

HIGHGATE SCHOOL : MALLINSON SPORTS CENTRE

POOL HALL REFURBISHMENT PROJECT

DESIGN & ACCESS STATEMENT

3 April 2018

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Introduction outline of proposals

This Design and Access statement is submitted in support of a full planning application by Highgate School for the refurbishment of their Mallinson Sports Centre [MSC] indoor Swimming Pool facilities.

The address is:

Mallinson Sports Centre
Bishopswood Road
Highgate
Haringey
London N6 4NY

The Swimming Pool part of the sports centre, with the main Pool Hall and its associated ancillary and plantroom areas, is in need of modernisation and repair, and the external cladding is at the end of its useful life. The Pool Hall was closed in June 2017 in order to carry out urgent repairs to the fabric, in particular to replace the existing roof finishes. The refurbishment proposals included in this application, when completed, will enable the Pool Hall to be re-opened for the School and other community users.

The proposed works in this planning application will include:

- Replacement of the existing metal sheet roof and upper wall cladding, including build-up of decking support and membranes, with new metal roof and wall cladding and insulation on new decking and framing, to modernise, enhance appearance and improve the energy performance of the building fabric
- New in-line rooflights to the Pool hall to enhance natural daylighting and reduce dependence on artificial lighting
- Replacement of the existing high level metal windows on the north elevation with new polyester powder coated metal double glazed windows in the same openings, also to benefit natural daylighting [as the original windows were long ago boarded over due to their condition]
- Replacement and renewal of existing mechanical and electrical plant and services to modern standards within the existing spaces, to modernise and create more energy efficient services
- Alterations to elevations and roof louvres, roof level ventilation and turrets, in order to modernise and replace existing mechanical ventilation plant
- Removal of existing plant boiler flue chimney and replacement with lower height flue

The works will not only modernise this facility, but also result in significant improvements in energy efficiency and reduction of carbon footprint.

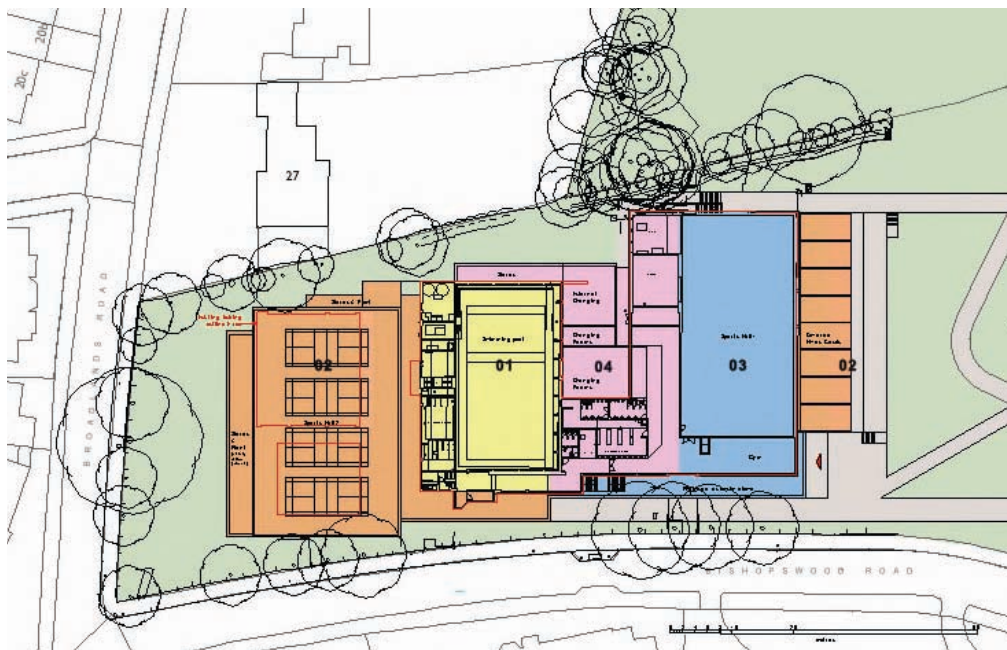
The new exterior cladding proposals are necessary in order to bring the building back into use, with the public benefit that will result. The design and material selection of the claddings

also aims to enhance the appearance of the building and be respectful to the context of this building within the Conservation Area.

The works form part of a broader staged development plan to improve and modernise the MSC sports centre as a whole by future planned refurbishment, alterations, demolitions and extensions. The first work to expedite this plan, the subject of this application, is the refurbishment of the Pool Hall block because the pool is currently closed, and future planning applications will be submitted in advance of later proposals.



Plan of the MSC Sports Centre as existing



Concept Plan of the MSC Sports Centre as proposed, with phased development

Highgate School

Highgate School was established in 1565 by a Royal Charter of Her Majesty Queen Elizabeth the First. Sir Roger Cholmeley, the School's Founder, was granted Letters Patent to found 'a grammar school...for good education and instruction'.

The external appearance of the majority of the Senior School buildings originates from the nineteenth century, constructed under the dynamic leadership of Head Master Rev. John Bradley Dyne (1838-1874). This includes the notable North London landmark of the listed School Chapel and Big School, which dominate the western end of Highgate High Street.

The Pre-Preparatory School was coeducational from 1993. The School admitted girls into the Junior School and Senior School in 2004 and by 2010 each year group was fully coeducational.

Highgate School is a registered charity, no.312765.

Planning context & background

For a full and detailed assessment of the planning context of this proposal, refer to the separate detailed covering letter by Bidwells LLP that accompanies this application.

The MSC sports centre lies within the Highgate Conservation Area, and is a development constructed in different phases. The Pool Hall block and associated plant and ancillary spaces were completed in 1969, and then the sports hall extension was added to the south in 1989. There was a consistent use of natural brick facings in both parts of the development, but the roof finishes are different.

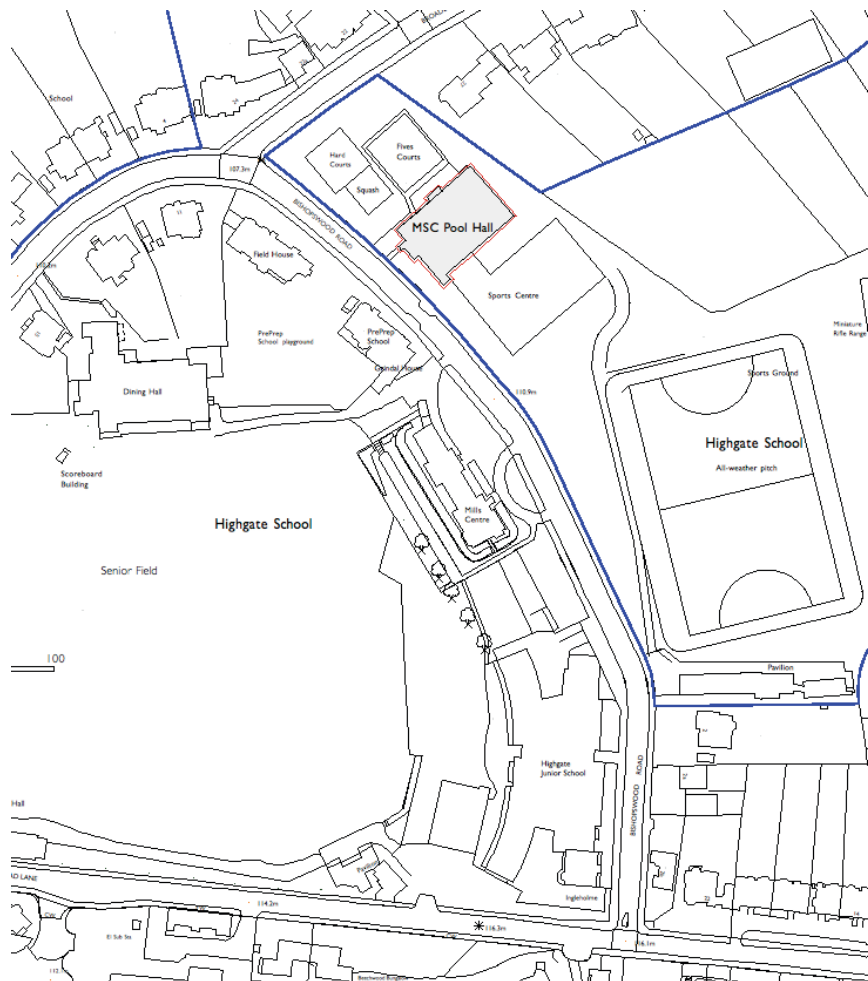
The MSC sports centre overall comprises indoor facilities including a main sports hall, a 25m 6-lane pool hall with spectator seating, a gym, other sports studio spaces, changing rooms and toilets, and reception and administration rooms.

The existing buildings are constructed in concrete foundations and floors, concrete and steel superstructure frame, external walls of fair faced natural clay brickwork, some areas particularly at the pool hall that include upper level metal sheet cladding, and with roofs of metal sheet cladding and colour coated profiled metal deck roofing systems, as well as felted flat roofs at lower level. There is a tall discharge boiler flue chimney for the main plantroom, finished in stainless steel sheet.

The sports centre as a whole is considered within the Highgate Appraisal to be a building with a negative impact on the Conservation Area. Nevertheless, the facilities provide a valuable need for the School, and for a sports centre the building adopts a low scale and profile within an area which largely comprises three and four storey buildings, many of residential use.

In addition, the fundamental structure of the buildings is sound, so that with care and targeted refurbishment, the buildings can continue to function for many years ahead, reflecting a sound policy of re-use of resources whenever possible.

The sports centre is used by the School on a daily basis, and is also available for community membership use, for sports clubs, other schools, and local residents. The location map shows its strong relationship to other School buildings in this area, as well as the sports pitches.

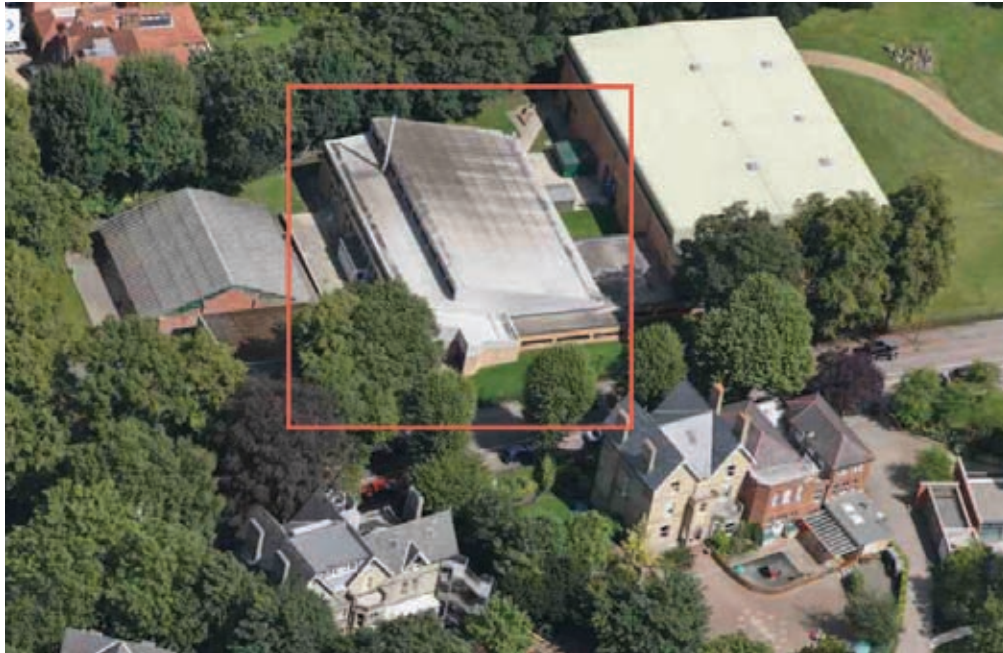


Operational Need

The Pool Hall is an important resource for the School in their sports and educational teaching programme for the pupils, and also serves a valuable facility for the local community, being available for membership and club use, as well as by other Schools. Highgate School has had several feasibility studies carried out to consider alternative solutions for the Pool, including demolition and new build, but the conclusion was that re-use and refurbishment of the existing building is the most appropriate solution and will provide an excellent Pool facility.

The Pool hall itself is currently closed while important interior repairs are being carried out, and the intention will be to follow on with the exterior refurbishment project in tandem, so that it can be re-opened at the earliest opportunity.

Photographs of existing site



Aerial view of the MSC sports centre site from west, with pool hall at centre



Aerial view of the MSC sports centre site from south, with pool hall behind sports hall



View of the pool hall from the south-west, with entrance extension to the left



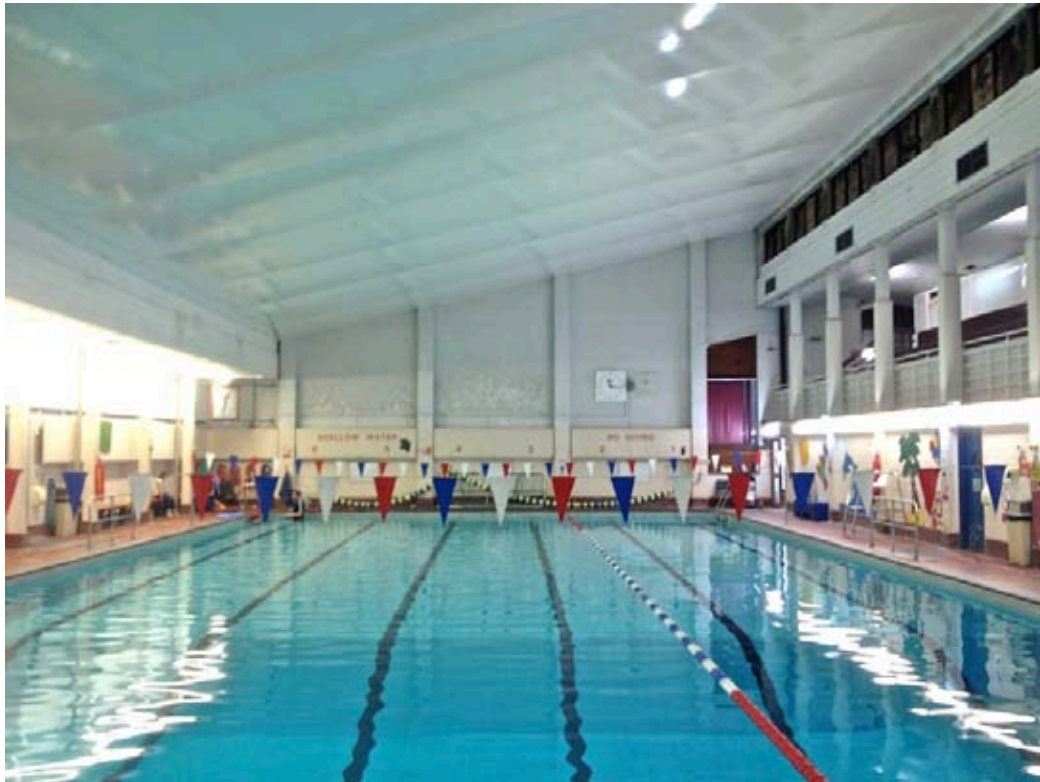
View of the pool hall from the west, as seen from Bishopswood Road



View of the north-west corner, with entrance to the right



View of the pool hall from the south-east, with courtyard to the left



View of the pool hall interior at start of 2017, ceiling now removed, towards west end



View of the pool hall interior at start of 2017, ceiling now removed, towards east end

Evaluation

Building:

- The Pool Hall is a part of the MSC indoor sports centre, in the southern area of the Highgate School estate, closely connected to adjacent all-weather pitches, grass pitches and sports areas, and other School facilities such as Art and Design [Mills Centre], the Pre-Preparatory School and the Junior School.
- The location of the MSC in close proximity to the School sports pitches is essential to the good management of School sports generally, therefore the School see a long term benefit in keeping indoor sports and swimming on this site.
- The site is bounded on the west side by Bishopswood Road, on the north side by Broadlands Road, which is largely residential, and on the east and south sides by School grounds and pitches. On the north-east side there is a boundary with the residential property of no.27 Broadlands Road and its front and rear garden.
- The MSC sports centre is accessed by all visitors and users via the main entrance off Bishopswood Road – the second northern entrance by the Pool Hall is only used by pupils and staff. It is a part single storey, part two-storey building, with the main sports spaces of the sports hall and pool hall being the predominant visible forms.
- The topography of the land includes a significant slope of ground levels falling from south to north, and the building has been planned to utilise this slope to maintain a low profile, using a “cut and carve” approach to set the building floor levels down into the ground.
- There are mature trees around the perimeter of the site to the west, north and east.
- The Pool Hall building, which is interconnected with the Sports Hall development but set at a lower floor level, centres around the pool hall itself, with a 6-lane 25 metre pool at its heart.
- The pool offers good depths, with a 3.7 metre deep end, and excellent swimming and water sports activities opportunities.
- The Pool Hall is a rectangular volume with a single mono-pitch sloping roof, from the ridge on the north side down to a deep and wide gutter at the south side. The spectator seating at first floor, and changing rooms and plantrooms below, forms another related block with a single mono-pitch roof of the opposite pitch. This results in the end gables to east and west, which simply reflect the roof forms rather than being composed as frontally designed elevations.
- On the west side of this block, a small projecting single storey extension includes a dedicated entrance to the pool facility, which is used only by pupils and staff.
- On the north side, the elevation at low level has a number of door, louvre and window openings that are designed for expediency of services and access, but do not create a good appearance. The plans for future development to the north intend to extend on this side directly, and thereby remove this elevation from view completely.
- The windows at high level which form a clerestory to the Pool hall are in a very poor state, having been boarded over for several years, and in need of replacement.

- The pool building has a tall metal extract boiler flue “chimney” that is of dominant height, rising nearly 7.5 metres above the roof ridge. It reinforces the negative impression of the building in the area, and technically the requirements can be addressed with new plant by a much shorter flue, which is what is proposed.



View of the north side of pool ancillary areas, with boiler flue

- The MSC is mentioned within the Highgate Conservation Area Appraisal [“Character Appraisal and Management Plan, December 2013 pages 149-150] where it is stated:

“There are, however, a number of buildings connected with the School which detract from the environment, especially the sports centre swimming pool....These have a somewhat industrial appearance and the cladding and roofing materials are not well maintained”

It is considered that the refurbishment proposals in this application will alter and improve the impression of an ‘industrial appearance’ of the Pool Hall building, and also will both preserve and enhance the Conservation Area.

- The Pool hall block has its main presence along the frontage with Bishopswood Road. From the east the building is visible from the residential property of No.27 Broadlands Road. The south elevation is only really visible directly from within the courtyard between the Pool Hall and the Sports Hall, otherwise it is seen from angled views along Bishopswood Road.
- From the north side on Broadlands Road, the building is concealed behind the existing fives court building and squash court building, as seen in the photograph below. The boiler flue is still very visible, but the main north elevation is largely concealed from public view.



View towards the overall site from Broadlands Road: the trees are deciduous, but even in winter the Pool Hall building is barely visible, except for the tall boiler flue

- The existing wall elevational design of the MSC building, including the Pool hall building, aims to establish a strong horizontal emphasis that reinforces the low scale of the development, with a single storey height of the facing clay brickwork, and an upper wall treatment of metal sheet cladding that is the same as the roof material.

Condition:

- The lower wall fabric of masonry brickwork is generally in sound condition and of good, weathered appearance.
- The upper wall and roof cladding of metal sheet is now in poor condition and in need of complete replacement.
- The roof and walls currently have very little insulation value, and so do not conform to current Building Regulations standards for energy retention and carbon footprint reduction.

Consultation

- The outline of this project [but not the materials selection proposed] was presented as a part of the Highgate School exhibition of projects to the public on Monday 12th March 2018.
- The residential neighbour at no. 27 Broadlands Road, the only adjacent property directly impacted by the proposals, was consulted on Friday 16th March.

Refurbishment Opportunities

- Significant extension to the life of the building, with long term sustainability benefits
- Modernisation of image of building from public street, especially Bishopswood Road.
- Improved experience for all users of the Pool Hall
- Significantly enhanced natural daylight to the Pool Hall
- Significant benefit in energy saving performance and lowering carbon footprint
- Enhance the contribution of the building in the Conservation Area
- Integration with a longer term development for the whole MSC site that will result in regeneration and improvements to this area

Refurbishment Constraints

- Need to respect the character of the Conservation Area
- Nature of refurbishment working within the existing footprint of the building limits the scope of overall change
- Select materials that are appropriate for a large swimming pool hall but also relevant to the local area
- Retention of the existing structure and main walls, with changes limited to roof and wall finishes and local alterations to walls.

Design, layout, appearance, materials

- The design retains the form and massing of the existing pool hall, roof profile and end gable walls.
- The exterior distinction between brickwork masonry lower walls and metal cladding to upper walls and roofs is also retained.
- Consideration has been given to planned future developments at the MSC sports centre, which are likely to result in the west end gable wall in particular being partially screened or obscured by new front extensions. For this reason the simplicity of the existing gable walls has been retained, rather than make a more distinct change that in a short time might be covered by later works. That said, the gable wall design that forms this application is designed to stand alone and enhance the appearance of the building, even if no such future development is carried out.
- The proposal is for the east and west gables elevations to be clad in vertical standing seam natural Zinc sheeting pigmented to give a darker tone that compares favourably in this context to natural “bright” zinc. Zinc is a material widely accepted as being of high quality, a natural material, with an element of crafted installation, and appropriate for Conservation Areas. It is often used in the place of lead, due to its greater workability and availability to install in long single sheets with fewer lateral joints. Moreover the standing seam joint is admired as it brings a clear and fine articulation to the roof surface. Zinc weathers naturally and softens in appearance over time.
- The main roof is a large expanse, and not so visible as the end gable walls. For this reason it is proposed to use a larger scale roof cladding system, but still with a comparable standing seam appearance and material. The material proposed for the roof is dark natural Zinc coated aluminium, called “dark AluPlusZinc” as supplied by Kalzip or other manufacturers. It will blend with the natural Zinc wall cladding – it is not intended to match. The same roofing system proposed has been used for high quality buildings such as the Mary Rose Museum in Portsmouth [Chris Wilkinson Architects].
- The new windows and the rooflights are proposed to be polyester powder coated aluminium, with thermally broken frames and double glazed low-E glass. The rooflights and the high level new windows are to be fixed, not openable.
- The new louvres, louvred doors and louvre upstands ventilation turrets are to be in aluminium, polyester powder coated in a dark grey colour to blend with the roof and wall finishes. They are essential for the improved new mechanical ventilation system.
- High quality materials have been selected that bring greatly enhanced appearance, as well as long term low maintenance and good weathering performance.
- The appearance of the materials has been selected to enhance the quality of the Conservation Area, and even though this is a sports building rather than a residential building, the material finish of pigmented natural Zinc is a very high quality finish.
- The colour and tone of materials is extremely important, and the selection is for a darker, less reflective matt finish than existing, the intent being to blend the roof and wall finishes more closely with the local built environment and tonally subdue the impact of the building – rather than stand out or display a brighter or more “industrial” and colourful aesthetic that is typical of many sports centres.

- The existing metal sheeting has a low profile flattened joint typically, which has little impact on how the roof surface is perceived [and has also contributed to the ingress of water into the joints over time, exacerbated by the low pitch of the roof]. The new roof and cladding materials will have more pronounced upstanding joints between sheets, that will give a more definitive rhythm to the cladding areas, especially when casting shadow in sunlight or strong light, adding an extra layer of detail to the surface and breaking up the large roof expanse. These joints are also technically much more suitable for the relatively low pitch of the roof, and will serve to guarantee a longer life span to the new finishes.
- Materials samples will be made available for the Planning Officer site visit – the photographs of materials here are representative:

	
<p><i>Wall cladding:</i> <i>Vertical standing seam pigmented Zinc:</i> <i>VM Zink Pigmento Blue or similar</i></p>	<p><i>Roof cladding:</i> <i>Kalzip Dark AluPlusZinc for standing seam</i> <i>profiled metal sheet</i></p>
	
<p><i>Windows [and louvres]:</i> <i>Polyester powder coated aluminium</i> <i>windows and louvres, 30% matt dark</i> <i>grey colour finish</i></p>	<p><i>Roof light: [example of glass rooflight or</i> <i>similar section] Polyester powder coated</i> <i>aluminium rooflight, 30% matt dark grey</i> <i>colour finish</i></p>

- The proposal is to remove the existing tall boiler flue chimney and replace it with a significantly shorter flue that will have far less visual impact. The new flue is to be finished in stainless steel. The reduction in height is approximately 5 metres.

- The Pool Hall and adjacent spaces do require a complete new installation for the mechanical air handling plant and distribution in order to improve substantially the internal environment, and this will require new ventilation louvred turrets on the north roof. The effect of this work will be to lengthen the life of the building fabric in the future. The technical mechanical and electrical services strategy is set out in this report in the Appendix.

Amount

- The proposals do not extend the building footprint, they are for refurbishment changes to the existing building within the same gross floor area.

Use

- Existing swimming pool, changing rooms, plantroom and ancillary accommodation continuing its current use.

Scale

- The existing massing and general scale of the building is not affected by these refurbishment proposals, as the main works are a replacement of existing cladding with retention of the existing structure. There is a slight increase in height on all elevations due to the additional insulation and roof build up, and also in order to enhance the shape of the end gable walls. The top ridge as a consequence will be raised by approximately 600mm. The north roof eaves is also to be raised slightly by approximately 300mm to provide reinforce the structure and better headroom at the back of the gallery upper floor level.
- The replacement of the tall boiler flue chimney with a much shorter flue will considerably enhance the appearance of the building.
- The new ventilation louvred turrets are required for the new mechanical systems, and do not rise higher than the top ridge.

Ecology & Landscaping

- There are no changes to external landscaping or planting in this project, and no loss of trees. Care will be taken during construction to protect existing trees.

Amenity

- There will be no daylight / sunlight or overlooking impact on neighbours. The new rooflights are on the south side of the pool hall roof and are not seen from the residential neighbour no.27 Broadlands Road.
- A new noise survey has been carried out, to be read in conjunction with an earlier survey from 2015, when the pool plant was operational [it is currently out of service so cannot be measured for the noise test on site].
- The results of the noise survey are included in a separate document.
- Note that new rooflights and high level windows are fixed, not openable, so will not let out noise from within the pool hall.

- All air extract from the Pool Hall will be taken to roof level and directed towards the west, away from the residential neighbour at no.27 Broadlands Road and back over School land. Further details on this are in the Appendix.

Structure

- The existing steel roof structure is largely being retained, in particular the main steel castellated beams of the Pool Hall. There may be some replacement of structure at roof level as the building fabric is opened up for inspection, depending on its condition. There are no works in this application included which require new foundations.

Drainage

- No new connections to the public sewer are expected or required, and there is no increase in surface water outflow from the building to the drains. There will be some local amendments to drainage for surface water and roof rainwater discharge.

Inclusivity

- The proposals in this planning application, which are mainly related to exterior fabric and services improvements, will not substantially affect the overall interior or exterior planning of the Pool Hall, so there are not intended to be significant changes in this phase of work for greater inclusivity of access or disabled provisions.
- These matters are however intended to be addressed at the earliest opportunity within the future development at the MSC as described earlier in this Statement, because the improvements to inclusivity and access are an important priority for the School.

Traffic, transport and parking

- There will be no change in usage or numbers of vehicles as a result of these proposals.

Construction Management Plan

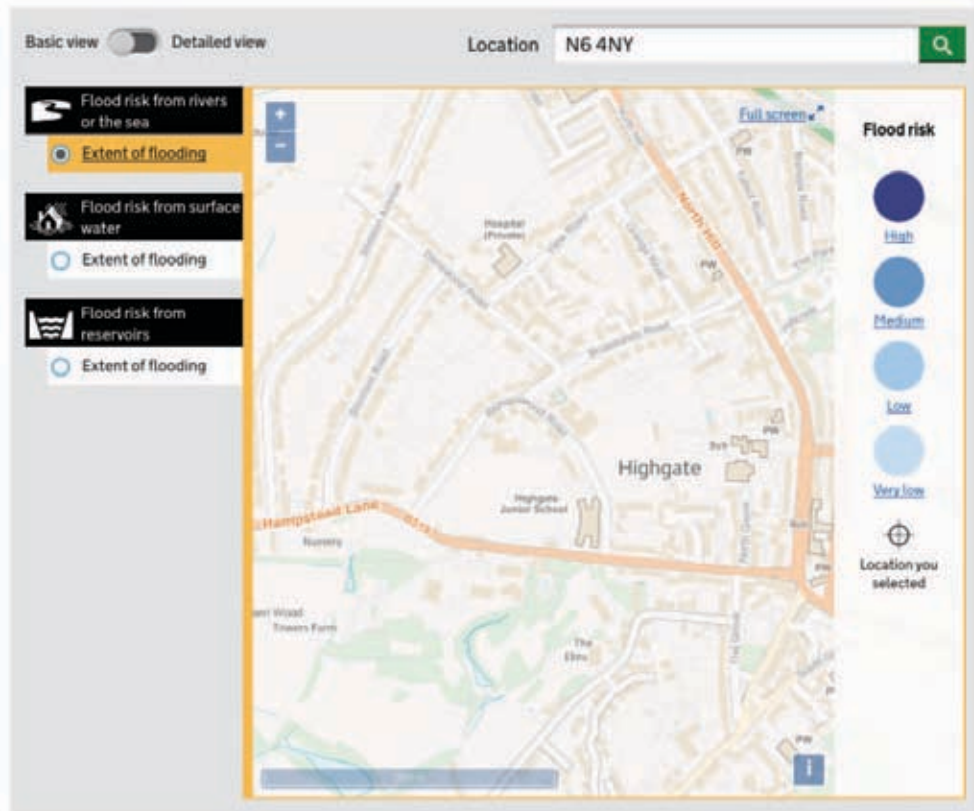
- An outline Construction Management Plan has been drawn up at the planning stage, which will need to be developed by the appointed contractor. The Construction Management Plan at this stage is attached in a separate document.

Security

- The works, especially replacement of windows, will serve to make the premises more secure, and make the fabric of roof and walls more robust.

Flood risk

- The Environment Agency flood map demonstrates that no special flood protection is required on this site. Also there is no increase in building footprint as a result of this application.



Environment Agency flood map for N6 4NY

Sustainability

- The project will involve a number of refurbishment measures which will have a very positive sustainable impact on the performance of the building and result in energy savings and a reduction in the carbon footprint:
 - Significant increase in fabric insulation for upper walls and roof, with reduction in heat loss, including elimination of cold bridges in new fabric
 - Additional increase in fabric insulation by internal lining of the pool hall walls
 - Improved thermal performance of new window replacements and rooflights
 - Improved air tightness of the roof and upper walls construction
 - New low energy lighting systems
 - New more energy efficient plant and services
 - Improved interior controlled environment of the pool hall by new mechanical heating and ventilation plant, resulting also in extended life to the building fabric
 - Improved environmental impact by replacing existing plant with new plant, including a reduction in carbon emissions.

Building Services and Energy

- The existing building main plant and services will be substantially replaced as part of these proposals.
- Swimming pool spaces typically do have high energy demands, but the new proposals will optimise energy use by the new plant, and by other measures such as fabric improvement and a new pool cover.
- The new equipment will be more energy efficient and significantly improve the internal environment.
- A detailed description of the proposed new Building Services strategy is included in the Appendix at the back of this document.

Conclusions

- The MSC sports centre as a whole is mentioned within the Highgate Conservation Area Appraisal where it is stated that the building “*detracts from the environment... these have a somewhat industrial appearance and the cladding and roofing materials are not well maintained*”.
- The selected materials are of high quality natural finish – zinc is often specified as a facing material within Conservation Areas as an alternative to traditional lead – and the darker tone of the natural materials serve to moderate the impact of the Pool Hall volume.
- It is considered that these proposals will change the perception of the current ‘industrial appearance’ of the Pool Hall to one that is more integrated within the context of the local built environment.
- The dark natural zinc finish to roof and wall cladding will create a refined and elegant building, with the subtle detail of the standing seams giving a pleasing rhythm to the surfaces. The appearance will be subservient to the other buildings around, thereby reducing its apparent impact.
- The proposed works will enhance the contribution to the Conservation Area.
- The refurbishment proposals will bring back this important educational and sporting facility into School and community use at the earliest opportunity. It will also substantially increase the lifespan of the building in a sustainable manner.

Appendix

Mechanical & Electrical Services and Energy Strategy

Peter Deer & Associates – Consulting Engineers, Building Services

Proposed improvements to Highgate School Pool energy services

The swimming pool was constructed in 1969. The swimming pool plant is largely original with the boilers and pump motors being replaced about 15 years ago. The swimming pool plant heating and air handling equipment is no longer fit for purpose and is not economic to operate.

Most of the swimming pool energy usage is used to heat the volume of the pool hall air above the water line to reduce the heat losses from the pool water and maintain suitable thermal comfort levels for the swimmers. For comfort, the pool hall air temperatures should be close to body temperature with a high humidity level of approximately 60% RH which also reduces the pool water evaporation rate and loss of temperature.

The pool hall currently is subject to infiltration of external air via existing external glass doors and boarded windows. The infiltration of external air and cold surfaces increases the risk of condensation which results in mould growth, peeling paint and other detrimental fabric problems, and causes high overall energy consumption required to run the swimming pool.

Proposed Building and Plant Improvements are:

- **Building Fabric**

The refurbishment scheme will consider the pool hall building fabric first by proposing to replace the roof with a new modern insulated roofing system and to insulate all external walls above the level of exterior brickwork. To avoid the risk of condensation the existing external glazed doors and openings will be insulated and lined internally, with translucent obscuring film applied to glass. New insulated double glazed aluminium rooflights are proposed, with existing high level windows replaced with new double glazed aluminium windows, to improve daylighting of the pool hall. The rooflight and new window performance will be selected with thermally broken systems to minimise cold surfaces reducing the risk of condensation.

- **Control of air movement and infiltration**

To contain the swimming pool hall area at design conditions, the provision of lobbies between adjoining spaces will be provided to minimise the transfer of high temperature and humidity air into other adjoining spaces. The ventilation for changing room areas leading into the pool hall will be positively pressurised to avoid transfer of pool air into the changing rooms. The restriction of pool hall air movement into other areas is to reduce condensation and possible corrosion of materials in the adjoining spaces.

- **Pool Cover**

To reduce the pool water evaporation rate and heat loss, the refurbishment scheme will provide a new pool cover, to be used for periods when the pool is not in use. The new cover will be a simple electrically operated roll at one end of the pool and will be a key feature in reducing the overall swimming pool energy consumption. The use of the pool cover will allow the pool air handling plant to operate at a lesser capacity especially during the night which will reduce external noise levels and discharge of pool hall exhaust air.

- **Pool hall Air handling unit:**

The refurbishment of the pool hall will include the provision of a new Air Handling Unit [AHU] with the following new features:

- **Supply and Extract Air**

The new pool hall air handling plant will be located in the upper plant room area at the north-east corner of the swimming pool building. The new air handling unit will supply treated air into the pool hall to maintain design environmental temperature and humidity levels. Intake air will be drawn from a wall mounted louvre at the rear of the building on the East elevation as indicated on Drawing No. 2002 /GE / 012 East Elevation Proposed. The AHU will exhaust air via a roof top louvred turret. For aesthetic purposes the turret will have louvres all round but only the louvres facing away from the neighbours will be active, and will discharge air back across the school grounds.

- **Modern Variable Speed Plug Fans**

The AHU will be provided with efficient fans to reduce energy consumption and running costs. The fans are inherently quieter than traditional fans reducing the attenuation required to meet required conditions. The fans will normally operate between general operate between 20-50% volume of design volume to maintain design condition within the pool hall, only increasing in speed when the pool hall relative humidity rises above 65%RH.

- **Cross Flow Plate Recuperator**

This will recover approximately 70-80% of the energy in the exhaust air stream and use the energy to pre-heat the cooler incoming fresh air.

- **Fresh Air Dehumidification Mixing Box**

Free cooling and dehumidification will be achieved through accurately regulating of the quantity of fresh air introduced into the pool hall, resulting in precise control of humidity and reduced running costs.

- **Air Quality**

The AHU dehumidifies the pool hall by introducing relatively dry external ambient air to replace the moisture laden pool air. The use of fresh air tends to promote a very high quality environment and dilutes odours. The new pool hall AHU will

minimise the amount of pool air exhausted to outside which will reduce the potential for pool hall odours to be sensed by persons in the vicinity.

- **Air Handling Unit Operation –**

- **Daytime Operation in Winter Months**

- The Pool Hall AHU introduces the minimum quantity of outside air which is required to provide a pleasant environment for the bathers. In order to minimize internal pressure drops, only the amount of air that is being replaced with the outside air is passed through the heat exchanger. The remainder is recirculated and warmed by the re-heater. If the dehumidification capacity is not sufficient the amount of dry outside air will be automatically increased. Minimal fresh air reduces the risk of odours from the pool and noise.

- **Daytime Operation in Summer Months**

- In this period the Pool Hall AHU delivers 100% outside air. The re-heater coil will normally be switched off as the supply temperature is high enough, after being pre-heated by the cross flow heat exchanger. If the outside air temperature continues to rise, a by-pass will open and the unit will operate in 'free cooling' mode.

- **Night Time (Pool Unoccupied) Operation**

- In this period the Pool Hall AHU runs in recirculation mode. If there is no dehumidification demand then the return air is recirculated and warmed by the re-heater. If dehumidification is required, a small proportion of the return air is replaced with outside air, similar to daytime operation in winter. Once the humidity in the swimming pool hall returns to the desired level, the Pool Hall AHU reverts to recirculation mode. Normally the fans will run at low speed overnight. With no fresh air therefore there will be no odours escaping the pool hall and this will reduce plant noise.

- **Boilers**

- The current installed atmospheric gas boilers are proposed to be replaced with new high efficiency gas-fired condensing boilers which considerably reduce the current levels of NOx discharged within the flue gas: a reduction from 130 to 35mg/kWh is anticipated. This will assist with the local environment by achieving current air quality targets. It is proposed to replace the existing boiler flue with a new smaller and lower boiler flue terminal.

- **Internal lighting**

- The existing pool hall had limited use of natural daylight and primarily compensated throughout the day with the use of artificial lighting which has been replaced over the years but is not as energy efficient as modern light fittings.

- The refurbishment scheme proposes to include the provision of new roof lights and high level windows which will allow natural daylight into the pool hall. It is proposed to

replace the existing lighting with modern energy efficient LED lighting. The LED lighting will be provided with daylight sensors to automatically reduce artificial lighting levels and energy consumption when natural light levels in the hall are sufficient.

- **Pool water pumps and filters**

Swimming pool water filtration and heating plant is proposed to be reconfigured to allow access from the rear of the building. This provides the opportunity to replace the existing pool water treatment plant including filtration; heat exchangers etc with modern energy efficient plant.

Improving the pool plant filtration reduces the amount of chemical required for the pool water resulting in an improved swimmer experience. The lower levels of chemical will also reduce the level of odour emanating from the pool water and in turn the levels of discharged odours to outside.

- **Conclusion**

The proposed swimming pool hall refurbishment and plant replacement will benefit the school with a much improved swimming pool environment and a reduced energy consumption and operating cost. In addition these improvements will significantly contribute to the longevity of the swimming pool building fabric. They will also benefit the neighbours by improving local air quality, by reducing the levels of pool odours and boiler NOx emissions being discharged from the building, and by the control of plant noise, which will be attenuated.