead No.2 Pond; •
 - Adding an overflow pipe to Model Boating Pond, in order to reduce the spillway width; •
 - Widening the proposed reinforced spillway at Mixed Bathing Pond to reduce the dam raising;
 - Relocating the overflow pipe between Bird Sanctuary Pond and Model Boating Pond. •
- 5.13 Throughout the duration of the project members of the public have been able to keep up to date with developments through the project website: <u>http://www.cityoflondon.gov.uk/things-to-do/green-</u> spaces/hampstead-heath/ponds-project/Pages/default.aspx. The website includes all the published project reports, consultation responses, frequently asked questions, and the latest news and developments on the project.
- 5.14 There was a 12 week non-statutory process of information giving and consultation carried out between 26th November 2013 and 17th February 2014. The consultation sought views on the two preferred options for each chain of ponds.
- 5.15 Based on the responses received from those who completed a questionnaire (mainly people who live close to the Heath and who are regular users of the Heath) there is a strong body of concern about the whole project. These concerns are to do with increases in dam height and perceived negative impacts on the Heath's amenity (especially for swimmers), its landscape or wildlife.
- 5.16 However, respondents from the downstream area in potentially impacted communities said that they supported the improved safety the work would bring. There are also a number of people who feel that the proposed works could create an opportunity for improvements to the Heath, especially for wildlife. A summary of the consultation responses is available for members of the public to view on the project website.
- 5.17 Where specific surveys such as ground investigations have been undertaken on the Site, information boards explaining what is taking place and why have been posted at various locations on the Heath to inform members of the public and other Heath users.

5.18 A series of consultations has also been undertaken with the London Borough of Camden and other statutory stakeholders on technical matters relating to the EIA throughout the scoping stage. The outcome of these consultations has influenced the scope and method of the EIA and are summarised at the beginning of the relevant assessment chapter. Please see Statement of Community Involvement which accompanies the planning application for more detail on the consultation process.

Uncertainties and assumptions

- 5.19 The environmental appraisal process aims to assist good decision-making based on the quality of the information provided including the potential environmental effects of the Hampstead Heath Ponds Project. Due to the nature of the assessment and the prediction of effects arising from events that have yet to take place, there is an inherent level of uncertainty within the assessments. Assessments use methods that are well established to minimise this uncertainty.
- 5.20 As with any project the design continues to evolve as further information is obtained and the design becomes more detailed. The level of detail presented within this ES about the Site and the design is sufficient to identify and understand the main environmental issues and significant effects which could arise as a result of the Proposed Development. Where uncertainties exist, a worst case scenario is assumed for the purposes of the EIA so that effective mitigation measures can be identified and deployed. The main uncertainties relating to the Proposed Development are as follows:
 - The changing facilities at the Kenwood Ladies Bathing Pond could be either refurbished or demolished and reconstructed depending on the outcome of further structure surveys.
 - The total extent of the borrow pits is unknown until they are excavated as the exact amount of suitable material available from the borrow pits cannot be determined in advance. The figures provided in Table 3.1 above assume a conservative estimate that 50% of the material obtained from the borrow pits would not be suitable for use in dam construction. The true figure is likely to be less than this so the project description is a likely maximum extent or worst case scenario.
- 5.21 Specific limitations, uncertainties and assumptions relating to each of the environmental aspects are described in relevant assessment chapters.
- 5.22 Should the assumptions in this ES prove incorrect, for example due to a material change to the design which could result in different environmental impacts to those reported in the ES, an addendum would be issued which would update the findings of this ES.