ATKINS

CITY OF LONDON

Hampstead Heath Ponds Project

SUSTAINABILITY STATEMENT

July 2014

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Definitions

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

Term	Definition
The Proposed Development	As specified in The Application which is the subject of this Sustainability Statement
The Site	Land area of the Proposed Development
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

1. Context

1.1 The purpose of this Sustainability Statement is to highlight how sustainable design and construction has been considered in the Proposed Development.

1.2 Relevant sustainability considerations have been used to establish how they have been or will be addressed in the proposed works. The findings have been informed by discussions with various project team members and information in other documents that accompany the planning application namely the Planning, Design and Access Statement; Environmental Statement; Arboricultural Impact Assessment; Flood Risk Assessment and Drainage Strategy; Project Management Plan (containing Construction management and site waste management proposals); and Ladies' Bathing Pond Replacement Changing Facility Design and Access Statement.

Proposed Development

1.3 The purpose of the Proposed Development is to safeguard the integrity of the dam structures in the face of extreme flood events so as not to exacerbate the effect of flooding on the downstream residents and property whilst at the same time safeguarding the integrity and character of the unique Hampstead Heath environment.

1.4 The works include:-

- Site clearance;
- Construction of earthworks dams, using locally sourced clay;
- Construction of culverted spillways;
- Construction of reinforced earth surface spillways;
- Drainage works;
- Sheet piling to raise crest heights;
- Crest levelling and restoration;
- Desilting to various ponds to help improve water quality;
- Terrestrial and aquatic environmental mitigation works;
- Installation of aeration units to improve water quality;
- Demolition and construction of new bathing facilities at Ladies' Bathing pond; and
- Construction of footpaths/access paths.

Policy Review

1.5 The Site is located within the London Borough of Camden. Strategic planning in London is the shared responsibility of the Mayor of London, 32 London boroughs and the Corporation of the City of London.

1.6 The Mayor produces a spatial development strategy (SDS) – which has become known as 'the London Plan' which is kept under review. Boroughs' local development documents' have to be 'in general conformity' with the London Plan, which is also legally part of the development plan that has to be taken into account when planning decisions are taken in any part of London.

1.7 On this basis, policies and guidance within the following London wide and local documents have been reviewed to establish the sustainability requirements for the Proposed Development:

- London Plan 2011;

- Greater London Authority (GLA), Sustainable Design & Construction SPG April 2014;
- Camden Council, Core Strategy DPD 2010 and Development Policies; and
- Camden Planning Guidance CPG3 Sustainability 2013.

London Plan 2011

1.8 The London Plan includes a policy specifically on Sustainable Design and Construction (policy 5.3) and a range of other policies that deal with matters relating to sustainability and which are of relevance to the Proposed Development:

- Policy 5.3 Sustainable Design and Construction

1.9 Policy 5.3 sets out that the highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime. It also sets out that development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process and that major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance.

Other relevant policies

- Policy 5.1: Climate change mitigation

1.10 Policy 5.1 sets out the Mayor's strategic target for the reduction of carbon dioxide emissions across London of 60 per cent (below 1990 levels) by 2025. It expects the GLA group, the boroughs and other organisations to make a contribution towards this target and that all new development fully contributes towards the London wide reduction target.

- Policy 5.2: Minimising carbon dioxide emissions

1.11 Policy 5.2 sets out the Mayor's energy hierarchy which developers are to follow when designing their schemes. It also sets out carbon dioxide reduction targets that developers are to aim for from their developments over the lifetime of the Plan and that where these can't be achieved an off-site or financial contribution in lieu can be sought by the local borough.

- Policy 5.4: Retrofitting

1.12 Policy 5.4 encourages the retro-fitting of measures to reduce carbon dioxide emissions, improve the efficiency of resource use (such as water) and minimise generation of pollution and waste from existing building stock and states that any opportunities created by new development for retro-fitting should be identified.

- Policy 5.7: Renewable energy

1.13 Policy 5.7 seeks to increase the proportion of energy generated from renewable sources, including through their incorporation into new developments and by identifying specific opportunities within London.

- Policy 5.8: Innovative energy technologies

1.14 Policy 5.8 encourages the use of innovative energy technologies that will provide an alternative energy source and reduce carbon dioxide emissions.

- Policy 5.9: Overheating and cooling

1.15 Policy 5.9 states that developments should be designed to limit their contribution to the heat island effect and encourages spaces to be designed to avoid overheating, including by following the cooling hierarchy set out in the policy.

- Policy 5.10: Urban greening

1.16 Policy 5.10 encourages the greening of London's buildings and spaces and specifically those in central London by including a target for increasing the area of green space (including green roofs etc) within the Central Activities Zone.

- Policy 5.11: Green roofs and development site environs

1.17 Policy 5.11 specifically supports the inclusion of planting within developments and encourages boroughs to support the inclusion of green roofs.

- Policy 5.12: Flood risk management

1.18 Policy 5.12 outlines the requirement for boroughs and developers to carry out flood risk assessments and that developments must comply with national planning policy on flood risk assessments and management to ensure they are designed and built to be resilient to flooding.

- Policy 5.13: Sustainable drainage

1.19 Policy 5.13 promotes the inclusion of sustainable urban drainage systems in developments and sets out a drainage hierarchy that developers should follow when designing their schemes.

- Policy 5.14: Water quality and waste water infrastructure

1.20 Policy 5.14 seeks to ensure that adequate provision is made for waste water infrastructure, and that water quality is protected and improved.

- Policy 5.15: Water use and supplies

1.21 Policy 5.15 encourages developments to incorporate measures to minimise the use of mains water.

- Policy 5.21: Contaminated land

1.22 Policy 5.21 supports the remediation of contaminated sites and seeks to ensure that developments don't activate or spread contamination.

- Policy 7.14: Improving air quality

1.23 Policy 7.14 aims to reduce exposure to poor air quality in London as well as reduce emissions from development, including during the demolition and construction phases and seeks new development to be 'air quality neutral'.

- Policy 7.15: Reducing noise and enhancing soundscapes

1.24 Policy 7.15 seeks to reduce overall exposure to noise within London as well as protect new occupiers from noise within their developments.

- Policy 7.19: Biodiversity and access to nature

1.25 Policy 7.19 seeks a proactive approach to the protection, enhancement, creation, promotion and management of biodiversity.

- Policy 7.21: Trees and woodlands

1.26 Policy 7.21 seeks to protect, maintain and enhance trees and woodlands on a strategic scale as well as protect and promote the provision of additional trees in the public realm as well as on development sites.

Greater London Authority Sustainable Design & Construction SPG 2014

1.27 The Mayor has published the SPG on Sustainable Design and Construction in April 2014. This SPG provides guidance on the implementation of London Plan policy 5.3 - Sustainable Design and Construction, as well as a range of policies, primarily in Chapters 5 and 7 that deal with matters relating to environmental sustainability (see above).

1.28 Mayor's priority areas (closely linked to the London Plan policies identified above) relevant to the Proposed Development have been identified as:

- Energy & Carbon Dioxide Emissions;
- Water Efficiency;
- Materials & Waste;
- Ground & Surface Water Flooding;
- Nature Conservation & Biodiversity;
- Increasing Green Cover;
- Land Contamination; and
- Air, Noise, Light and Water Pollution.

Camden Council Core Strategy 2010

1.29 Two policies are of particular relevance to the Proposed Development:

- CS13 - Tackling climate change through promoting higher environmental standards

1.30 Policy CS13 requires all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation.

- CS20 – Protecting and improving our parks and open spaces and encouraging biodiversity

1.31 Through Policy CS20 the Council will protect and improve Camden's parks and open spaces; protect and improve sites of nature conservation and biodiversity and preserve and enhance the historic, open space and nature conservation importance of Hampstead Heath.

Camden Council Development Policies

1.32 A number of policies are of relevance to the Proposed Development:

- DP22 – Promoting sustainable design and construction

1.33 Policy DP22 requires development to incorporate sustainable design and construction measures.

- DP23 – Water

1.34 Policy DP23 requires developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding.

- DP26 – Managing the impact of development on occupiers and neighbours

1.35 Policy DP26 protects the quality of life of occupiers and neighbours by only granting planning permission for development that does not cause harm to amenity.

- DP28 – Noise and Vibration

1.36 Policy DP28 seeks to ensure that noise and vibration is controlled and managed and will not grant planning permission for development likely to generate noise pollution or development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

- DP32 – Air quality and Camden's Clear Zone

1.37 Policy DP32 requires air quality assessments where development could potentially cause significant harm to air quality and expects mitigation measures in development that are located in areas of poor air quality.

Camden Planning Guidance Sustainability 2013

1.38 This guidance provides information on ways to achieve carbon reductions and more sustainable developments. It also highlights the Council's requirements and guidelines which support the relevant Local Development Framework (LDF) policies set out above. It covers:

- Energy statements;
- The energy hierarchy;
- Energy efficiency – in new and existing buildings;
- Decentralised energy and combined heat and power (CHP);
- Renewable energy;
- Water efficiency;
- Sustainable use of materials;
- Sustainability assessment tools - Code for Sustainable Homes, BREEAM and EcoHomes;
- Green roofs, brown roofs and green walls;
- Flooding;
- Climate change adaptation;
- Biodiversity; and
- Urban food growing.

2. Approach

Derivation of sustainability framework

2.1 The Mayor's priority areas contained in GLA Sustainable Design and Construction SPG 2014 have been used as the main organising framework to assess the sustainability of the Proposed Development, bearing in mind the very specific nature of the Proposed Development. Each section of the SPG sets out the Mayor's priorities for the particular area, which the Mayor seeks developers to address in all development proposals. Some sections also contain best practice approaches, which the Mayor strongly encourages be delivered in the appropriate developments.

2.2 In deriving the organising framework for the Proposed Development, the Mayor's priorities and best practice approaches applicable to residential development only have been scoped out given the non-residential nature of the proposals. Also, approaches at Borough scale have not been considered.

2.3 In addition, the framework takes into account the Camden Local Plan relevant policies and guidance as outlined above by making the necessary linkages to the GLA SPG.

2.4 The sustainability review which follows considers the following topics:

- Energy and carbon dioxide emissions;
- Energy Demand Assessment;
- Use less energy;
- Renewable energy;
- Carbon dioxide off-setting;
- Monitoring energy use;
- Water efficiency;
- Materials and waste;
- Nature conservation and biodiversity;
- Heat and drought resistant planting;
- Resilient foundations;
- Increasing green cover;
- Flooding;
- Land contamination;
- Air quality;
- Noise;
- Light pollution; and
- Surface water runoff.

3. Sustainability Review

Table 3.1 Sustainability Review

Sustainable Design and Construction SPG 2014 **Summary of the Mayor's priorities and best practice approaches**	**Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance**	**How considerations are addressed in the Proposed Development**
Energy and carbon dioxide emissions		
Mayor's Priority The overall carbon dioxide emissions from a development should be minimised through the implementation of the energy hierarchy set out in London Plan policy 5.2. Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: 1. Be lean: use less energy 2. Be clean: supply energy efficiently 3. Be green: use renewable energy	**CS13 - Tackling climate change through promoting higher environmental standards ...** c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy: - ensuring developments use less energy, - making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks; - generating renewable energy on-site - Sustainability Planning Guidance - Key messages - All developments are to be design to reduce carbon dioxide emissions. - Energy strategies are to be designed following the steps set out by the energy hierarchy.	In broad terms, the Proposed Development comprises the following key elements of relevance in terms of energy demand and associated carbon emissions: - Increase flood storage capacity by raising some of the dams and constructing a new dam in the Catchpit area; - Reinforcement of dams where required; - Construction of spillways to prevent any overtopping which would erode the dams; - Construction of new changing and lifeguard facilities at Kenwood Ladies' Bathing Pond - Operation of the new changing and lifeguard facilities - Operation of aeration systems in the ponds <u>Construction</u> Most of the energy use will occur during construction and will come from the diesel consumption for excavators, earth moving equipment, pumps and generators. The building contractor (BAM Nuttall) has indicated that the construction equipment used will be modern; the fuel consumption and CO2 output will be considered

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
		when selecting the plant. Also, plant operators will be instructed to switch of plant when not in use so as to save energy and the shortest possible material haul routes will be chosen so as to reduce diesel consumption. In addition, the contractor will be purchasing a small fleet of mountain bikes for site transportation and are considering the use of electric or small petrol engine vehicles for movement of small tools and light materials. Any mains electricity usage will be supplied from Hampstead Heath's current supplier to reduce the use of on-site generators. <u>Operation</u> During operation the only energy used will be to run aeration systems in the ponds and the heating / lighting of the new changing and lifeguard facilities at Kenwood Ladies' Bathing Pond (see below for carbon reducing design considerations). The Turbo-Jet aerators will be used which have a submersible motor with its directly driven propeller produces water circulation with relatively low energy-consumption. Solar (renewable energy) aeration systems are available although these are not practical in ponds which are surrounded by trees and have therefore not been considered. The aeration systems used in the Proposed Development will use energy supplied from Hampstead Heath's current supplier but in some ponds generators will be used as it will be difficult to connect the aerators to the main grid.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
Mayor's Priority Developments should be designed to meet the following Regulated carbon dioxide standards, in line with London Plan policy 5.2. For non-domestic buildings the standards are as follows: *Non-domestic buildings* Year - Improvements beyond 2010 Building Regulations 1st October 2013 – 2016 40 per cent 2016 – 2019 As per the Building Regulation requirements 2019 - 2031 Zero carbon *Note: The Mayor began to implement his 40% carbon dioxide reduction target for major development, in line with London Plan policy 5.2 from 1st October 2013. It was thought that this would be in line with the introduction of Part L of the Building Regulations 2013. The Government has announced the improvements in carbon dioxide emissions set out in Part L 2013 will come into force on the 6th April 2014.* *Part L 2013 aims to deliver an overall 6% reduction in carbon dioxide emissions from new residential buildings and an overall 9% reduction in carbon dioxide emissions from new non-residential buildings compared to 2010.* *To avoid complexity and extra costs for developers, the*	**Sustainability Planning Guidance** **Key messages** All new developments are to be designed to minimise carbon dioxide emissions. The most cost-effective ways to minimise energy demand are through good design and high levels of insulation and air tightness. The Council expects all new developments to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable.	The nature of the Proposed Development is such that the existing single-storey changing room building will be replaced with a new non-domestic building for the new changing and lifeguard facilities at Kenwood Ladies' Bathing Pond. The building fabric will be designed to meet current Building Regulations and will reduce the heating demand and primary energy consumption. In the next design stage consideration will be given to designing the building to meet the 35% carbon dioxide improvement target beyond Part L 2013.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
Mayor will adopt a flat carbon dioxide improvement target beyond Part L 2013 of 35% to both residential and non-residential development.		
Mayor's best practice Developers are encouraged to include innovative low and zero carbon technologies to minimise carbon dioxide emissions within developments and keep up to date with rapidly improving technologies.	None	Consideration will be given at the next design stage to the inclusion of low and zero carbon technologies in the new changing and lifeguard facilities at Kenwood Ladies' Bathing Pond.
Energy Demand Assessment		
Mayor's Priority Development applications are to be accompanied by an energy demand assessment	**Sustainability Planning Guidance** Only developments involving 5 or more dwellings and/or 500sq m (gross internal) floor space or more are required to submit an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy.	As the new changing and lifeguard facilities will have an area less than 500sqm there is no requirement for an energy statement to be submitted with the planning application.
Use Less Energy		
Mayor's Priority The design of developments should prioritise passive measures.	**Sustainability Planning Guidance** **Key messages** The Council expects all new developments to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable. Ways in which buildings can be designed to be more energy efficient:	The building fabric of the new facilities will be designed to meet current Building Regulations and will reduce the heating demand and primary energy consumption. The thermal envelope will have a good level of insulation with minimal thermal bridges, high performance windows with insulated frames and good air tightness. Energy demand (either for heating or cooling) has been reduced in a number of ways through the use of passive measures:

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
	- Natural systems; - Thermal performance; - Mechanical systems; and - Other energy efficient technology.	- The orientation of the building has limited glazing to the south elevation, and includes a retractable canopy to provide summer shading to the northwest elevation. - The building has a compact form with a low surface area to volume ratio to reduce heating demands. - Energy-efficient light fittings will be installed.
Mayor's best practice Developers should aim to achieve Part L 2013 Building Regulations requirements through design and energy efficiency alone, as far as is practical.	None	The building fabric of the new changing and lifeguard facilities will be designed to meet current Building Regulations and will reduce the heating demand and primary energy consumption. The thermal envelope will have a good level of insulation with minimal thermal bridges, high performance windows with insulated frames and good air tightness.
Renewable Energy		
Mayor's Priority Major developments should incorporate renewable energy technologies to minimise overall carbon dioxide emissions, where feasible.	**CS13 - Tackling climate change through promoting higher environmental standards …** c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy: - ensuring developments use less energy, - making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks; - generating renewable energy on-site	Renewable energy technologies will be further considered in the next design stage of the project for the new changing and lifeguard facilities. Solar powered aeration systems for ponds are available although these are not practical in ponds which are surrounded by trees and have therefore not been included in the Proposed Development.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
Carbon dioxide off-setting		
Mayor's Priority Where developments do not achieve the Mayor's carbon dioxide reduction targets set out in London Plan policy 5.2, the developer should make a contribution to the local borough's carbon dioxide off-setting fund.	**Sustainability Planning Guidance** Where the new London Plan carbon reduction target in policy 5.2 cannot be met onsite, we may accept the provision of measures elsewhere in the borough or a financial contribution which will be used to secure delivery of carbon reduction measures elsewhere. This process is known as carbon offsetting.	The nature of the Proposed Development is such that there will be only one small support building constructed (the new changing and lifeguard facilities). As such it is considered that carbon offsetting elsewhere or a financial contribution to the Council is not appropriate. In the next design stage further consideration will be given to reducing or offsetting in-situ the carbon emissions of the proposed buildings.
Monitoring energy use		
Mayor's best practice Developers are encouraged to incorporate monitoring equipment and systems, where appropriate to enable occupiers to monitor and reduce their energy use.	**Sustainability Planning Guidance** **Other energy efficient technology…** Energy monitoring, metering and controls should be used to inform and facilitate changes in user behaviour.	Consideration will be given in the next design stage to monitoring and controlling the energy use by the Proposed Development, both for the new buildings and for the aerator systems in the ponds.
Water efficiency		
Mayor's Priority Developers should maximise the opportunities for water saving measures and appliances in all developments, including the reuse and using alternative sources of water.	**DP23 – Water** The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by: a) incorporating water efficient features and equipment and capturing, retaining and re-using surface water and grey water on-site; b) limiting the amount and rate of run-off and waste water entering the combined storm water and sewer	At the new changing and lifeguard facilities, low water consumption sanitary ware fixtures will be incorporated in the buildings. Also, rainwater harvesting tanks will be utilised for toilet flushing in the new changing and lifeguard changing facilities. The requirement for grey water harvesting doesn't apply as new building has an area of less than 500sqm. Any dewatering of ponds (partial or complete) as part of

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
	network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding;… <u>Sustainability Planning Guidance</u> Key messages	the construction will be replaced naturally with rainwater and the use of potable supplies prohibited. Concrete mix designs for construction works using the lowest possible water cement ratio will be considered in the next design stage.
Mayor's Priority New non-residential developments, including refurbishments, should aim to achieve the maximum number of water credits in a BREEAM assessment or the 'best practice' level of the AECB (Association of Environment Conscious Building) water standards.	At least 50% of water consumed in homes and workplaces does not need to be of drinkable quality re-using water. All developments are to be water efficient. Developments over 10 units or 1000sq m should include grey water recycling. The Council expects all developments to be designed to be water efficient by minimising water use and maximising the re-use of water. This includes new and existing buildings. Minimising water use The simplest way of doing this is through installing efficient water fittings and plumbing, such as - dual flush toilets; - low flow taps and shower heads; and - low water consuming washing machines and dishwashers. Your development will need to use a range of these measures to reduce their water consumption. Specifications should be practical for the intended occupier to ensure that fittings are not simply replaced.	A BREEAM assessment is not considered necessary for this project as the new non-residential building is less than 500sqm. Please refer to entry above for water efficiency and rainwater harvesting measures being applied.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
	Your development should include meters which are visible to occupants, as this has been shown to result in reductions in water use. We will assess the performance of water minimisation measures used against the water category in BREEAM, EcoHomes or the Code for Sustainable Homes assessments (see section 8 on sustainability assessments for more information). <u>Maximising the re-use of water</u> At least 50% of water consumed in homes and workplaces does not need to be of drinkable quality. For example, rain water can be water used for flushing toilets, washing laundry and watering plants and gardens. <u>Collecting rain water</u> This involves collecting rainwater from a building's roof, as well as its surroundings, and storing it in a tank. Once filtered of leaves and larger objects, the water can be re-used for toilet flushing, laundry and watering plants. If used outside, the rain water harvesting system can take the form of a simple water butt. If used within the building it will need to be supplied through pipes and taps that are separate from the standard mains water supply. <u>Green/brown roofs and collecting rain water</u> Green/brown roofs can be designed to include rain water collection. However, more consideration needs to be given to the materials and pipe work that will go	

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
	underneath the green/brown roof structure. Green/brown roofs with rainwater harvesting may also need to use extra filters to ensure the water can be re-used. See section 10 for more information on green/brown roofs. <u>Re-using water</u> 'Grey water' (water that has already been used in hand basins, baths and showers) can be stored, filtered and disinfected, and then reused, for toilet flushing, garden watering or laundry. It is also possible to recycle 'black water' (water used for toilet flushing and washing up) although this is more resource intensive. Both 'grey water' and 'black water' systems will require regular maintenance to ensure their ongoing quality and effectiveness. A separate standard mains supply will also always be needed in addition to provide drinking water. The Council will require developments over 10 units or 1000sq m and/or intense water use developments, such as hotels, hostels, student housing etc to include a grey water harvesting system, unless the applicant demonstrates to the Council's satisfaction that this is not feasible.	
Mayor's Priority All developments should be designed to incorporate rainwater harvesting.	**Sustainability Planning Guidance** **WHAT WILL THE COUNCIL EXPECT** The Council will require buildings with gardens or landscaped areas that require regular maintenance to be fitted with water butts for rainwater harvesting (also see above)	Rainwater harvesting tanks will be utilised for toilet flushing in the new changing and lifeguard changing facilities.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
Materials and waste		
Design phase **Mayor's Priority** The design of development should prioritise materials that: - have a low embodied energy, including those that can be re-used intact or recycled; - at least three of the key elements of the building envelope (external walls, windows roof, upper floor slabs, internal walls, floor finishes / coverings) are to achieve a rating of A+ to D in the BRE's The Green Guide of specification; - can be sustainably sourced; - at least 50% of timber and timber products should be sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of forestry Certification (PEFC) source; - are durable to cater for their level of use and exposure; and - will not release toxins into the internal and external environment, including those that deplete stratospheric ozone **Mayor's best practice** The design of developments should maximise the potential to use pre-fabrication elements.	**Sustainability Planning Guidance** As part of the Design and Access Statement for your development, you will be expected to describe how the development has considered materials and resources. This statement should provide an explanation of the opportunities for the selection and sourcing of sustainable materials that have been considered in the proposal, and the reasons for the sourcing choices made. Your statement should also detail which existing materials on the site are to be re-used as part of your development or made available for re-use elsewhere. <u>Managing existing resources</u> Most development sites have existing materials which can be re-used, recycled or obtained from nearby development sites. You should always look for options to sensitively re-use, refurbish, repair and convert buildings, rather than wholesale demolition (see Camden Development Policies paragraph 22.4). This will reduce the amount of resources used and will help reduce construction waste. Where the retention of a building or part of a building is not possible, you should aim to tackle the quantity of waste produced - from the demolition phase through to the construction phase – through the use of the waste hierarchy.	**Design phase** The embodied energy / carbon of all materials together with the use of recycled and locally sourced products has been considered at this stage and will be further considered at the next stage of design for the Proposed Development using the BRE Green Guide to Specification. Options have been considered for refurbishing the existing facilities at Kenwood Ladies' Bathing pond rather than demolishing them but it has been decided to build new facilities for a number of reasons as follows. As part of the Proposed Development, a new spillway is required to the west of the existing buildings as well as the restoration of the crest of the existing dam, which will increase in height. As a result, the lifeguard welfare facility currently located in temporary accommodation on the dam crest and new spillway will be lost. It is not possible to accommodate these welfare facilities in the existing buildings, as these are already too small to meet the requirement of users and lifeguards. In addition, current buildings do not meet the requirements of the current Building Regulations or comply with the Equality Act. It should be noted that the design of the new changing and lifeguard facilities will re-use and adapt the existing concrete deck and piled foundations to support the new buildings. The buildings will be clad in timber and the window door frames will be timber; the extension of the deck will be constructed out of reinforced concrete using

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
	Using the BRE Green Guide to Specification You are encouraged to use the BRE Green Guide which provides guidance on how to make the best environmental choices when selecting construction materials and building components. The Green Guide ranks, materials and components on an A+ to E rating scale – where A+ represents the best environmental performance / least environmental impact, and E the worst environmental performance /most environmental impact. **WHAT THE COUNCIL EXPECTS** The Council expects all developments should aim for at least 10% of the total value of materials used to be derived from recycled and reused sources. This should relate to the WRAP Quick Wins assessments or equivalent as (highlighted in the waste hierarchy information section below). Special consideration will be given to heritage buildings and features to ensure that their historic and architectural features are preserved.	precast slabs. Due to the large amount of embodied CO^2 in cement, alternatives to concrete have been considered and will continue to be considered in the next design stage wherever possible. Where the use of concrete is unavoidable, cement alternatives and recycled aggregates will be considered wherever possible. The new walls in two of the ponds (the Men's Bathing pond and Highgate No.1 Pond) have been switched from concrete to sheet piling, significantly reducing the quantity of concrete to be used overall. For the spillways turf (light weight plastic) reinforcement mesh will be used instead of Armaflex concrete mats. The fill material for raising the dams will be sourced locally from borrow pits located close to each pond where the material is needed. Any unsuitable fill material will be used to back fill the borrow pits together with the sediment dredged from the ponds. Also, the stone / tarmac for some new paths will be recycled material crushed from the paths being removed. Wood will be a significant construction material in the Proposed Development for cladding the changing and lifeguard building, and potentially for cladding new and existing sheet piles (materials to be agreed). It is not possible to utilise the wood from the trees that are going to be felled (see section on Trees below) as it is untreated and will not last. Suitably treated timber will be sourced. The building contractor's policy is that 100% of timber is sourced from accredited Forest Stewardship Council (FSC) or Programme for the Endorsement of

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		forestry Certification (PEFC) source. Further consideration will be given to deriving at least 10% of the total value of materials from recycled and reused sources in the next design stage, in particular for the roof of the changing and lifeguard facilities, the turf reinforcement mesh and the sheet piles.
Construction phase **Mayor's Priority** Developers should maximise the use of existing resources and materials and minimise waste generated during the demolition and construction process through the implementation of the waste hierarchy.	**Sustainability Planning Guidance** **Key messages** Reduce waste by firstly re-using your building, where this is not possible you should implement the waste hierarchy. The waste hierarchy prioritises the reduction, re-use and recycling of materials. Source your materials responsibly and ensure they are safe to health. In line with the waste hierarchy, during the construction phase, our preferred approach is: 1. the use of reclaimed materials; 2. the use of materials with higher levels of recycled content; and 3. the use of new materials. Similarly, in demolition you should: 1. prioritise the on-site reuse of demolition materials; 2. recycle materials on site recycling, then off site recycling;	**Construction phase** Demolition of the existing ladies changing room at will take place as part of the Proposed Development. The demolition materials ($2m^3$ of brick and concrete; $5m^3$ of wood; $0.5m^3$ of mixed metal; $0.5m^3$ of roofing felt and $0.25m^3$ of glass approximately) will be segregated and placed in skips at Kenwood Nursery Yard. All the materials will be sent for recycling except the roofing felt. The existing concrete deck and piled foundations will be reused and adapted to support the new buildings rather than demolishing them hence reducing the total amount of demolition waste produced. BAM Nuttall has prepared a Project Management Plan (PMP) which includes construction management and a site waste management measures. BAM Nuttall will ensure that waste generated during the construction process will be minimised through the implementation the following waste hierarchy: 1. Reduce; 2. Reuse (prioritise on-site reuse of demolition materials, followed by off-site reuse);

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	A Construction Management Plan will be required to support many developments and will help manage on site impact arising from demolition and construction processes. Where a 'site waste management plan' (SWMP) is required (in projects with an estimated construction cost of over £300,000) it should include a pre-demolition audit of materials completed by a qualified professional and submitted with an application, in accordance with the Demolition Protocol. The audit must show what materials can and will be reused. If a full audit cannot be provided with the application, it should be submitted to and approved by the Council prior to commencement of works on site. Therefore the Construction Management Plan (where required) will have to reflect that space will be required to sort, store and perhaps crush/recycle materials as part of the SWMP.	3. Recycle (prioritise on-site recycling, then off-site recycling); 4. Resource recovery (for energy generation processes – fuels, heat and power); and 5. Disposal. By reducing waste generated and managing waste materials effectively, impact on the environment is minimised and the cost of waste disposal reduced. Compliance with BAM Nuttall waste procedures and guidance will ensure: • compliance with relevant waste management legislation • application of industry best practice • identification of opportunities in waste minimisation The PMP identifies the waste streams generated with forecast quantities, defines the selected waste management measures of reduction, reuse, recycling and recovery and, at the end of the project, allows a comparison to be made between forecast and actual waste quantities. Quantities of waste, categorised as inert waste, non-hazardous waste and hazardous waste, will be monitored by use of the BAM SMART web-based sustainability database which will also provide details of waste management contractors and the waste treatment facilities or disposal sites used. The PMP will identify and monitor: • reuse of materials on the project e.g. cut and fill, site

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		won materials • waste minimisation implemented on the project • waste management options for waste generated during the works including waste generated by subcontractors • any cost savings achieved through waste minimisation Materials identified within the PMP are not necessarily statutory waste as they do not fall within the legal definition of waste i.e. 'any substance or object which the holder discards intends to discard or is required to discard.' There is no intention to discard materials such as: • site won excavated materials • aggregates crushed in accordance with the WRAP Quality Protocol (on or off site) • pre-planned use of materials All materials whether they are imported, reused 'as is' on site, recycled (on or off site) or sent off site for disposal are identified within the plan. The PMP includes the approaches to be used in the selection of material suppliers and sustainable products and materials. The construction works include:- • Site clearance. • Construction of earthworks dams, using locally sourced clay.

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		• Construction of culverted spillways. • Construction of reinforced earth surface spillways. • Drainage works. • Sheet piling to raise crest heights. • Crest levelling and restoration • Desilting to various ponds to help improve water quality. • Terrestrial and aquatic environmental mitigation works. • M & E works to install aeration units to improve water quality. • Demolition and construction of new bathing facilities at Ladies Bathing pond. • Construction of footpaths/access paths <u>Selection of material suppliers</u> The selection of material suppliers is undertaken in accordance with BAM Nuttall Procedure NP5.3: Procurement of materials, goods and equipment. Client supplied goods are subject to the same process of evaluation as those supplied by BAM Nuttall. The submission and approval of materials, as required by the conditions of contract, and any changes and alternatives, are confirmed in correspondence. Where BAM Nuttall is responsible for design, the submission and approval of materials is dealt with by the designer and

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		confirmed in correspondence. The requisitioning of materials and the placing of orders is undertaken in accordance with BAM Nuttall Procedure NP5.3: Procurement of materials, goods and equipment. The management of suppliers is undertaken in accordance with BAM Nuttall Procedure NP5.6: Management of vendors on site. Suppliers are required to submit documents, test certificates, delivery tickets etc to illustrate how their product meets the specification requirements and to demonstrate compliance. The agent nominates people to receive goods and call forward bulk materials, ensuring that those so nominated are sufficiently competent and have knowledge of any relevant special requirements. The agent ensures that: - a log of bulk materials called forward/delivered is maintained. - materials received are recorded in the materials/stores record - records are kept of any specially instructed checks. - nonconforming materials are clearly identified to prevent their use. - materials are handled and stored in ways that prevent damage or degradation. Specific handling requirements and off-loading arrangements are described within specific activity plans.

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		Client supplied materials are called forward, controlled, checked and stored as any other material. Client materials which are unsuitable, damaged or lost are reported when this becomes apparent. The agent assigns responsibilities for collection and allocation of cost codes to all material delivery tickets. The responsible engineer maintains a record of materials delivered and used against quantities measured from the contract drawings to reconcile material usage and wastage. The agent arranges for reconciliation of material use in order to monitor wastage, identify loss and assess weekly costs incurred. <u>Sustainable products and materials</u> BAM Nuttall will make every attempt to reduce the use of primary aggregates and unsustainable products and materials wherever possible. Where practicable, commercially acceptable and in accordance with specification and regulatory requirements, use is made of waste or recycled material, or products containing recycled material. Consideration is also given to the environmental impact of delivery transport when material decisions are made. In accordance with the BAM Nuttall timber procurement policy, every effort is made to use timber obtained from certified legal and sustainable sources.
Nature conservation and biodiversity		

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Mayor's Priority There is no net loss in the quality and quantity of biodiversity. **Mayor's Priority** Developers make a contribution to biodiversity on their development site.	**CS15- Protecting and improving our parks and open spaces and encouraging biodiversity …** The Council will protect and improve sites of nature conservation and biodiversity, in particular habitats and biodiversity identified in the Camden and London Biodiversity Plans in the borough by: d) designating existing nature conservation sites; e) protecting other green areas with nature conservation value, including gardens, where possible; f) seeking to improve opportunities to experience nature, in particular in South and West Hampstead, Kentish Town and central London, where such opportunities are lacking; g) expecting the provision of new or enhanced habitat, where possible, including through biodiverse green or brown roofs and green walls; h) identifying habitat corridors and securing biodiversity improvements along gaps in habitat corridors; i) working with The Royal Parks, the London Wildlife Trust, friends of parks groups and local nature conservation groups to protect and improve open spaces and nature conservation in Camden; j) protecting trees and promoting the provision of new trees and vegetation, including additional street trees. The Council will preserve and enhance the historic, open	An ecology assessment has been undertaken which has considered the effects of the Proposed Development on terrestrial and aquatic ecology within the Site and where there are likely to be effects the wider Heath and designated sites up to 2km from the Site. There are no internationally statutorily designated sites within 2km of the Site. There is one nationally statutorily designated site within 2km, this is the Hampstead Heath Site of Special Scientific Interest (SSSI), the southern part of the SSSI (Ken Wood) is also classified as ancient woodland. There are 3 local statutory designated sites within 2km of the Site; these are Belsize Wood Local Nature Reserve (LNR), Parkland Walk LNR and Queens Wood LNR. The Site itself falls within a non-statutory designated site the Hampstead Heath Site of Metropolitan Importance for Conservation (SMI). The assessment has considered potential environmental effects during both the construction and operational phases. <u>Construction</u> During the construction phase, impacts considered to have potential to affect designated sites, terrestrial and aquatic ecological habitats and associated species include the following: - Permanent and temporary removal of terrestrial habitats within working areas; - Direct loss of trees; - Direct loss of pond and pond margin habitat extent

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	space and nature conservation importance of Hampstead Heath and its surrounding area by: k) working with the City of London, English Heritage and Natural England to manage and improve the Heath and its surrounding areas; l) protecting the Metropolitan Open Land, public and private open space and the nature conservation designations of sites; m) seeking to extend the public open space when possible and appropriate; n) taking into account the impact on the Heath when considering relevant planning applications; o) protecting views from Hampstead Heath and views across the Heath and its surrounding area; p) improving the biodiversity of, and habitats in, Hampstead Heath and its surrounding area, where opportunities arise. … **Sustainability Planning Guidance** <u>Key messages</u> Proposals should demonstrate: • how biodiversity considerations have been incorporated into the development; • if any mitigation measures will be included; and	through creation of inlet and outlet structures; - Deterioration in water quality due to suspended sediment input/re-suspension; - Physical removal of biota associated with de-silting works; - Potential for invasive species introductions; - Disturbance to legally protected and notable species resulting from construction activities; and - Disturbance to fish resulting from construction activities. A number of mitigation measures have been identified in the Ecology chapter of the ES. Most measures have been incorporated into the design of the Proposed Development as the design developed. They include the minimisation of the extent of the Site; no loss of ancient trees; avoidance of known desirable vegetation and/or retention of desirable species for reintroduction after the works; construction at the Bird Sanctuary Pond will completely avoid the east bank where grass snakes are known to be concentrated; construction activities including piling will avoid known kingfisher. Other measures concern replacing and new planting which will provide foraging habitats for bats, reptiles, birds and invertebrates. With the mitigation measures the Proposed Development would not result in any significant adverse effects on either terrestrial or aquatic ecology of the Heath or wider assessment area. <u>Operation</u> During the operational phase impacts considered to have

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	• what positive measures for enhancing biodiversity are planned. Before the design stage developments are to consider the quality of the existing biodiversity and the potential for enhancement as any site or building may have important biodiversity or contain nature conservation features. This should be done by carrying out a habitat and ecology survey. During the design stage the biodiversity value of developments can be improved significantly if the design and management of buildings and landscaping elements is more explicitly geared towards nature. All developments should incorporate green and brown roofs. The appropriate roof or wall will depend on the development, the location and other specific factors. Specific information needs to be submitted with applications for green/brown roofs and walls. The Council will expect all developments to incorporate brown roofs, green roofs and green walls unless it is demonstrated this is not possible or appropriate. This includes new and existing buildings. Special consideration will be given to historic buildings to ensure historic and architectural features are preserved.	potential to affect designated sites and terrestrial and aquatic ecological habitats and associated species include the following: - Increase in extent of wetland vegetation in marginal pond habitat due to the creation of marginal planting shelves and increases in the existing extent of reed bed vegetation. - Increase in extent of floristically more diverse grassland due to use of species-rich mixes in new spillways and where reinstatement of grassland is required within working areas. - Effect on pond ecological communities resulting from improved water quality associated with the removal of fine sediment accumulations and measures to address quality of inflows, through for example, incorporation of wetland treatment areas connecting inflow streams and drainage channels. Most effects have been assessed as minor beneficial in the long term with the exception of the improvements at the Model Boating Pond and Bird Sanctuary Pond which will result in significantly improved pond habitat quality as a result of improved water quality and marginal planting. Overall, some changes in habitat types will take place within the Site as a result of the Proposed Development, but the extent of vegetated areas will remain unchanged with no net loss, and possibly a net gain, in the quantity and quality of biodiversity. For example, at the Catchpit there will be a change from semi-natural broad-leaved woodland and willow scrub to a mosaic of species-rich

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		grassland, marshy grassland, scrub, scattered broad-leaved trees, and marginal habitat.
Heat and drought resistant planting		
Mayor's Best practice The design of developments should prioritise landscape planting that is drought resistant and has a low water demand for supplementary watering.	None	The landscape planting that is being proposed will be mainly native species which naturally occur in the Heath rather than drought resistant species which tend to be exotic species not currently found in the Heath.
Resilient foundations		
Mayor's Best practice Developers should consider any long term potential for extreme weather events to affect a building's foundations and to ensure they are robust	None	All dams and spillways have been designed to withstand extreme weather events. The ladies changing and lifeguard building will remain above the maximum flood level of the pond as the new spillway has been designed for a higher discharge flow to take into account extreme weather events.
Trees		
Mayor's Priority Developments should contribute to the Mayor's target to increase tree cover across London by 5% by 2025.	None	The City of London's primary objective is to manage and preserve the Heath as an open space and maintain its unique wild and natural aspects and its ecology. Increasing the tree cover is not in alignment with this primary objective. 18% of the trees to be removed are BS Category A or B and these are to be replaced through mitigation planting with equivalent semi-mature new trees. Furthermore, as discussed above, the Proposed Development will result in a possible net gain in the quantity and quality of

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		biodiversity.
Mayor's Priority Any loss of a tree/s resulting from development should be replaced with an appropriate tree or group of trees for the location, with the aim of providing the same canopy cover as that provided by the original tree/s.	**CS15- Protecting and improving our parks and open spaces and encouraging biodiversity...** The Council will protect and improve sites of nature conservation and biodiversity, in particular habitats and biodiversity identified in the Camden and London Biodiversity Plans in the borough by: ... j) protecting trees and promoting the provision of new trees and vegetation, including additional street trees.	The Heath supports a wide range of tree species including English oak, London Plane, Willow species and Poplar species. The Heath is estimated to support a total tree population in excess of 20,000 trees. The most notable individual trees are the veteran oak specimens in proximity to Stock Pond, black poplars at The Catchpit and the avenue of London Plane trees between Highgate No.2 and Highgate No.1 Ponds. The trees around the ponds vary in species, age and form. The larger climax tree species such as London Plane and English oak provide distinct landscape features; the smaller tree stock comprises mainly hedgerow tree species. A tree survey has been undertaken in support of the planning application. A number of veteran trees were included within the survey, including specimens that can be classified as ancient veteran trees. Where these are in close proximity to the proposals the designers have sought to amend the designs to ensure their retention. However, as a result of the Proposed Development there will be selective vegetation removal. The Proposed Development will require the removal of 174 trees (less than 1% of the total existing tree population on the Heath). 18% of the trees to be removed are BS Category A or B and these are to be replaced through mitigation planting with equivalent semi-mature new trees. The majority of the trees to be felled (around 72%) are

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		BS Category C. These trees are either of limited size or are in such a condition that their useful remaining life expectancy is below 20 years. It is proposed that the trees to be felled are to be coppiced where feasible; this will allow for multi-stem regeneration of the coppice stool. The allowance of felled trees to re-establish, or for successional growth of scrub species to colonise areas where trees are removed could provide a better solution for the replacement of lost vegetation. This is because the existing root system or seed banks previously shaded out by competing vegetation being able to establish at a quicker rate than any newly planted stock.
Flooding		
Mayor's Priority Developers should maximise all opportunities to achieve greenfield runoff rates in their developments	**CS13 - Tackling climate change through promoting higher environmental standards** Water and surface water flooding We will make Camden a water efficient borough and minimise the potential for surface water flooding by: g) protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir; h) making sure development incorporates efficient water and foul water infrastructure; i) requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and down-stream flooding, especially in areas up-hill from, and	There will be no permanent taking of greenfield land. The raised dam embankments, the new dam in the Catchpit area and the new spillways will be overlaid with topsoil and grass, with no change in the rate or volume of surface water runoff from these areas.
Mayor's Priority When designing their schemes developers should follow the drainage hierarchy set out in London Plan policy 5.13. The drainage hierarchy requires that surface water run-off is managed as follows: 1 store rainwater for later use 2 use infiltration techniques, such as porous surfaces in non-clay areas		The purpose of the Proposed Development is to significantly reduce the risk of dam failure at any of the ponds in the Highgate and Hampstead chains of ponds that could result in severe flooding and the consequential risk of loss of life and damage to property. 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;

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3 attenuate rainwater in ponds or open water features for gradual release 4 attenuate rainwater by storing in tanks or sealed water features for gradual release 5 discharge rainwater direct to a watercourse 6 discharge rainwater to a surface water sewer/drain 7 discharge rainwater to the combined sewer	in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel Oak and King's Cross (see Map 5). **DP23 – Water** The Council will require developments to reduce their water consumption, the pressure on the combined sewer network and the risk of flooding by: … b) limiting the amount and rate of run-off and waste water entering the combined storm water and sewer network through the methods outlined in part a) and other sustainable urban drainage methods to reduce the risk of flooding; c) reducing the pressure placed on the combined storm water and sewer network from foul water and surface water run-off and ensuring developments in the areas identified by the North London Strategic Flood Risk Assessment and shown on Map 2 as being at risk of surface water flooding are designed to cope with the potential flooding; d) ensuring that developments are assessed for upstream and downstream groundwater flood risks in areas where historic underground streams are known to have been present; and e) encouraging the provision of attractive and efficient water features. <u>Sustainability Planning Guidance</u> Key messages	• reinforce existing dams where required; • construct spillways to prevent any overtopping which would erode the dams; • replacement of the changing facilities by the Ladies' Bathing Pond; • mitigate ecological and landscape impacts by softening pond edges and improving marginal habitat; and • removal of silt from Stock Pond, Ladies Bathing Pond, Men's Bathing Pond, Viaduct Pond and Mixed Bathing Pond to improve the water quality of the ponds. Temporary works are required in order to construct the Proposed Development, and can be summarised as follows: • A main works compound located at the site of Kenwood House nursery at the northern extent of East Heath. This works compound will be used to store stockpiled materials and plant, and also be the location of welfare facilities and the site office. • A series of small worksites to be established by each of the Ponds, where construction works are due to take place. • Four borrow pits are required, from which the fill material required to raise the dams will be obtained from. There is a high risk of surface water flooding at the Site and the Hampstead Heath ponds are located within a Critical Drainage Area. The Proposed Development

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	All developments are required to prevent or mitigate against flooding All developments are expected to manage drainage and surface water There is a hierarchy you should follow when designing a sustainable drainage system The Council expects developments must not increase the risk of flooding, and are required to put in place mitigation measures where there is known to be a risk of flooding.	would not introduce new impermeable areas, but would beneficially alter the surface water flow paths affecting the rate and volume of water discharging from the last ponds in each chain, directly into the surface water sewer system. Surface water flooding on and around Hampstead Heath can result from the following: • exceedance of infiltration capacity (on both permeable greenfield and impermeable developed land); • exceedance of minor surface watercourse capacity; and • exceedance of the piped surface water drainage capacity including surface water sewers and the discharge of water into the culverted River Fleet. The impact of the Proposed Development has been assessed both with respect to the temporary works and during operation. <u>Temporary Works</u> The works compound will be located on existing areas of hardstanding at the Kenwood House nursery. Plant and materials will be transported from the works compound to the worksites using designated access routes across the Heath, all of which are existing hard standing paths and roads. The only exception to this is the temporary access route which will be required to access Stock Pond and Ladies' Bathing Pond from the west, as use of Millfield Lane is not permitted. This may entail a small temporary increase in impermeable area, the drainage

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		from which will be managed by the contractors. Surface water runoff assessments will be produced by BAM Nuttall for each of the works areas. The worksites will be optimised to minimise the construction footprint, thereby reducing the likely impacts on flood flow routes. Any impacts which do result from the worksites will be limited to the local diversion of surface water runoff, with a negligible impact on the risk of surface water flooding. Several of the ponds are to be de-silted using suction pump dredgers. The sediment will be discharged into silt bags where it will be left to settle and dewater, with the water passing through the walls of the bags. This water will either infiltrate into the ground or runoff overland back into the pond following the local topography. The bags will be located close to the ponds, such that any surface water runoff will only occur over a short distance. Given that the water will have originated from the ponds, the discharge of this same water back into the pond will not cause any increase in pond water levels and flood risk. It is recommended that the silt bags are orientated to minimise the impact they could have on existing surface water flow paths. As with the worksites, any impacts which do result from the silt bags will be limited to the local diversion of surface water runoff, with a negligible impact on the risk of surface water flooding. At Model Boating Pond, a portable dam will be installed in front of the existing dam. The space between the two dams will then be dewatered to provide the necessary working area. Dewatering and the subsequent controlled discharge of this water will be undertaken in accordance

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		with the Environment Agency Pollution Prevention Guidelines and the issue of any relevant permits to ensure no increase in downstream flood risk. The use of a portable dam will avoid the need to completely dewater the whole pond. <u>Pond Overtopping</u> The construction works would have no impact on the frequency of pond overtopping and therefore no impact on the risk from flooding from this source to either the Heath to downstream areas. <u>Pond Failure (breaching)</u> The construction works will have no impact on the risk of dam failure, and therefore no impact on the risk of flooding to either the Heath or to downstream areas. <u>Operation</u> The Proposed Development will not result in any permanent increase in impermeable area on the Site during operation. The new facilities at the Ladies' Bathing Pond are to replace the current facilities. While there is a proposed 90 to 120m² (33%) increase in the building footprint, this increase will be over the existing pond, and therefore will not result in any change in the impermeable area on the Site. The raised dam embankments, the new dam in the Catchpit area and the new spillways will be overlaid with topsoil and grass, with no change in the rate or volume of surface water runoff from these areas. A new dam is to be constructed in the Catchpit area at the lowest point of the valley. This has been designed to

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		deliberately retain water in the upstream part of the Hampstead pond catchment during flood events. A pipe in the dam will allow the stream to flow unimpeded during normal conditions. Currently, Highgate No.1 Pond and Hampstead No.1 Pond both have overflow pipes which discharge directly into the culverted River Fleet system. These overflow pipes will not be changed as part of the Proposed Development. The rate at which water is discharged through these pipes depends on the head of water at the upstream end (i.e. in the pond) and the water levels in the downstream end (i.e. in the connecting pipe). The model results demonstrate that there will be a reduction in both peak rate and volume of water that is passed into the downstream surface water drainage system from Highgate No. 1 Pond and Hampstead No. 1 Pond. The peak flow in the Highgate No. 1 Pond outlet pipe is marginally higher because the dam raising work accommodates higher flood levels in the pond and therefore a higher head of water at the upstream end of the pipe. This peak flow is still very small in the context of the overall flows through the pond chain in these flood events. It is also more than compensated for by the reduction in peak flow over the new Highgate No. 1 Pond spillway compared with over the existing dam crest. Furthermore, the additional storage capacity means that there will be a delay in the discharge of water from Highgate No. 1 Pond and Hampstead No. 1 Pond, providing more time during a flood event for the peak flows in the surface water sewer to pass further

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
		downstream.
Mayor's Priority Developers should design Sustainable Drainage Systems (SuDS) into their schemes that incorporate attenuation for surface water runoff as well as habitat, water quality and amenity benefits.		The Hampstead Heath Pond systems actually act as large natural SuDs attenuating surface runoff as well as providing habitat, water quality and amenity benefits. The Proposed Development will improve the capacity of the system to attenuate surface runoff.
Mayor's Priority Development in areas at risk from any form of flooding should include flood resistance and resilience measures in line with industry best practice.		A Flood Risk Assessment (FRA) has been undertaken in line with the requirements of the National Planning Policy Framework. This has assessed the risk of all sources of flooding to the Proposed Development, and the impact of the development on flood risk to the Site and to neighbouring areas. The site is wholly in Flood Zone 1, with a low probability of flooding from rivers or the sea. The Proposed Development (raising of the dams, new pipes and spillways etc.) is water compatible and will be designed to withstand flood water. There is no significant permanent change in impermeable area and no change in existing surface water drainage. Rainfall will continue to either infiltrate into the ground, pond, or runoff over the land surface following the topography (and therefore generally discharging into the pond system).
Mayor's Priority Developments are designed to be flexible and capable of being adapted to and mitigating the potential increase in flood risk as a result of climate change.		The ponds have been designed to be safe in the Probable Maximum Flood (PMF) event, which is a worst case scenario and allows for climate change.

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
Mayor's Priority All sources of flooding need to be considered when designing and constructing developments.		The following sources of flooding have been considered when designing the Proposed Development: <u>Fluvial Flooding</u> There are no rivers on or in the vicinity of Hampstead Heath. The streams on Hampstead Heath are classified as minor watercourses. <u>Tidal Flooding</u> Hampstead Heath is located on higher ground over 50m higher than, and over 5km from, the closest tidal reach of the River Thames. There are no other tidal open channels near the Site. <u>Surface Water (pluvial) flooding</u> The Environment Agency flood mapping, SFRA, PFRA and SFRM have all identified the site as an area with a high risk of surface water flooding. Furthermore, the SWMP highlights the Hampstead Heath ponds as being located within a Critical Drainage Area. The Proposed Development has the potential to change the risk of surface water flooding by introducing new impermeable areas, disrupting surface water flow paths and affecting the rate and volume of water discharging from the last ponds in each chain, directly into the surface water sewer system. <u>Groundwater flooding</u> The higher parts of the Heath are underlain by the permeable Bagshot Beds and Claygate Members. At the lower elevations however, most of the ponds are underlain by impermeable London Clay. At the junctions

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
		of these bedrock geologies, spring lines form at the ground surface. These springs feed the streams which drain into the pond chains. Flood risk from these streams has been classified as surface water flooding. The majority of the Heath is undeveloped and therefore not sensitive to groundwater flooding. There are no historical records of groundwater flooding at or in the vicinity of the site. There is potential for any proposed below-ground works (for example, building foundations) to disrupt groundwater flow paths. The underlying London Clay will however contain very little mobile groundwater and any below-ground structures near the ponds will therefore have a negligible impact on groundwater flood risk. <u>Foul sewer flooding</u> The majority of the Heath is undeveloped and therefore has a low existing risk of flooding from foul sewers. The existing foul water system will not be affected by the Proposed Development and no new sewer connections are proposed. As part of the works at Ladies' Bathing Pond, the existing changing rooms will be demolished and replaced with new facilities built in the same location. The replacement changing rooms will offer the same facilities and capacity and therefore there is no anticipated increase in foul sewer flows. The new system will be designed to ensure that there is no risk of foul sewer flooding. <u>Other sources of flood risk including ponds and reservoirs</u> The closest canal is Regents canal, which is

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		approximately 3.5km from the Site. This is however located at a lower elevation and so the Site would not be at risk should a breach from this canal occur. There are no raised flood defences in the vicinity of the Site which would pose a risk of flooding if failure occurred. The following other sources of flooding are however directly applicable to Hampstead Heath: • The actual risk of flooding to the Site and downstream receptors arising from the exceedance of pond capacity and the subsequent overtopping at one or more pond locations. • The residual risk of flooding to the Site and downstream receptors arising from the unlikely event of dam failure (breach).
Land contamination		
Mayor's Priority Developers should set out how existing land contamination will be addressed prior to the commencement of their development.	**Core Strategy page 106 (supporting text to CS16 - Improving Camden's health and well-being** <u>Contaminated land</u> In order to protect the health and well-being of local residents, workers and visitors, the Council will expect proposals for the redevelopment of sites that are known to be contaminated, have the potential to be contaminated, or are located in proximity to such sites to take appropriate remedial action to the Council's satisfaction.	Silt tests have been done in all ponds with negative results regarding contamination. Contamination checks in the pits have also produced negative results. No construction operations involving contaminated soils are expected.

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Mayor's Priority Potentially polluting uses are to incorporate suitable mitigation measures.	None	A comprehensive assessment of the potential risks of water pollution (and potentially land pollution) as a result of establishing the Site will be made by BAM Nuttall before any construction activity is carried out. The Project Management Plan has identified the planned 4000 ltr bunded fuel tank at Kenwood Nursery Yard as a potential source of contamination and mitigation measures include the refuelling location is to be bunded to prevent run off and be lined with an impermeable membrane.
Air quality		
Mayor's Priority Developers are to design their schemes so that they are at least 'air quality neutral'.	**DP32 – Air quality and Camden's Clear Zone** The Council will require air quality assessments where development could potentially cause significant harm to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality.	The nature of the Proposed Development will result in an air quality neutral scheme during operation. Temporary construction impacts are likely to arise but these should be satisfactorily minimised through following the requirements of the Mayor's SOG on 'The control of dust and emissions from construction and demolition'. See below.
Mayor's Priority Developments should be designed to minimise the generation of air pollution.		There will be no emissions to air or dust generating activities during the operation. The EPUK Development Control Guidance advises that an air quality assessment would be required at large long-term construction sites, with over 200 Heavy Duty Vehicle (HDV) movements per day. The numbers of HDV travelling to and from the Proposed Development are expected to be of the order of only one or two per day. At certain peak times numbers may increase to ten to fifteen per day. This is considerably lower than the criteria for which quantitative assessment would be
Mayor's Priority Developments should be designed to minimise and mitigate against increased exposure to poor air quality.		

Sustainable Design and Construction SPG 2014 Summary of the Mayor's priorities and best practice approaches	Relevant policies within the Camden's Local Plan and Sustainability Planning Guidance	How considerations are addressed in the Proposed Development
		required, and therefore construction traffic emissions have not been considered. Thus during construction, the only activities that are likely to give rise to air quality concerns are dust raising activities which could lead to dust deposition and elevated PM10 concentrations at properties near to the ponds. The only proposed demolition works (which could lead to dust raising) are at the Ladies' Bathing pond where the existing changing rooms will be demolished and then replaced with new facilities in the same location. Other dust raising activities are earthworks and construction activities involved at every stage of the construction works at each pond. There are a number of residential properties within 350m of the development Site. The dust risk assessment identified a low risk from dust soiling, prior to any mitigation measures being applied, at the following ponds due to the presence of residential properties within 20m of the Proposed Development: Highgate Men's Bathing Pond; Highgate No. 1 Pond; Vale of Health Pond; Hampstead No. 2 Pond and Hampstead No. 1 Pond. At other ponds, the risk was identified as negligible. The impact on human health at nearby residential receptors was identified as negligible. The air quality assessment identified that the risk of an impact from dust soiling and on human health at receptors near the borrow pits would be medium at the Highgate Chain and low at the Hampstead Chain, due to the nearest receptors being over 100m from the extent

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		of the expected location areas. In all cases, the impact on ecological receptors was identified as negligible both with and without mitigation measures. Where the programme identified that construction works would be taking place at two or more locations, an assessment was made of the combined effects. In all cases, due to the nearest receptors being over 50m from combined sources, it was expected that any risk from dust would not materially change, and would remain low or negligible. With appropriate mitigation to prevent and control dust emissions the impact from construction dust is expected to be negligible. On this basis there are not expected to be significant effects on air quality due to the Proposed Development.
Mayor's Priority Developers and contractors should follow the guidance set out in the emerging 'The Control of Dust and Emissions during Construction and Demolition SPG' when constructing their development.		The contractor BAM Nuttall will follow the guidance set out in the emerging 'The Control of Dust and Emissions during Construction and Demolition SPG'. Mitigation measures to be applied include the dampening down of haul roads when required and the use of water spray dust suppression where required.
Noise		
Mayor's Priority Noise should be reduced at source, then designed out of a scheme to reduce the need for mitigation measures.	**DP26 – Managing the impact of development on occupiers and neighbours** The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The	A noise and vibration assessment has been undertaken. Impacts have been considered during the construction phases, in particular, potential impacts on identified receptors, in terms of:

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	factors we will consider include: a) visual privacy and overlooking; b) overshadowing and outlook; c) sunlight, daylight and artificial light levels; d) noise and vibration levels; e) odour, fumes and dust; f) microclimate; g) the inclusion of appropriate attenuation measures. We will also require developments to provide: h) an acceptable standard of accommodation in terms of internal arrangements, dwelling and room sizes and amenity space; i) facilities for the storage, recycling and disposal of waste; j) facilities for bicycle storage; and k) outdoor space for private or communal amenity space, wherever practical. **DP28- Noise and Vibration** The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for: a) development likely to generate noise pollution; or b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are	• Predicted noise and vibration levels from construction works; and • Any increases to road traffic attributed to the proposed works. Operational noise and vibration effects are not expected due to normality returning to the Heath once the construction works have finished. **Construction** <u>Noise Impacts</u> Construction works are due to start in Spring 2015 and would last for a period of 18 months, with all vegetation clearance and de-silting undertaken in the winter months. Based upon a detailed construction program provided by the contractor, the schedule of activities occurring at each pond has been broken down into a number of phases. For each of the identified phases, the main items of plant and equipment to be employed and the corresponding noise levels in dB LAeq have been predicted at distances of 10m from the source activities. The calculations indicate that at all receptors considered, the predicted outdoor noise level from construction works does not exceed SOAEL noise level (75dB LAeq, 12hr), above which a significant adverse effects on health and quality of life occurs. Notwithstanding this, a potential significant effect is identified at four receptors adjacent to the Highgate No 1 Pond worksite due to the installation of the sheet piles to increase the height of the dam crest and at one receptor adjacent to the Hampstead No 1 Pond worksite due to earthwork and concreting operations. It is recommended that the

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	provided. Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted. The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds. The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.	effects are minimised through the design of appropriate mitigation measures, described in the mitigation section below. In all other instances the noise levels incident upon adjacent receptors are below the threshold values and therefore no potential significant effect is identified. <u>Vibration Impacts</u> Vibration levels from typical mobile construction equipment are generally imperceptible at distances greater than around 20m from the source. The delivery routes used by trucks and lorries should avoid residential areas as far as possible. Where possible, vibration generating machinery should be situated away from the noise-sensitive receivers. These measures would help minimise noise impacts as well as vibration. Activities such as piling however can cause much higher vibration levels, which in some cases may cause damage to properties. These activities are also likely to cause annoyance and discomfort to the local residents and could result in complaints. To raise the height of the dam crest at a number of ponds, walls clad in timber (material to be agreed) are to be constructed along the line of the existing fences. The wall would be constructed from steel or plastic sheet piles driven sufficiently deep to reduce the current leak in the dam. It is difficult to predict accurately the propagation of vibration without full details of the pile and pilling hammer or driver, the construction of the receiving structure and the ground conditions between source and receiver. However, it is understood that a vibratory piling method is to be used, an indicative assessment of the resultant peak particle velocity (PPV)

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		has been provided below based upon the empirical formulae for vibratory piling given in BS5228-2:2009. <u>Construction Traffic Impacts</u> Traffic associated with the construction works is not expected to exceed no.14 two-way movements at the Kenwood Yard and no.20 two-way movements per day at all other access points. A construction traffic noise assessment along the designated construction traffic routes and the significance of the effect has been undertaken. It is predicted that noise levels from traffic associated with the construction works will have a negligible effect along the designated roads. Noise and vibration will be managed to reduce all potential noise effects and mitigation measures will be documented within the Construction Environment Management Plan (CEMP). General principles for the control of noise and vibration, as suggested by BS5228, during the construction works could include: • All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good and efficient working order; • All compressors and generators should be "sound reduced" models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools should be fitted with mufflers or suppressers of the type recommended by the manufacturers and should be kept in a good state of repair;

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		• Machines in intermittent use should be shut down in the intervening periods between work, or where this is impracticable, throttled down to a minimum; • The worksite areas and static machines should be sited as far as is practicable from inhabited buildings; • Where practicable, plant with directional noise characteristics should be positioned so as to minimise noise at adjacent properties; • Where reasonably practicable, vibratory equipment should be located as far from sensitive premises as possible. • Establishment of agreed criteria and monitoring whilst undertaking significantly noisy or vibration-causing operations near to sensitive locations to ensure compliance and to identify any problems; • Programming works such that the requirement for working outside of normal working hours is minimised; • Ensuring that all staff and operatives are briefed on the requirement to minimise nuisance from site activities, via tool box talks etc; • Use of temporary noise screens or partial enclosures around particularly noisy activities in close proximity to dwellings; and • Regular plant maintenance. An important element of the pro-active approach to limiting the likely significant effects of such works is to ensure that the public, residents and nearby businesses

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		are kept fully informed over the scale and nature of the works, when they are to take place, and who to contact if they are disturbed. Delivery routes used by trucks and lorries should avoid residential areas as far as possible. Where possible, vibration generating machinery should be situated away from the noise-sensitive receivers. These measures would help minimise noise as well as vibration impacts on nearby receptors.
Light pollution		
Mayor's Priority Developments and lighting schemes should be designed to minimise light pollution.	**DP26 – Managing the impact of development on occupiers and neighbours** The Council will protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. The factors we will consider include: a) visual privacy and overlooking; b) overshadowing and outlook; c) sunlight, daylight and artificial light levels; d) noise and vibration levels; e) odour, fumes and dust; f) microclimate; g) the inclusion of appropriate attenuation measures. We will also require developments to provide: h) an acceptable standard of accommodation in terms	No artificial lighting will be provided either during construction or operation of the Proposed Development.

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	of internal arrangements, dwelling and room sizes and amenity space; i) facilities for the storage, recycling and disposal of waste; j) facilities for bicycle storage; and k) outdoor space for private or communal amenity space, wherever practical.	
Surface water runoff		
Mayor's Priority In their aim to achieve a greenfield runoff rate developers should incorporate sustainable urban drainage systems (SuDS) into their schemes which also provide benefits for water quality.	**CS13 - Tackling climate change through promoting higher environmental standards** <u>Water and surface water flooding</u> We will make Camden a water efficient borough and minimise the potential for surface water flooding by: g) protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir;	The Proposed Development comprises the construction of a new building to accommodate new changing and lifeguard facilities which will replace the existing building. The area of the existing building is 90m²; the area of the proposed buildings is 120m². An access deck of 100m² is provided, which matches the area of the existing access deck. The proposed new buildings are located in the same location as the existing buildings. The building runoff will be discharged directly to the pond and absorbed this way.
Mayor's best practice Encourage those working on demolition and construction sites to prevent pollution by incorporating prevention measures and following best practice.	h) making sure development incorporates efficient water and foul water infrastructure; i) requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and down-stream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel	BAM Nuttall will ensure that the necessary pollution prevention measures will be in place to reduce water pollution during construction. Surface water runoff will be managed during the construction stage to ensure that any temporary increases in impermeable area will not increase the rate of runoff, and also to ensure pollution prevention. A comprehensive assessment of the potential risks of water pollution as a result of establishing the Site is

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	Oak and King's Cross (see Map 5).	made before any activity is carried out. Surface, ground and coastal waters are considered as appropriate. This risk assessment deals with the following matters: • fuel storage and general refuelling • run-off from the compound • waste water from the welfare accommodation • run-off from semi-permanent haul roads • bulk material storage • chemical storage • plant maintenance areas

4. Conclusions

4.1 The nature of the Site and the Proposed Development offer many opportunities in terms of sustainable design and construction. The purpose of the Proposed Development is to significantly reduce the risk of dam failure at any of the ponds in the Highgate and Hampstead chains of ponds in Hampstead Heath that could result in severe flooding and the consequential risk of loss of life and damage to property. The Proposed Development comprises increasing flood storage capacity by raising some of the dams and constructing a new dam in the Catchpit area; reinforcing existing dams where required; constructing spillways to prevent any overtopping which would erode the dams; mitigating ecological and landscape impacts by softening pond edges and improving marginal habitat; removing silt from Stock Pond, Ladies' Bathing Pond, Men's Bathing Pond, Viaduct Pond and Mixed Bathing Pond to improve the water quality of the ponds; and constructing new changing and lifeguard facilities at Kenwood Ladies' Bathing Pond.

4.2 From an energy demand and carbon dioxide emissions perspective, most of the energy use will occur during construction and will come from the diesel consumption for excavators, earth moving equipment, pumps and generators. The building contractor (BAM Nuttall) has indicated that the construction equipment used will be modern; the fuel consumption and carbon dioxide output will be considered when selecting the plant. Plant operators will be instructed to switch off plant when not in use so as to save energy and the shortest possible material haul routes will be chosen so as to reduce diesel consumption. In addition, the contractor will be purchasing a small fleet of mountain bikes for site transportation and are considering the use of electric or small petrol engine vehicles for movement of small tools and light materials. Any mains electricity usage will be supplied from Hampstead Heath's current supplier to reduce the use of on-site generators. During operation the only energy use will be to run aeration systems for the ponds and the heating/lighting of the new changing and lifeguard facilities ate Kenwood Ladies' Bathing Pond. Energy efficiency and renewable energy sources in order to reduce carbon dioxide emissions have been preliminary considered for these and will be given further consideration at the next design stage.

4.3 At the new changing and lifeguard facilities, water efficiency considerations have led to low water consumption sanitary features being incorporated and rainwater harvesting tanks being utilised for toilet flushing.

4.4 The embodied energy / carbon of all materials together with the use of recycled and locally sourced products has been considered at this stage of design and will be further considered at the next stage of design for the Proposed Development using the BRE Green Guide to Specification. The design of the new changing and lifeguard facilities at Kenwood Bathing Pond will re-use and adapt the existing concrete deck and piled foundations to support the new buildings rather than demolishing them. The buildings will be clad in timber and the window and door frames will be timber as well; the extension of the deck will be constructed out of reinforced concrete using precast slabs. Due to the large amount of embodied CO^2 in cement, alternatives to concrete have been considered. The new walls in two of the ponds (the Men's Bathing pond and Highgate No.1 Pond) have been switched from concrete to sheet piling, significantly reducing the quantity of concrete to be used overall. For the spillways turf (light weight plastic) reinforcement mesh will be used instead of Armaflex concrete mats. The fill material for raising the dams will be sourced locally from borrow pits located close to each pond where the material is needed. Any unsuitable fill material will be used to back fill the borrow pits together with the sediment dredged from the ponds. Also, the stone / tarmac for some new paths will be recycled material crushed

from the paths being removed. Wood be used for cladding the changing and lifeguard building and could potentially be used for cladding new and existing sheet piles (materials to be agreed). Further material specification will be undertaken as the works progress and the use of recycled materials for the construction elements that have no restrictions placed on them will be a key consideration.

4.5 Demolition of the existing ladies' changing room at Kenwood Ladies' Bathing Pond will take place as part of the Proposed Development. The demolition materials will be segregated and placed in skips at Kenwood Nursery Yard. All the materials will be sent for recycling except the roofing felt. The existing concrete deck and piled foundations will be reused and adapted to support the new buildings rather than demolishing them hence reducing the total amount of demolition waste produced. BAM Nuttall has prepared a Project Management Plan which includes a Construction Management Plan and a Site Waste Management Plan (SWMP).

4.6 As a result of the Proposed Development there will be selective removal of 174 trees (less than 1% of the total existing tree population on the Heath). It is proposed that the trees to be felled are to be coppiced where feasible; this will allow for multi-stem regeneration of the coppice stool. The allowance of felled trees to re-establish, or for successional growth of scrub species to colonise areas where trees are removed could provide a better solution for the replacement of lost vegetation. This is because the existing root system or seed banks previously shaded out by completing vegetation being able to establish at a quicker rate than any newly planted stock.

4.7 An ecology assessment has been undertaken which has considered the effects of the Proposed Development on terrestrial and aquatic ecology within the Site and where there are likely to be effects the wider Heath and designated sites up to 2km from the site.

4.8 During the construction phase, impacts considered to have potential to affect designated sites, terrestrial and aquatic ecological habitats and associated species have been assessed and a number of mitigation measures have been identified. Most measures have been incorporated into the design of the Proposed Development as the design developed. They include the minimisation of the extent of the site; no loss of ancient trees; avoidance of known desirable vegetation and/or retention of desirable species for reintroduction after the works; construction at the Bird Sanctuary Pond will completely avoid the east bank where grass snakes are known to be concentrated; and construction activities including pilling will avoid known kingfisher and swan nesting sites. Other measures concern replacing and new planting which will provide foraging habitats for bats, reptiles, birds and invertebrates. With the mitigation measures incorporated the Proposed Development would not result in any significant adverse effects on either terrestrial or aquatic ecology of the Heath or wider assessment area. During the operational phase most effects have been assessed as minor beneficial in the long term with the exception of the improvements at the Model Boating Pond and Bird Sanctuary Pond which will result in significantly improved pond habitat quality as a result of improved water quality and marginal planting. Overall, some changes in habitat types will take place within the site as a result of the Proposed Development, but the extent of vegetated areas will remain unchanged with no net loss, and possibly a net gain, in the quantity and quality of biodiversity.

4.9 The nature of the Proposed Development will result in an air quality neutral scheme during operation as the Heath returns to normality. During construction the only activities that are likely to give rise to air quality concerns are dust raising activities such as demolition of the existing facilities at the Ladies Bathing Pond and earthworks and construction activities. It is expected that with appropriate mitigation in place to prevent and control dust emissions the impact from construction dust will be negligible.The Proposed Development's construction is likely to generate noise impacts; therefore a noise assessment has been undertaken. Operational noise effects are not expected due to normality returning to the Heath once the construction works

have finished. Impacts have thus been considered during the construction phase, in particular, potential impacts on identified receptors, in terms of noise levels from construction works; and any increases to road traffic attributed to the construction works. A potential significant effect is identified at four receptors adjacent to the Highgate No 1 Pond worksite due to the installation of the sheet piles to increase the height of the dam crest and at one receptor adjacent to the Hampstead No 1 Pond worksite due to earthwork and concreting operations. It is recommended that the effects are minimised through the design of mitigation measures. In all other instances the noise levels incident upon adjacent receptors are below the threshold values and therefore no potential significant effect is identified. It also is predicted that noise levels from traffic associated with the construction works will have a negligible effect along the designated roads.

4.10 A Flood Risk Assessment (FRA) has been undertaken in line with the requirements of the National Planning Policy Framework. This has assessed the risk of all sources of flooding to the Proposed Development, and the impact of the Proposed Development on flood risk to the site and to neighbouring areas. The site is wholly in Flood Zone 1, with a low probability of flooding from rivers or the sea. The proposed development (raising of the dams, new pipes and spillways etc.) is water compatible and will be designed to withstand flood water. There is no significant permanent change in impermeable area and no change in existing surface water drainage. Rainfall will continue to either infiltrate into the ground, pond, or runoff over the land surface following the topography (and therefore generally discharging into the pond system).

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