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Fylde council

Kirkham Rural Splash

Station Road
Kirkham
Preston
PR4 2HA

Mechanical & Electrical Engineering Services Condition Report & Options Appraisal

REVISION HISTORY			Ref.	1367-R01
Rev.	**Author**	**Checked By**	**Date**	**Comments / Status**
01	Steven Walley (Mech) Jonathan Baron (Elec)	N/A	04/03/24	First issue.
02	Steven Walley (Mech) Jonathan Baron (Elec)	N/A	20/03/24	Second issue.
03	Steven Walley (Mech) Jonathan Baron (Elec)	N/A	26/03/24	Third issue.
04	Steven Walley (Mech) Jonathan Baron (Elec)	N/A	03/04/24	Fourth issue.

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1 Executive Summary

The building services at the YMCA baths in Kirkham are generally in a very poor condition and beyond their serviceable lifespan.

A report was published in 2009 when YMCA Fylde Coast began to operate the facility, where it was deemed that the estimated operational life of the facility was approximately 10 years.

During the winter of 2021 the building was hit by Storm Arwen a powerful cyclone that with intense winds lifted the domed roof off the facility leaving an area 25-30 meters by 10 meters completely exposed to the elements, of which is still exposed.

In addition to the storm damage there have been numerous breaking ins where bouts of vandalism are evident throughout.

During the survey there was mostly no lighting within only a few in the basement operational. There was no heating within the building and services don't appear to have been operational since the storm forced the closure.

It is therefore recommended that a full back to brick refurbishment and a full replacement of M&E services is required to bring life back to the facility.

Estimated Costs of M&E Services

For option 1, the M&E Services budget costs amount to **£742,279** excluding VAT.

For option 2, the M&E Services budget costs amount to **£948,380** excluding VAT.

For option 3, the M&E Services budget costs amount to **£1,042,715** excluding VAT.

For option 1&2, the Pool Services budget costs amount to **£277,500** excluding VAT.

For option 3,

- The Pool Plant Services budget costs amount to **£277,500** excluding VAT.
- The Pool Shell budget costs amount to **£500,000** excluding VAT.

Estimated Running Costs & Emissions

	OPTION 1	OPTION 2	OPTION 3
ANNUAL ENERGY - TOTAL COST			
TOTAL ANNUAL ENERGY INPUT	**724.005 kWh**	**248,760 kWh**	**300,895 kWh**
TOTAL ANNUAL CO2 EMISSION	**134.214 Tons**	**42.880 Tons**	**58.187 Tons**
TOTAL ANNUAL ENERGY COST	**£61,694.20**	**£49,753.00**	**£60,179.20**

2 Report Contacts

M&E Services Consulting Engineer:	
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3 Glossary of Terms

A	Amps
AC	Air Conditioning
ACH	Air Changes Per Hour
AHU	Air Handling Unit
ASHP	Air Source Heat Pump
BEMS	Building Energy Management System
CDM	Construction, Design and Management
CO2e	Carbon Dioxide Equivalent
COP	Coefficient of Performance
DB	Distribution Board
DNO	Distribution Network Operator
FP	Fire Performance Cable
GSHP	Ground Source Heat Pump
HV	High Voltage
HVAC	Heating, Ventilation & Cooling
HWS	Hot Water Service
IFA	Internal Floor Area
IP	Ingress Protection
IPS	Integrated Plumbing System
kVA	Kilo-Volt Amps
kW	Kilowatts
LED	Light Emitting Diode
LTHW	Low Temperature Hot Water
LV	Low Voltage
mbar	Millibar
MCB	Miniature Circuit Breaker
M&E	Mechanical & Electrical
MICC	Mineral Insulated Copper Cable
MVHR	Mechanical Heat Recovery Ventilation
PDU	Power Distribution Unit
PV	Photovoltaics

RCBO	Residual Current Breaker with Over-Current
RCD	Residual Current Device
SBEM	Simplified Building Energy Model
SCOP	Seasonal Coefficient of Performance
SWA	Steel Wired Armored Cable
TPN	Three Phase & Neutral
V	Volts
XLPE	Cross-linked Polyethylene
CIBSE	Chartered Institute of Building Services Engineers
BISRIA	Building Services Research and Information Association
QS	Quantity Surveyor

4 Introduction

4.1 Purpose of Report

We have been appointed to carry out a high-level survey and report on the overall condition of the existing mechanical & electrical engineering services within the building at the address below: -

YMCA Kirkham Rural Splash
Station Road
Kirkham
Preston
PR4 2HA

Following the completion of the condition survey option appraisals with budget costs along with future estimated running costs for the options along with estimated carbons emissions will form the latter part of this report.

4.2 Survey of Existing Services

A survey of the existing installation was carried out by the report authors on Tuesday 13th February with a second follow up visit to gain access to the plant room spaces on the 21st February 2024.

The survey of the existing services was visual only and did not involve intrusive/invasive inspection, functional testing of plant and services or testing of plant and services.

4.3 Survey Photos Share

Our survey photos can be viewed via the link below. This allows you to access full resolution images of those included in this report, plus many more besides.

Survey Photos accessed from here: 'Click Here'.

Or Scan here: -

5 The Site

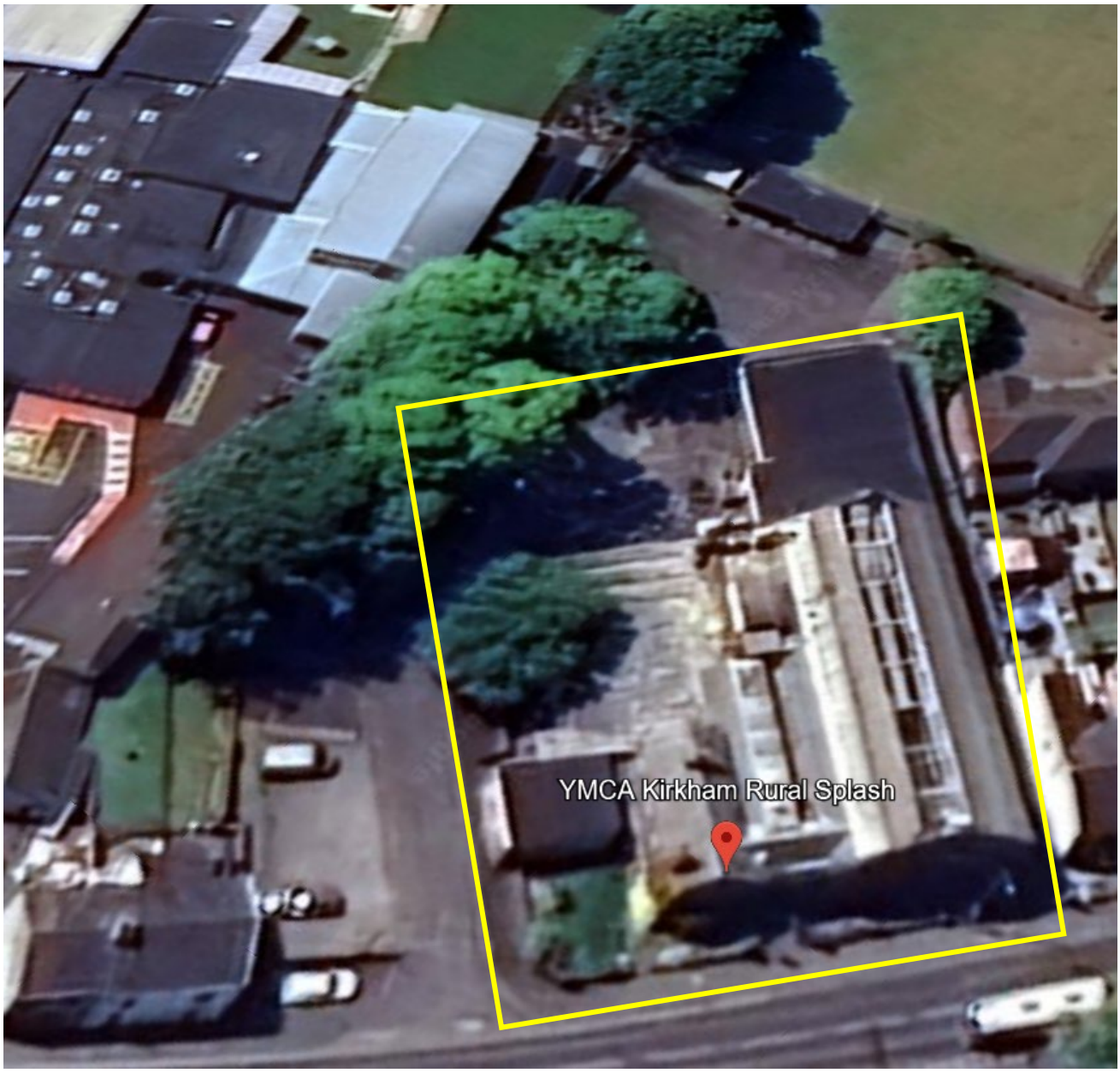
5.1 General Description

Kirkham Swimming Baths was erected in 1908 by the bequest of William Segar Hodgson and has served Kirkham as a public swimming pool for over a century.

The building has undergone various changes over time, with the building of numerous flat roof single-story extensions with various reconfiguring of the internal layout, there is also an attached “Pool House”.

Externally there is a tarmac parking area with a green space and some mature trees.

The building is shown in the image below and outlined in Yellow.



Google Maps Satellite Image of the Site (North at Top)

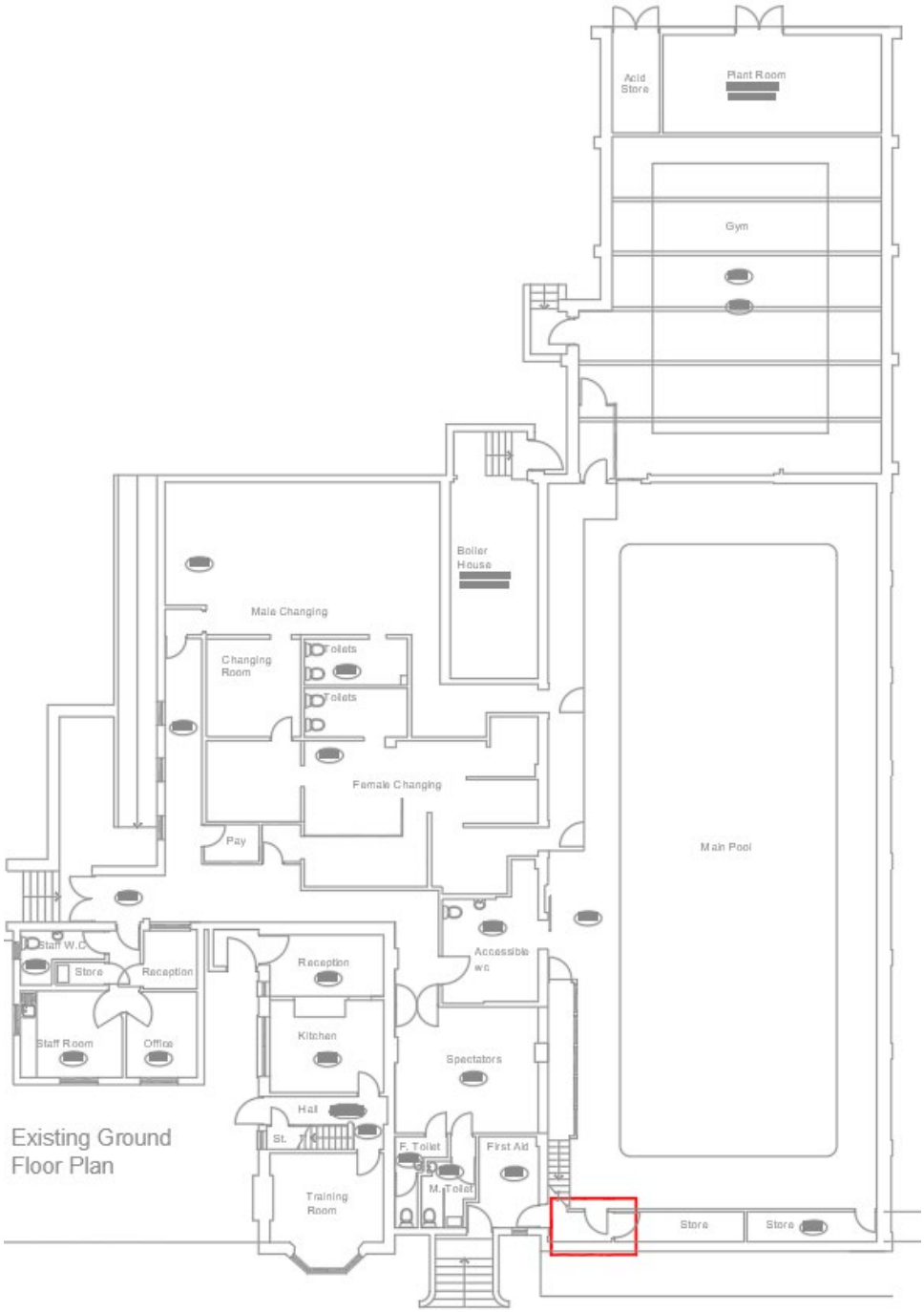
The Google Map for the above can be viewed using the website link: ‘Click Here’.

6 Existing M&E Services Review

6.1 Utility Services

All incoming services enter the building within the same vicinity towards the front of the site within the damp basement pool access & service tunnels with limited height for maintenance.

The position of the service entry positions and meters are shown in the image below, highlighted in the red box: -



6.1.1 Incoming Mains Cold Water Service

The Utility Company's incoming mains cold water service pipe is routed externally below ground, entering the building through the basement wall into the Pool Area under croft. The Utility Company's meter assembly is located in this space.

The meter assembly is shown below: -

Utility Company's Mains Cold Water Meter Assembly

The inlet to the meter is fitted with a gate valve. The outlet is fitted with a gate valve. There are no draincocks, double check valves, pressure gauges or pressure reducing valves fitted.

The cold-water pipework appears to be a mixture of cast iron (lead caulked joints to fittings), galvanised mild steel, with significant signs of corrosion. None of the pipework is thermally insulated or trace heated.

6.1.2 Incoming Natural Gas Services

The Utility Company's incoming natural gas service pipe is routed externally below ground, entering the building through the basement wall into the Pool Area under croft. The Utility Company's meter assembly is located in this space. The supply appears to be standard low pressure (21mbar).

The meter is a Schlumberger Delta D3 with a rated maximum capacity of 84.95m³/hour. The MPRN reference is stated as 1621408 (this has not been verified with the Utility Company). The meter is complete with inlet emergency control valve (manually operated), governor and pulsed output module. The meter assembly is shown below: -

Utility Company's Natural Gas Service Governor & Meter Assembly

A further incoming natural gas service enters the two-storey" house" area of the building. The incoming service pipe routed below ground rises to enter the building through the external wall at low level. We were unable to access this area of the building for safety reasons. We are led to believe that this gas service supplies a domestic-style boiler.

Incoming Natural Gas Service to Two-Storey "House" Area

6.1.3 Incoming Electricity Supply

The supply to the building is 400V three phase with an estimated maximum rated of 69kVA based on the cutout being fitted with 100A fuses and whole current metering.

It was noted the overall condition of the existing electrical cutout was poor and it was badly corroded as such if the existing supply is to be re-used an application request should be made to replace the old cutout and cable for new. This is often done by the DNO at nil cost however and application must be made to confirm this.

The cutout is in a poor place on the site and the tunnels are very damp with access being restricted due to limited height.

The Internal electrical cutout is shown below: -

6.1.4 Incoming Telecoms

The building has an incoming telephone which enters through one of the air vents in the basement also this was not observed to be functional at the time of the survey, and an allowance should be made to bring in a new Fibre service to the site.

6.2 Existing Mechanical Services

6.2.1 Above Ground Drainage

The above ground drainage system was not surveyed since it forms a very minor part of the installed services.

Given the age of the building, we would expect the main soil vent stacks to be cast iron, with uPVC used where areas have been refurbished in the last 40 years or so.

6.2.2 Domestic Cold-Water Services

The mains cold water service pipework is routed from the incoming service position in the Pool area under croft to the Boiler house.

We could not locate any potable cold water storage cisterns. We are led to believe that these may be located in a rooftop enclosure, positioned above the Boiler house; however, this could not be accessed for safety reasons.

Rooftop Enclosure for Potable Cold Water Storage Cistern(s)
Enclosure Clad in White Panelling (Highlighted in Yellow Box)

We could not find a cold-water booster set so we presume the domestic services systems are either cistern-fed or pressurised by the mains cold water service.

We could not identify if any tap outlets are fed direct from the mains cold water service, since the service has been isolated and drained down. We also could not access the two-storey" house" area for safety reasons.

The pipework appears to be copper, with a mixture of screwed, capillary and compression joints. The majority of pipework is thermally insulated, with aluminium cladding applied in the Plantroom.

The services appear to be a mix of those that were installed at the time of the original build, together with a significant proportion in areas that have obviously been modified/refurbished since that time (changing areas etc.).

For services routed within the general areas of the building (Reception, staff areas, changing rooms etc.), there are no obvious visual signs of damage, or deterioration above and beyond what would be expected for services of their age. Our survey did not reveal building fabric, fixtures and/or fittings which had been damaged by water leakage.

The services within the pool under croft and Boiler house certainly show signs of age and deterioration. This will no doubt be the case for the cold-water storage cisterns.

6.2.3 Domestic Hot Water Services

Domestic hot water is generated by a vented, indirect, copper, cylindrical, vertical pattern calorifier, located in the Boiler house. The calorifier is approximately 1m diameter x 2m tall, giving a capacity of 1,500 litres or thereabouts. No manufacturer's data plate is visible. The calorifier is thermally insulated and clad in stucco-embossed aluminium sheeting.

HWS Storage Calorifier

The heater is controlled via the HVAC Automatic Controls panel located in the same room. The exact control strategy was not investigated (timeclock, pasteurisation routines etc.).

The hot water system is provided with a pumped hot water circulation system. The single-head pump is located adjacent to the water heater in the Boiler house.

The wall-mounted thermostatic showers within the changing rooms have been stripped out, with the hot and cold-water pipework left unattached from the wall. We note that the final pipework connections were carried out using John Guest flexible pipe, rather than traditional copper.

The pipework appears to be copper, with a mixture of screwed, capillary and compression joints. The majority of pipework is thermally insulated, with aluminium cladding applied in the Plantroom.

The services appear to be a mix of those that were installed at the time of the original build, together with a significant proportion in areas that have obviously been modified/refurbished since that time (changing areas etc.).

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Changing Area Thermostatic Showers (Stripped Out)

Typical Pipework Installation in Ceiling Void

6.2.4 LTHW Heating

Low Temperature Hot Water (LTHW) is generated by 5 No. IDEAL CONCORD C SERIES 2 330 floor-mounted, non-condensing, natural gas-fired, conventionally flued boilers, located in the Boiler house. Each boiler has a heat input of 125.0kW and a heat output of 96.7kW. The data plates don't state a manufacturing date; however, we consider it reasonable to presume that the plant is at least 25 years old. The plant is mounted on a concrete plinth.

It is evident that there used to be 8 No. boilers installed at one time, with three of them having been stripped out at some point. The blanked-off pipe and flue connections remain in place and the HVAC control panel has had the relevant control switches removed.

Significant areas of rust are present on every boiler casing panel. Some panels have been removed or have fallen off.

LTHW Boiler Plant

Products of combustion from the boilers are discharged to atmosphere at roof level via a combined atmospheric flue. We presume that the flue routed externally used to serve a coal-fired boiler plant, since it is much larger in size than the header in the Boiler house.

LTHW Boiler Plant Combustion Exhaust Flue

A number of pumps are provided to provide water circulation to the various circuits. The HVAC control panel has lamps and switches for the following circuits: -

- Pool Area AHU heater battery.
- Pool water heating (with plate heat exchanger assembly).
- HWS calorifier.
- Compensated heating to radiators etc. (with 3-port motorised mixing valve).

It is evident that the original pumps have been replaced at some point with newer Grundfos models. There are no obvious visual signs of damage, or deterioration above and beyond what would be expected for pumps of this age.

Typical Heating System Pumps

We presume that system pressure is maintained by feed and expansion cistern(s), no doubt located in the rooftop enclosure positioned above the Boiler house. This room could not be accessed for safety reasons.

The pipework within the Boiler house is generally mild steel with welded and flanged joints on large-bore and screwed joints on small-bore. The majority of pipework is thermally insulated; however, no valve insulation covers are fitted. The pipework shows significant signs of corrosion.

Rooms are heated by various types of heat emitter (radiators, pipe coils, fan convectors etc.).

Radiators are pressed steel panel types, the majority being cased double-panel types, with some triple panel types. Some of the radiators have been painted silver. Pipe connections are generally top-bottom-opposite-end, with manual valves (no thermostatic types). The radiators in wet areas, such as changing rooms, are showing signs of corrosion, particularly along the bottom welded seams.

The changing rooms are also heated by warm air, with supply grilles located at low level under the lockers. The finned tubing was visible through the grilles. We could not gain access to the heat emitters, so cannot confirm if they utilise fans or rely on natural convection.

A small number of areas are heated with pipe coils, with the large-bore mild steel pipework generally routed either under seating benches or at high level.

Typical Pressed Steel Panel Radiator (Rust along Bottom Edge)

Typical Pressed Steel Panel Radiator (Painted Silver)

Typical Pipe Heating Coil Under Benches

Typical Finned Tube Heaters to Lockers

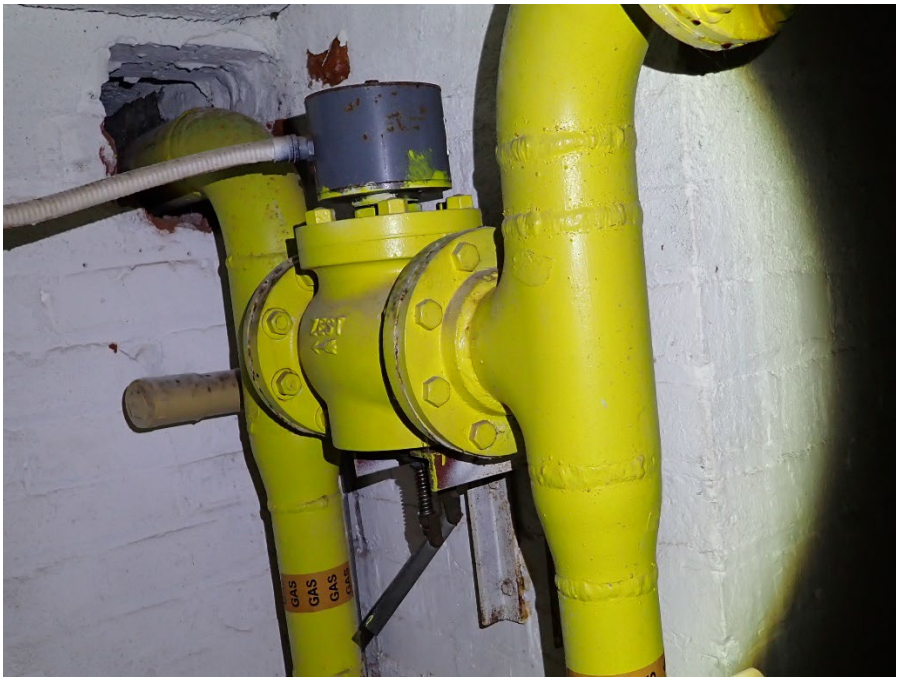
The pipework routed throughout the building is generally mild steel with welded and flanged joints on large-bore and screwed joints on small-bore. The majority of concealed pipework is thermally insulated; however, no valve insulation covers are fitted. The pipework shows significant signs of corrosion in places. The system is generally a

single-pipe distribution type, utilising a series of large-bore pipes to serve the various radiators and pipe heating cold. This type of distribution has rarely been used for the last 30 years, since it is costly to install, limits the choice and location of heat emitters and is considered unsightly.

Typical Single-Pipe Heating Distribution

6.2.5 Natural Gas Services

From the outlet of the Utility Company's meter located in the Pool area under croft, the gas pipework is routed through the building to the Boiler house to serve the LTHW Heating boiler plant. A DN80 flanged 2-port, solenoid-operated, shut-off valve is located adjacent to the meter assembly in the under croft.



Gas Solenoid Valve

The pipework is generally mild steel with welded and flanged joints on large-bore and screwed joints on small-bore. The pipework shows some signs of corrosion.

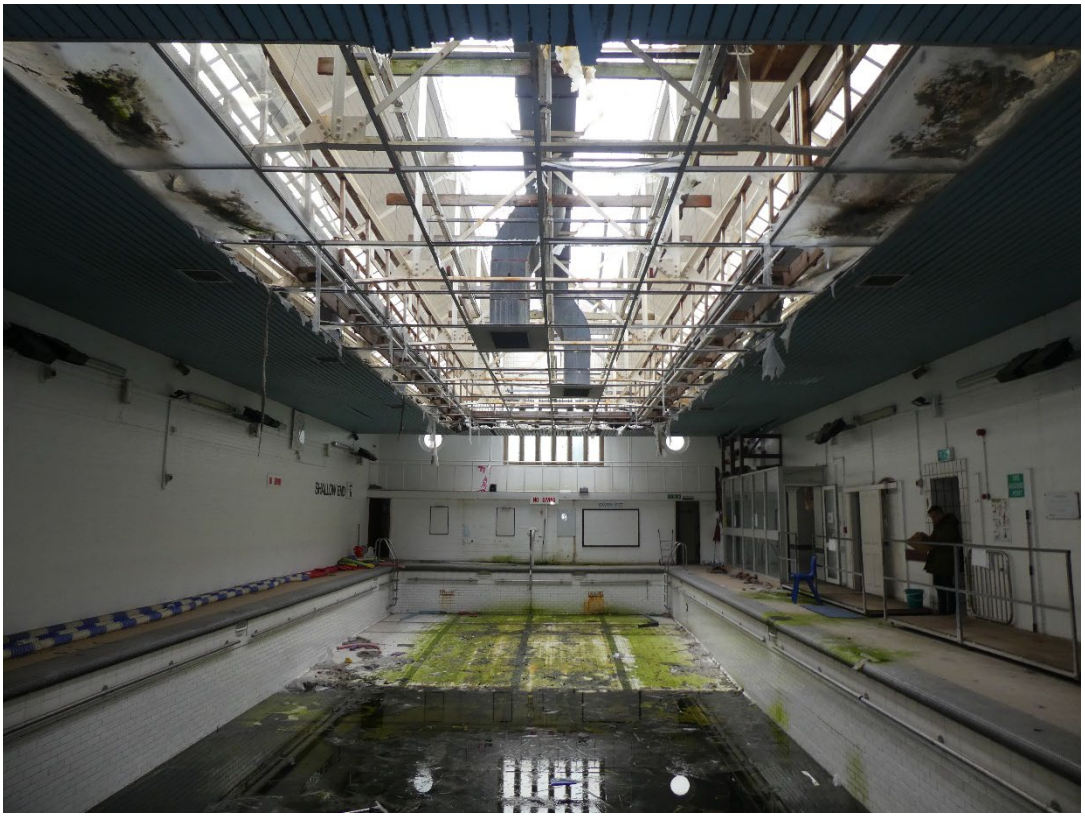
The gas supply serving the two-storey" house" area of the building was not surveyed. We were unable to access this area of the building for safety reasons. We are led to believe that this gas service supplies a domestic-style boiler.

6.2.6 Pool Area Ventilation

The Pool Area is provided with mechanical fresh air supply and extract ventilation. The air handling unit is located on a platform in the roof void of the pool. We were unable to gain access to the AHU for safety reasons.

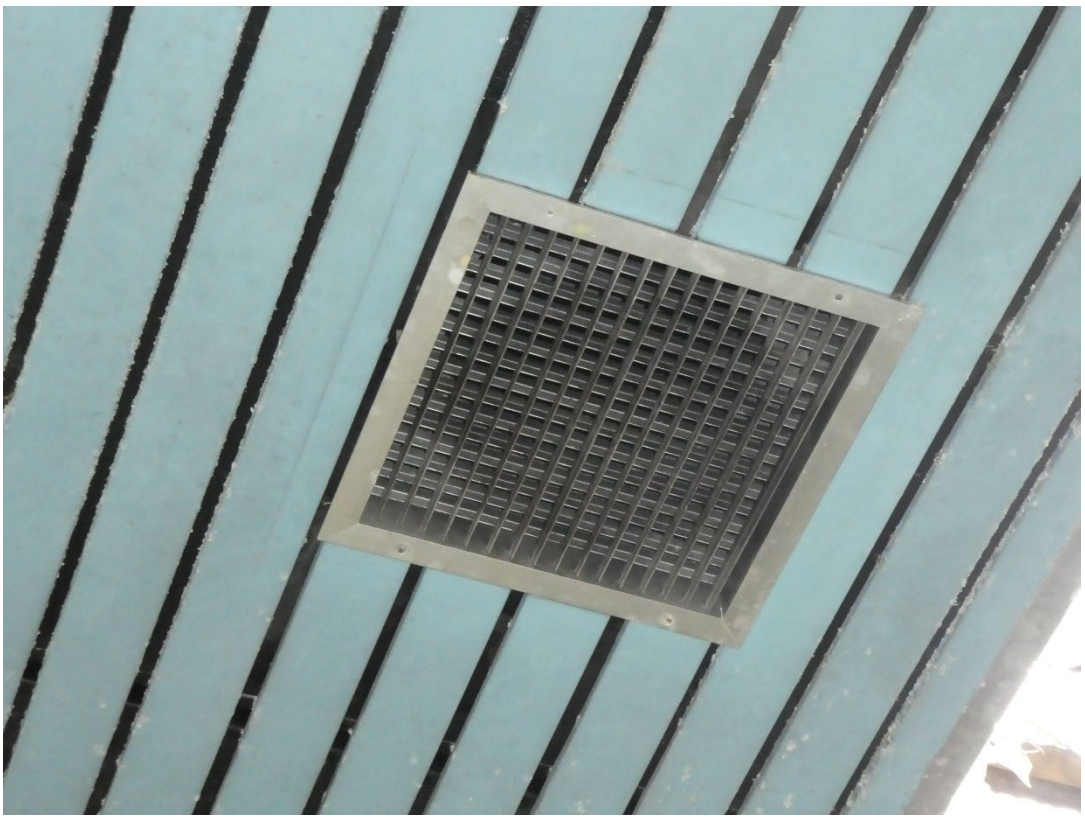
The air is heated via LTHW Heating coils, as evidenced by the controls lamps and switched mounted on the fascia of the HVAC control panel in the Boiler house.

Pool Area AHU



Pool Area Ductwork

The ductwork is generally routed in the roof void. The ductwork appears to be galvanised mild steel. Thermal insulation is applied to the supply ductwork only. Supply air is discharged into the space by a series of ceiling-mounted double deflection grilles. The return air grilles are egg-crate types.



Pool Area Supply Grille

The pool ventilation system also serves the adjacent Gym, which is known to have been a learner pool which was filled in to create the current Gym space. The supply and extract ductwork serving the gym is routed down the wall of the main pool area, with supply and extract grilles mounted at high level in the gym.

Ductwork Serving the Gym (Routed on the Wall)

High Level Supply Air Grilles in the Gym

Significant corrosion is evident on the panels of the AHU, even when viewed from floor level. The unit has been exposed to weather since the collapse of the pool roof. The unit is clearly many decades old, given the type of construction. Given that pool ventilation systems operate with warm humid air, which may also contain traces of the pool water sterilisation chemicals, they usually corrode far more quickly that “normal” ventilation systems. We would expect this to be the case in this installation.

6.2.7 Local Ventilation Systems

There are several local extract ventilation systems installed throughout the building, serving areas such as the changing rooms.

These systems were not surveyed since they form a very minor part of the installed services.

Local Ducted Extract Fan (Female Changing Area)

Gym Local Extract Fan

6.2.8 Gym Air Conditioning

There are 2 No. Hitachi ceiling cassette units installed in the space, each with condensate lift pump. The associated outdoor units are located externally, fixed at high level using cantilever brackets on the northern wall of the Gym. The data plate on the outdoor units indicates a manufacturing date of 2000. The systems use refrigerant type R410.

The AC units are operated by local wall-mounted controllers.

Gym AC Indoor Unit

Gym AC Outdoor Units

6.2.9 HVAC Automatic Controls

The main mechanical services plant is controlled by an HVAC control panel, mounted on the floor in the Boiler house. The panel was manufactured by LANDIS & GYR. The panel is an old electro-mechanical type, with no BEMS-type intelligent controls. The fascia of the panel is fitted with lamps and switches for the main plant items.

HVAC Control Panel

Significant corrosion is evident on the enclosure metal panels. Several of the switches have had the selector knobs removed.

6.3 Existing Electrical Services

6.3.1 Main Electrical Distribution.

The main electrical distribution boards are located in the basement swimming pool service tunnels with various other distribution boards placed around the building. The distribution boards are generally manufactured by Hager & Crabtree and are populated with MCB's for submains, lighting and RCBO's for socket circuits. The distribution boards are assumed to be 20+ years old and show evidence of electrical switchgear replacement works in line with the 16th edition.

Note: we are currently on the 18th Edition Amendment 2. The panel has circuit identifier labels to most circuits but there are no details of cable sizes. There was no schematic drawing displayed or rubber matting to the floor.

The containment, distribution boards & other switch gear specifically within the harsh environment of the basement are corroded. The IP ratings of the equipment and containment is compromised with direct access to single insulated exposed cables evident during the survey.

There is no sub-metering of services in place.

The submain cabling is mostly in SWA cable with some auxiliary earths clipped direct to the building fabric using non fire rated fixings to prevent premature collapse in the event of a fire with some switchgear fed in FP and/or MICC cable.

The existing Earthing & Bonding arrangement appears to be in poor condition with some main protective bonding showing signs of deterioration.

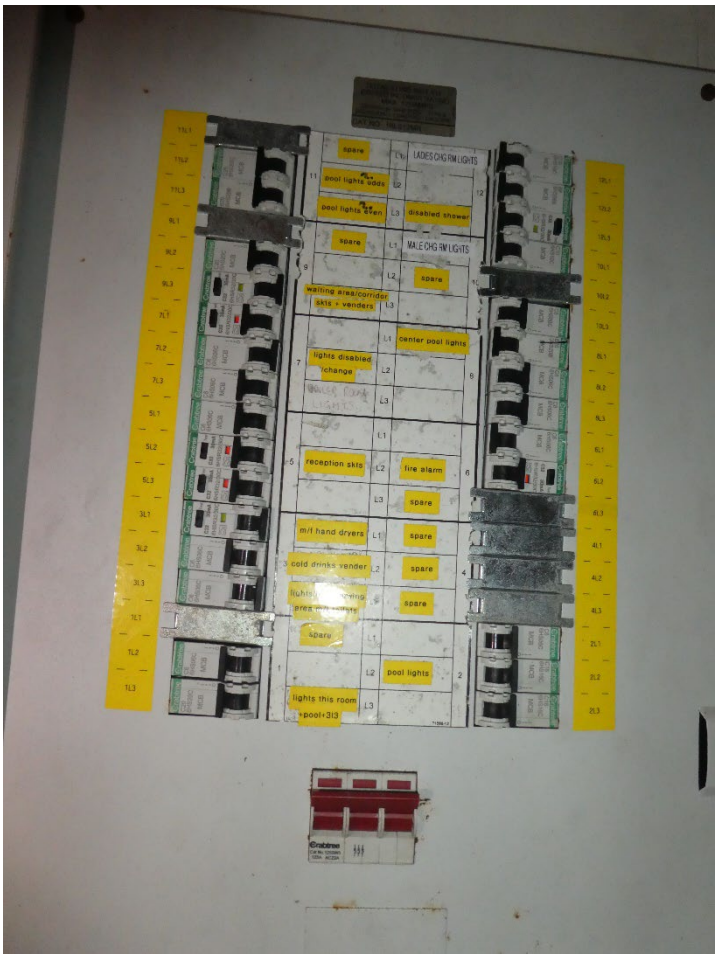
A recommendation for the proposed works would be to install a switch fuse in the tunnel with a submain to another dryer location with better access, or alternatively relocate the electrical incomer.

Main Distribution Boards – Basement

6.3.2 Ground Floor Distribution.

The ground floor is fed from a 16th Edition Crabtree TPN metal distribution board fed via an PVC SWA cable from the basement distribution board, the DB is located within the 1st Aid Room at the front of the building and appears to serve the majority of the ground floor area, there are some RCBO's protecting circuits feeding sockets with all other circuits for lighting and socket circuits not being protected by RCD's and would be a current Code 3 on an Electrical Installation Condition Report with a recommendation to upgrade.

Ground Floor DB



6.3.3 Small Power

The building has an array of various cable types installed using a variety of methods. There appears to have been many alterations over time, much of which has been installed in an ad-hoc manner. Many instances of poor installation and non-compliance were observed throughout the building.

Prior to the closure of the building the installation was circa 25+ years and was nearing the end of its recommended economic life. Following the closure of the building,and taking into account the installation has being stood unheated, unused and exposed for a long period of time, there may be instances of moisture tracking into accessories and cabling, which is likely to have reduced the life span of the services further.

Small Power within Pay Room

6.3.4 Lighting

The general lighting within the building is a combination of LED lighting, Florescent Lighting and Metal Halide Floods. The changing & gym area has some modern LED Lighting and appears to be circa 7+ years old.

Some areas were served with T8 fluorescent luminaires of 20+ years old with some T12 fluorescent luminaires observed of 40 years. As of September 2023, no new lamps have been manufactured and all replacements will be from existing stock meaning they are effectively obsolete.

The Swimming Pool is served with Metal Halide Flood lights, these are not yet obsolete but appear to be circa 20 years old and are likely to be at the end of their economic life and are recommended for replacement with modern high efficiency LED lights.

The External lighting was tested to be operational the time of the survey, however on visual inspection the existing luminares used a combination of LED flood lights, Metal Halide wall lights & Fluorescent circular bulkheads. Generally, the installation was poor with cabling clipped to the external faced of the building in a poor manor, as part of the works new shall be installed with all cables installed internally where possible therefore removing the need for externally clipped cabling and thus tidying up the building.

Gym Lighting

Changing Room Lighting

WC Lighting

Disabled WC Lighting

Swimming Pool Roof Void Lighting

Swimming Pool Lighting

External Lighting 1

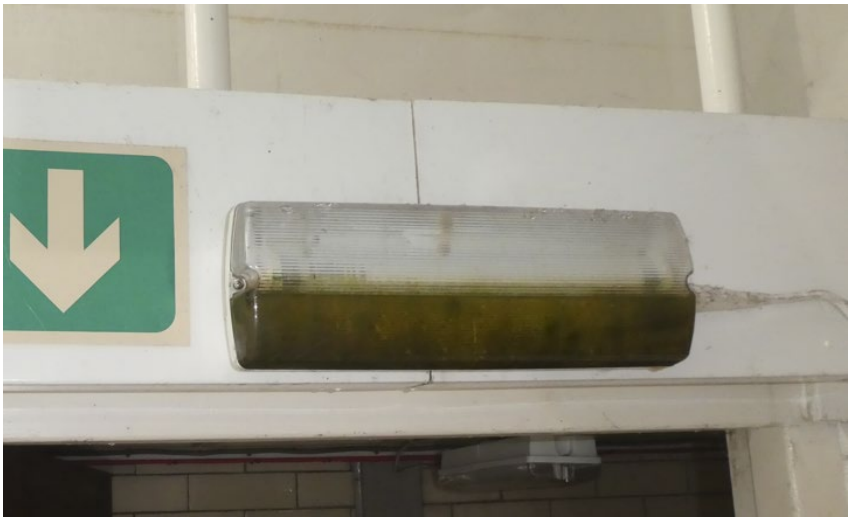
External Lighting 2

6.3.5 Emergency Lighting

The emergency lighting was observed to be self-contained luminares with individual battery packs. The installation was not functional during the survey with evidence of water ingress in some fittings.

Following the full deep discharge of the batteries since the closure and isolation of lighting circuits, the luminares will be beyond recovery and will require a full replacement.

Typical Emergency Luminaire



Typical Emergency Exit Luminaire

6.3.6 Fire Alarm System

The fire alarm is an addressable CHUBB Advanced Control Master 100 system with an estimated manufacturing date of 2007, the main panel is located in the reception circulation area. Detection is automated with manual call points installed at relevant locations. The system was non-operational at the time of the survey, due to the age of the system and parts being unavailable for an obsolete system; the panel, wiring and devices should be replaced as part of the refurbishment works.

Existing Fire Alarm Panel

6.3.7 Data and Telecoms

At the time of survey, the existing system was not functional there was no existing data cabinet found during the survey, however the incoming copper telephone line was noted entering the basement via an opening within an air vent and was secured in a poor manner with minimal fixings.

Following the planned phasing out of analogue copper telephone lines a new fibre service should be brought into site with new services installed throughout to future proof the site.

6.3.8 CCTV

The building was observed to have some antiquated CCTV services, these were not observed to be operational, a full new system should be installed throughout.

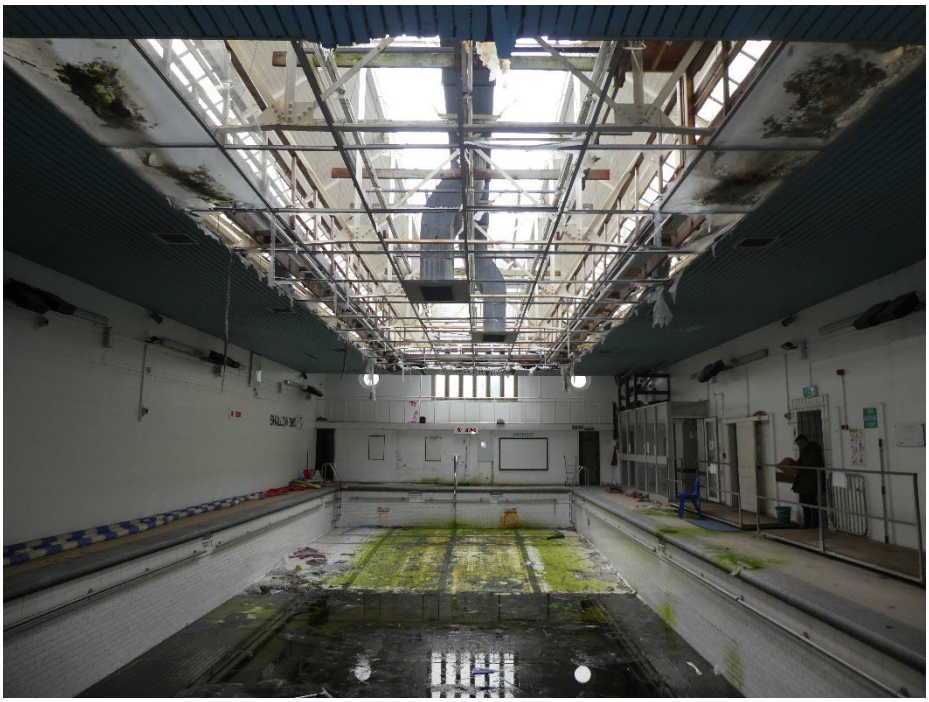
6.4 Existing Pool Equipment Services

6.4.1 Overview.

It is assumed that the existing pool has changed very little since the building was initially built, with the obvious replacement and interchanging of the old equipment for new as required to keep the pool in use. There is evidence of some additional inlets / outlets being added, probably at the time filtration system was replaced in circa 1986.

This is likely to be when the rear extension was built to house the large sand filters, and presumably when the smaller learner pool was filled in, as the services are assumed to run within the floor in the current gym space.

The current equipment is at the end of its economic life, antiquated and requires replacement.



6.4.1.1 Pool Skimmers

The existing skimmers are ornate gravity fed and deposit pool water into rainwater style hoppers before entering the filtration pipework, these are all currently full of standing water, full of biofilm and algae.

This open drainage system is aiding the moist chlorine environment causing accelerated corrosion of services within the basement; therefore, it is recommended these skimmers are isolated / capped off somehow but retained for their ornate features, and a new sealed system installed.

Existing Pool Skimmer

Existing Pool Skimmer Hoppers

6.4.1.2 Suctions & Inlets

On initial review and discussion with the pool specialist the quantity of suction and inlets for the pool is unlikely to be sufficient for modern pool standards, as such additional units shall be installed.

This is to ensure the changeover rate enough pool water is put through the filtration system to ensure the quality of the pool water is controlled and maintained within current guidelines.

6.4.1.3 Filtration Equipment

The pool filtrations system is estimated to be in the region of 38 years old with the pipe routes presumed to be run within the floor of the gym.

The filters are large floor mounted sand type filters and have a date stamp of 1989, there are 3 tanks 2 larger and one smaller, the larger tanks feed the main pool and the smaller tank is thought to have fed the learner pool but has been disconnected and is not in use.

The filtration tanks should be relined at regular intervals and after 3 re-linings the units should be replaced. As such due to the age, it is recommended that a new filtration system is installed to reduce the risk of reliability issues and enhance the filtration capability ensuring water quality.

The existing pumps appear to be in reasonable condition, and one motor has apparently been re-wound prior to the pool closure. There is the possibility that these motors may be able to be re-used however at this stage as this is an unknown, new should be allowed for and investigated further at a later stage.

Main Pool Filtration Tank No1

Main Pool Filtration Tank No2

Basement Filtration Pumps

Basement Inverter Controls

6.4.1.4 Pool Chemical Dosing Equipment

The existing pool is fitted with an automatic chemical dosing system; EVO 2 Control System from national control of Preston, however we would recommend this system to maintain reliability and to assist with maintenance that this is replaced and upgraded for a cloud based automatic dosing system that can track and provide real time data on the quality of the water in regards both temperatures and chemical levels.

EVO 2 Controls System

Chlorine Dispenser

6.4.1.5 Pool Heating & Heat Exchanger

The pool is currently fed via the 5 existing boilers as detailed within the mechanical section above, this feeds a plate heat exchanger (HEX). All connecting pipe work to the HEX and including the HEX unit are badly corroded and covered in detritus. the unit is bolted directly to the cold floor. There is some evidence that there have been previous issues with this unit as there are spare contact plates adjacent to the unit.

We do not recommend the re-use of this unit as this style of unit will be inefficient, it will not have sufficient contact area for the reduced flow & return temperatures required to ensure condensing mode on the modern GAS heating solution for Option 1 and will be massively undersized for the other solution when fed via an ASHP where the flow & return temperatures are lower still.

Pool Heat Exchanger

6.4.1.6 Pool Evaporation Cover

The existing pool cover is mounted in front of the gym on the pool side and is motorised and mounted on painted steel stanchions. the cover has been exposed to the elements since the roof damage and is showing signs of age through deterioration of the fabric, discoloration through chlorine bleaching and UV damage.

it is unknown at this stage the exact condition as it is fully closed and was non-operational. As such we would recommend that this unit is replaced with new.

Pool Evaporation Cover

7 Options & Budgets Appraisals

7.1 Options Overview

Option 1: This option consists of a refurbishment of the building and its services to bring the building back to life with minimal internal alterations.

- It has been confirmed that this option will not require an SBEM, this in turn means Option 1 will utilize the existing Gas service to provide Heating & Hot water to the site but with the replacement and upgrade of all the mechanical & electrical plant & equipment. Following this upgrade the site will benefit from reduced running costs and reduced emissions using highly efficient modern technology.

Option 2: This option aims to retain the main Pool building and its structure but with the demolition of all the connected buildings and the rebuild of these buildings with the addition of a 1st Floor.

- It has been assumed that the existing Pool building will not require an SBEM, but the new build sections will. As a result, all new build areas shall be built and designed incompliance with the current building regulations and energy & carbon targets for a building of this type. This in turn means that renewable technologies such as ASHP's and/or PV may be required, and the budgets will be based on a de-gassed solution. However, it will only be at design stage when it will be known as to what flexibility there is to use GAS on the site.

Option 3: This option is a full new build solution on the existing site complete with the sympathetic retention and inclusion of the historical front façade. This option will include a new sport England community style 25m 4 lane pool, all existing services will need to be stripped out from site and all existing foundation scrubbed up.

- The whole building will be built under the current edition of the building regulations and be designed and built to current modern energy efficiency standards and fully modelled under SBEM. The solution will be a degassed fully electric solution utilizing ASHP's and PV.

Option 4: This option is a full new build solution on a notional site, see the QS report for details of costings.

7.2 SBEM – What is SBEM?

SBEM stands for Simplified Building Energy Model. It's a software tool used for assessing the energy performance of non-domestic buildings in the United Kingdom. SBEM calculations are often required to demonstrate compliance with building regulations, specifically Part L (Conservation of Fuel and Power) in England, Wales, Scotland, and Northern Ireland.

SBEM calculates the energy use and carbon dioxide emissions of a building based on various factors such as its geometry, construction, heating, ventilation, air conditioning (HVAC) systems, lighting, and hot water provision. It provides an estimate of the building's energy consumption and CO2 emissions, allowing designers and builders to evaluate and optimize the energy performance of their buildings.

SBEM is closely linked to the Energy Performance Certificate (EPC) system, which provides information on a building's energy efficiency to potential buyers or tenants. EPC ratings are generated using SBEM calculations.

7.3 Recommended M&E Works – Option 1

7.3.1 Mechanical Services

7.3.1.1 General Comments

It should be noted that whilst this report makes recommendations for replacement of the majority of the mechanical equipment, this is unlikely to be "like for like" in the current locations. Any works will have to be compliant with current standards and practices which is likely to make the current solutions unsuitable in both technology and location. New air handling plant will be larger in size and require safe access and renewable heat sources must be considered. All of this will increase both the cost and complexity of an already challenging scheme.

7.3.1.2 Incoming Natural Gas Services

The Utility Company's natural gas meter assembly is located in the pool under croft. The meter has a rated maximum capacity of 84.95m³/hour, which could support a heat load of up to 375kW (assuming that sufficient capacity is available from the Utility Company).

This supply should be sufficient to support the load of any gas-fired appliances (boilers, water heaters and catering equipment) and we do not envisage an upgrade being required. This would require confirmation at concept/detailed design stage.

A further incoming natural gas service enters the two-storey" house" area of the building. We were unable to access this area of the building for safety reasons. We are led to believe that this gas service supplies a domestic-style boiler. We would recommend that this service is stripped out and the services replaced to suit.

7.3.1.3 Incoming Mains Cold Water Service

Further investigation will be required to ascertain the capacity of the incoming mains cold water service. Since the incoming service pipe material is metallic, it is highly likely that a new incoming supply will be required to ensure long-term water quality.

7.3.1.4 Above Ground Drainage

The above ground drainage system was not surveyed since it forms a very minor part of the installed services.

If the building is subject to a major refurbishment, we would recommend that the above ground drainage system is replaced with new throughout.

7.3.1.5 Domestic Services

The existing vented, indirect, copper, cylindrical, vertical pattern calorifier, located in the Boiler house, appears to be many decades old and will almost certainly be heavily scaled on the internal surfaces.

No legionella inspection reports for the existing Domestic Services were made available to us. In our experience, buildings of this age have significant defects, such as corroded/leaking pipework, no/poor pipework thermal insulation, poor hot water circulation, presence of dead legs, inadequate backflow prevention etc. A detailed survey would be required to examine these potential defects.

To exacerbate the above issues, the recent dilapidation of the building, including the stripping out of all showers and sanitary appliances have accelerated the deterioration of the services.

To ensure service resilience and longevity, we would recommend that the services are replaced throughout with new.

Consideration should also be given to the installation of a cold-water booster set, particularly so if the incoming mains cold water service is low pressure (less than 3 bar) and/or where the design load profile envisages a significant peak flow rate.

7.3.1.6 LTHW Heating

The existing 5 No. boilers are at least 25 years old. It is evident that there used to be 8 No. boilers installed at one time, with three of them having been stripped out at some point. Significant areas of rust are present on every boiler casing panel. Some panels have been removed or have fallen off.

The feed and expansion cistern(s) require replacement with modern pressurisation equipment to ensure removal of air and to prevent unnecessary corrosion.

The HVAC control panel would require replacement with new, to meet modern demands and to ensure resilience and availability of spare parts.

The majority of the radiators in the building are presently disconnected from the heating system, leading to a significant number of rooms having no form of heating.

To ensure service resilience and longevity, we would recommend that the entire LTHW Heating system is replaced throughout with new if a full redevelopment of the site is considered.

7.3.1.7 LTHW Heating to Pool Equipment

Following on from the issue of our report and budget costs for options 1 and 2, we have subsequently been advised by the pool specialist that the heat load requirement for the existing pool equipment was circa 120kW.

To meet this requirement, the LTHW Heating boiler plant detailed in the previous section would require increasing in size accordingly. The budget costs have been increased to suit.

7.3.1.8 Natural Gas Services

The pipework is generally mild steel with screwed joints, even on pipework above DN50. Screwed joints on large-bore pipework are not compliant with current regulations. We also noted a lack of isolation valves, pressure test points and purge points, again demonstrating non-compliance with current regulations.

To ensure service resilience and longevity, we would recommend that the natural gas service is replaced throughout with new if a full redevelopment of the site is considered, especially so if the proposed layout differs significantly from existing.

7.3.1.9 Ventilation to Pool Area

The Pool Area is provided with mechanical fresh air supply and extract ventilation. The air handling unit is located on a platform in the roof void of the pool. We were unable to gain access to the AHU for safety reasons.

The existing system has no form of heat recovery and very basic controls, all leading to very poor energy efficiency.

Significant corrosion is evident on the panels of the AHU. The unit and ductwork have been exposed to weather since the collapse of the pool roof.

We would recommend that the ventilation system is replaced completely, regardless of what other works are proposed to be carried out.

7.3.1.10 Local Ventilation Systems

The ancillary areas, such as the Gym, Changing Areas etc. have no effective means of ventilation and certainly don't comply with current Building Regulations.

To ensure service resilience and longevity, we would recommend that these services are replaced throughout with new.

7.3.1.11 Air Conditioning to Gym

The existing Hitachi AC systems are not as old as the other M&E Services (say 10-15 years). It is possible that these units could be retained and re-used, subject to detailed design validation and inspection/servicing.

For the purposes of budget costing, we would recommend that these are replaced with new.

7.3.1.12 HVAC Automatic Controls

The panel is an old electro-mechanical type, with no BEMS-type intelligent controls. Significant corrosion is evident on the enclosure metal panels. Several of the switches have had the selector knobs removed.

The HVAC control panel would require replacement with new, to meet modern demands and to ensure resilience and availability of spare parts.

7.3.2 Electrical Services

7.3.2.1 General Comments

Due to the scale and nature of the building, there have been many changes over time leading to a wide variation in age and condition of individual items of equipment and services. This report does not attempt to address each item of equipment or service on an individual basis but take the installation as a whole and makes recommendations on that premise.

7.3.2.2 Electrical Incoming Supply

The existing electrical supply will need a replacement due to corrosion but an increase in site capacity for option 1 is not considered necessary, as the current supply had previously supplied the site.

As option 1 will simply upgrade, replace, and modernise the existing services with an increase in energy efficiency the demand for the site is not expected to increase.

7.3.2.3 Electrical Distribution

The main distribution board is in poor condition due to the corrosive atmosphere within the pool service tunnels and shall be replaced and relocated to a more suitable location, the store beneath the viewing area have been currently used for the option 1 budgets.

A new 400A section panel with submetering has been proposed, new SWA XLPE submains shall be installed run above the flat ceiling in the pool area on new hot dip galvanised tray containment to feed distribution boards for:

- Mechanical services within the Boiler Plant Room.
- Mechanical Services within the Pool Plant Room.
- General lighting & Power location to be agreed.

7.3.2.4 Mechanical Power

With reference to the mechanical section of this report, the electrical supplies to the mechanical services will require replacement.

7.3.2.5 Small Power

The small power installation is beyond its serviceable life and should be replaced. This shall involve all outlets to serve the general duties of the building.

7.3.2.6 Lighting

The lighting installation is beyond its serviceable life and should be replaced. The replacement scheme shall comprise LED with automated controls as appropriate. Due to the nature of the pool area's chlorine rich environment special chlorine resistant luminares have been proposed, these will generally be LED flood lights shone upwards to illuminate the pool using indirect lighting as per the Sport England Lighting Guide.

External building mounted lighting has been allowed for with some inground architectural uplighting for the front façade to emphasize the historic features of the building.

The carpark area will be provided with some lighting columns to help safe access around site.

7.3.2.7 Emergency Lighting

The lighting installation is beyond its serviceable life and should be replaced. A new scheme fully compliant with the current British standards and regulations will be provided.

7.3.2.8 Fire Alarm System

The existing fire alarm system is obsolete and past its economic life and shall be replaced, at this stage a L1 fully addressable system with an Aspiration system for detection within the inaccessible void above the pool has been budgeted. Prior to design a fire risk assessment should be carried out by a suitably qualified fire engineer to determine the risk and determine what level of system should be provided to manage the perceived risks.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.3.2.9 Data and Telecoms

At the time of survey, the existing system was not functional there was no existing data cabinet found during the survey, however the incoming copper telephone line was noted entering the basement via an opening within an air vent and was secured in a poor manner with minimal fixings.

Following the planned phasing out of analogue copper telephone lines a new fibre service should be brought into site with new services installed throughout to future proof the site, this shall include but not limited to:

- New Data Cabinet complete with switches, patch panels, PDU's & routers
- Wi-Fi access points.
- New Cat6A data cabling to RJ45 data outlets where required for PC's, Phones, Vending Machines. Etc
- The CCTV network video recorder shall also be placed within the new Data cabinet.

7.3.2.10 CCTV System

A new CCTV system shall be provided throughout this shall include internal CCTV services, consideration around the placement of cameras will need to be discussed during the design to avoid invasion of privacy but also to help with safeguarding procedures.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.3.2.11 Intruder Alarm System

A new Intruder alarm system shall be provided throughout to provide early warning of intruders.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.3.2.12 Lightning Protection

The building will require a new lightning protection system the installation of which will need to account for the heritage nature of the building and listed exterior.

7.3.3 Pool Services

7.3.3.1 General Comments

The generally theme for this option is full strip out and removal, with the relocation of all possible plant out of the pool access tunnels and into the existing plant room at the rear of the gym, this will require the exposing of the existing services within the floor void of the gym, for the initial removal and then widening of the trenching to accommodate the additional pipework for the Heating, Suction, Inlets, & Drainage lines. Exact details will be confirmed at design stage with a civil engineer.

The relocation of this equipment will aid in the longevity of these systems through ease of maintenance and corrosion from moving from a wet environment will very little space & height to a new dry plant room with better access & lighting.

7.3.3.2 Pool Skimmers

New pool skimmers will be installed, existing pipework & equipment will be removed and disposed of by others and new installed to ensure sufficient surface water is drawn from the pool into the filtration system, and debris traps to ensure the changeover rate of the pool meets modern standards and also the Sport England Requirements.

7.3.3.3 Suctions & Inlets

Looking at the current pool inlets and suctions there will need to be additional units installed to ensure sufficient water is drained from the pool into the filtration system and also to run sufficient volumes of water through the heat exchanger unit for heating, all existing suction/inlets shall be replaced with new, all existing pipework and equipment will be removed and disposed of by others and new installed.

7.3.3.4 Filtration Equipment

A new sand type filtration system with pumps shall be installed within the existing plant room to the rear of the gym, all existing pipework & equipment will be removed and disposed of by others and new installed, on this option, the existing doorway will need to be enlarged to remove the large sand filter units from site.

7.3.3.5 Pool Chemical Dosing Equipment

The existing chemical dosing system shall be stripped out removed disposed of by others and a new cloud based automatic dosing system that can track and provide real time data on the quality of the water in regards both temperatures and chemical levels.

7.3.3.6 Pool Heating & Heat Exchanger

The heating system is designated for replacement as part of the mechanical section, the existing heating pipework including the existing HEX & pumps shall be stripped out removed disposed of by others.

A new high efficiency HEX unit along with circulation pumps shall be installed within the plant room at the rear of the gym and connected up to the new gas condensing boilers, all linked up to a new pool equipment control panel.

An estimated pool heating demand of 120kW will be required.

7.3.3.7 Pool Evaporation Cover

A new pool cover shall be installed which will insulate the pool and reduce evaporation for when not in use and helping to reduce the pool heating costs.

7.3.3.8 Budget Costs

A budget cost of around £265,000 should be allowed at this stage to cover the above works.

7.3.4 Budget Costs

Section	Description	Total (£)
M01	PRELIMINARIES	£ 3,300
M02	STRIP OUT EXISTING REDUNDANT SERVICES	£ 6,020
M03	REPLACE INCOMING MAINS COLD WATER SERVICE	£ 8,250
M04	ABOVE GROUND DRAINAGE	£ 7,820
M05	DOMESTIC SERVICES	£ 65,879
M06	LTHW HEATING	£ 123,166
M07	NATURAL GAS SERVICE	£ 8,740
M08	VENTILATION TO POOL AREA	£ 69,800
M09	LOCAL VENTILATION	£ 53,800
M10	AIR CONDITIONING TO GYM	£ 11,000
M11	HVAC AUTOMATIC CONTROLS	£ 44,000
M12	TEST & COMMISSION AND O&M MANUALS	£ 12,207
	Mech Sub-Total (£):	**£ 413,982**
E01	PRELIMINARIES - ELECTRICAL SERVICES	£ 5,500
E02	NEW SUBMAINS	£ 10,643
E03	ELECTRICAL DISTRIBUTION BOARDS	£ 14,850
E04	ELECTRICAL CABLE CONTAINMENT SYSTEMS	£ 13,871
E05	GENERAL & EMERGENCY LIGHTING	£ 114,378
E06	FIRE ALARM SYSTEMS	£ 27,962
E07	SECURITY SYSTEMS	£ 37,915
E08	GENERAL POWER	£ 42,526
E09	DATA SERVICES	£ 25,234
E10	ELECTRICAL WORKS FOR MECHANICAL SERVICES	£ 7,205
E11	LIGHTNING PROTECTION	£ 9,350
E12	STRIP OUT OF EXISTING SERVICES	£ 2,200
E13	CONTINGENCY	£ 5,500
E14	NOT REQUIRED	NOT REQUIRED
E15	ALTERATIONS TO EXISTING	£ 7,150
E16	INSPECTION, TESTING & COMMISSIONING	£ 2,695
E17	HANDOVER, O&M MANUAL AND AS-INSTALLED DRAWINGS	£ 1,320
	Elec Sub-Total (£):	**£ 328,298**
	Total (£):	**£ 742,280**

All costs exclude the following: -

- Value Added Tax
- Professional fees
- Principal Contractor management fees, overhead and profit
- CDM Principal Contractor's duties
- Asbestos survey and/or mitigation works.
- Sanitary ware and IPS systems
- Sanitary ware and IPS systems
- Rainwater disposal and below ground drainage
- Firefighting services (sprinklers, smoke ventilation etc.).
- Builders work in connection.
- Premium-time working

7.4 Recommended M&E Works – Option 2

7.4.1 Mechanical Services

7.4.1.1 General Comments

It should be noted that whilst this report makes recommendations for replacement of the majority of the mechanical equipment, this is unlikely to be "like for like" in the current locations. Any works will have to be compliant with current standards and practices which is likely to make the current solutions unsuitable in both technology and location. New air handling plant will be larger in size and require safe access and renewable heat sources must be considered. All of this will increase both the cost and complexity of an already challenging scheme.

7.4.1.2 Incoming Natural Gas Services

To comply with the spirit of the Building Regulations, and Government policy in general, we would recommend that no new gas-fired equipment is installed. As such, we recommend that the existing gas service to the site is decommissioned and stripped out.

7.4.1.3 Incoming Mains Cold Water Service

Further investigation will be required to ascertain the capacity of the incoming mains cold water service. Since the incoming service pipe material is metallic, it is highly likely that a new incoming supply will be required to ensure long-term water quality.

7.4.1.4 Above Ground Drainage

The above ground drainage system was not surveyed since it forms a very minor part of the installed services.

If the building is subject to a major refurbishment, we would recommend that the above ground drainage system is replaced with new throughout.

7.4.1.5 Domestic Services

The existing vented, indirect, copper, cylindrical, vertical pattern calorifier, located in the Boiler house, appears to be many decades old and will almost certainly be heavily scaled on the internal surfaces.

No legionella inspection reports for the existing Domestic Services were made available to us. In our experience, buildings of this age have significant defects, such as corroded/leaking pipework, no/poor pipework thermal insulation, poor hot water circulation, presence of dead legs, inadequate backflow prevention etc. A detailed survey would be required to examine these potential defects.

To exacerbate the above issues, the recent dilapidation of the building, including the stripping out of all showers and sanitary appliances have accelerated the deterioration of the services.

To ensure service resilience and longevity, we would recommend that the services are replaced throughout with new.

Consideration should also be given to the installation of a cold-water booster set, particularly so if the incoming mains cold water service is low pressure (less than 3 bar) and/or where the design load profile envisages a significant peak flow rate.

7.4.1.6 LTHW Heating

The existing 5 No. boilers are at least 25 years old. It is evident that there used to be 8 No. boilers installed at one time, with three of them having been stripped out at some point. Significant areas of rust are present on every boiler casing panel. Some panels have been removed or have fallen off.

The feed and expansion cistern(s) require replacement with modern pressurisation equipment to ensure removal of air and to prevent unnecessary corrosion.

The majority of the radiators in the building are presently disconnected from the heating system, leading to a significant number of rooms having no form of heating.

To ensure service resilience and longevity, we would recommend that the entire LTHW Heating system is replaced throughout with a new system using air-source heat pumps (ASHP). These units would be located externally, preferably in a position that's not susceptible to vandalism (on the roof of the building or protected in a cage at ground level).

Heating to the redeveloped areas would generally be via wet underfloor heating, with wall-mounted radiators and fan convectors also used where additional heating is required.

Typical Air-Source Heat Pumps

7.4.1.7 LTHW Heating to Pool Equipment

Following on from the issue of our report and budget costs for options 1 and 2, we have subsequently been advised by the pool specialist that the heat load requirement for the existing pool equipment was circa 120kW.

To meet this requirement, the LTHW Heating boiler plant detailed in the previous section would require increasing in size accordingly. The budget costs have been increased to suit.

7.4.1.8 Natural Gas Service

A natural gas service is not required.

7.4.1.9 Ventilation to Pool Area

The Pool Area is provided with mechanical fresh air supply and extract ventilation. The air handling unit is located on a platform in the roof void of the pool. We were unable to gain access to the AHU for safety reasons.

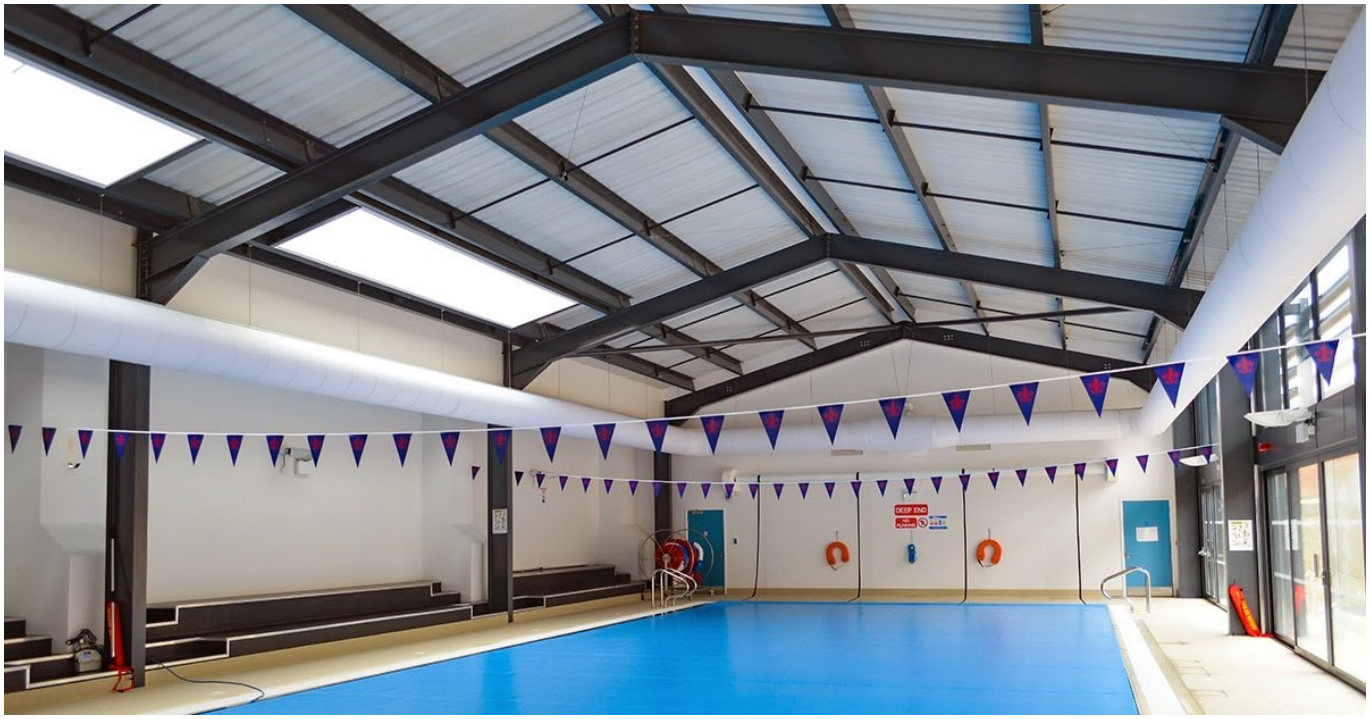
The existing system has no form of heat recovery and very basic controls, all leading to very poor energy efficiency.

Significant corrosion is evident on the panels of the AHU. The unit and ductwork have been exposed to weather since the collapse of the pool roof.

We would recommend that the ventilation system is replaced completely, regardless of what other works are proposed to be carried out.

The associated heat recovery air handling unit (AHU) would be located in the main Plantroom, with heating provided by the ASHP plant. The unit would be selected to work with a high-humidity environment.

The supply ventilation ductwork routed within the main Pool Hall would be either a textile duct or a traditional galvanised mild steel duct, routed at high level. The exact details would be confirmed at detailed design stage.



Typical Textile Ventilation Duct to Pool Hall

7.4.1.10 Local Ventilation Systems

The ancillary areas, such as the Gym, Changing Areas etc. have no effective means of ventilation and certainly don't comply with current Building Regulations.

To ensure service resilience and longevity, we would recommend that these services are replaced throughout with new.

The associated heat recovery air handling unit (AHU) would be located in the main Plantroom.

7.4.1.11 Air Conditioning

The existing Hitachi AC systems serving the Gym are not as old as the other M&E Services (say 10-15 years). It is possible that these units could be retained and re-used, subject to detailed design validation and inspection/servicing. For the purposes of budget costing, we would recommend that these are replaced with new.

We would recommend that air conditioning is also provided to the following areas, subject to detailed design confirming that these areas would overheat without AC: -

- GF Reception
- GF Café
- GF Dry Activity Space
- FF Dry Activity Space 1
- FF Dry Activity Space 2

7.4.1.12 HVAC Automatic Controls

The panel is an old electro-mechanical type, with no BEMS-type intelligent controls. Significant corrosion is evident on the enclosure metal panels. Several of the switches have had the selector knobs removed.

The HVAC control panel would require replacement with new, to meet modern demands and to ensure resilience and availability of spare parts.

7.4.2 Electrical Services

7.4.2.1 General Comments

Due to the scale and nature of the building, there have been many changes over time leading to a wide variation in age and condition of individual items of equipment and services. This report does not attempt to address each item of equipment or service on an individual basis but take the installation as a whole and makes recommendations on that premise.

7.4.2.2 Electrical Incoming Supply

The existing electrical supply will be undersized for this de-gassed solution therefore an estimated 200kVA supply with an expected main fuse size of 315A has been budgeted for, however at this stage it has been assumed that the DNO will be able to provide the site with the required capacity using an LV point of connection.

If the DNO determines upon application that there is insufficient capacity in the area at LV, then they will provide a HV point of connection where a new substation will be required at an agreed location on the site, this in turn will increase the cost of the new supply up to an estimated budget of around £100,000.00.

The new incomer shall enter the site in the new plant room at the rear of the site.

This item should be highlighted as a potential risk item.

7.4.2.3 Electrical Distribution

The new section panel shall be located in the new plant room adjacent to the new electrical supply.

The section panel shall be a 400A rated section panel with submetering, SWA XLPE submains shall be installed run above the flat ceiling in the pool area on new hot dip galvanised tray containment to feed distribution boards for:

- Mechanical services within the Boiler Plant Room.
- Mechanical Services within the Pool Plant Room.
- General lighting & Power 2 locations to be agreed.

7.4.2.4 Mechanical Power

All mechanical service wiring shall be new and wired either from the new BEMS panel or directly from the Mechanical distribution boards where the energy usage for these items of equipment can be monitored.

7.4.2.5 Small Power

All new services for sockets, switched fused connection units and the like shall be provided to serve the duties of the building.

7.4.2.6 Lighting

The lighting installation is beyond its serviceable life and should be replaced. The replacement scheme shall comprise of LED luminares with automated controls as appropriate. Due to the nature of the pool area's chlorine rich environment special chlorine resistant luminares have been proposed, these will generally be LED flood lights shone upwards to illuminate the pool using indirect lighting as per the Sport England Lighting Guide.

External building mounted lighting has been allowed for with some inground architectural uplighting for the front façade to emphasize the historic features of the building.

The carpark area will be provided with some lighting columns to help safe access around site.

7.4.2.7 Emergency Lighting

The lighting installation is beyond its serviceable life and should be replaced. A new scheme fully compliant with the current British standards and regulations will be provided.

7.4.2.8 Fire Alarm System

The existing fire alarm system is obsolete and past its economic life and shall be replaced, at this stage a L1 fully addressable system with an Aspiration system for detection within the inaccessible void above the pool has been budgeted. Prior to design a fire risk assessment should be carried out by a suitably qualified fire engineer to determine the risk and determine what level of system should be provided to manage the perceived risks.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.4.2.9 Data and Telecoms

At the time of survey, the existing system was not functional there was no existing data cabinet found during the survey, however the incoming copper telephone line was noted entering the basement via an opening within an air vent and was secured in a poor manner with minimal fixings.

Following the planned phasing out of analogue copper telephone lines a new fibre service should be brought into site with new services installed throughout to future proof the site, this shall include but not limited to:

- New Data Cabinet complete with switches, patch panels, PDU's & routers
- Wi-Fi access points.
- New Cat6A data cabling to RJ45 data outlets where required for PC's, Phones, Vending Machines. Etc
- The CCTV network video recorder shall also be placed within the new Data cabinet.

7.4.2.10 CCTV System

A new CCTV system shall be provided throughout this shall include internal CCTV services, consideration around the placement of cameras will need to be discussed during the design to avoid invasion of privacy but also to help with safeguarding procedures.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.4.2.11 Intruder Alarm System

A new Intruder alarm system shall be provided throughout to provide early warning of intruders.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.4.2.12 Lightning Protection

The building will require a new lightning protection system the installation of which will need to account for the heritage nature of the building and listed exterior.

7.4.2.13 Photovoltaics

As this option requires SBEM renewable technologies may be needed, therefore for budget purposes an allowance of £20,000.00 has been added to the costs. The minimum size of the PV array will need to be determined at design stage when the SBEM model is run as this will determine the quantity of panels required to meet the carbon emission targets any additional panels above the minimum required can be discussed at this stage also.

An application will need to be put into the DNO at design stage to inform them of the intentions and to gain approval for connecting the electrical generation equipment to their network.

7.4.2.14 Electric Vehicle Charging

The requirement for EV charging will need to be determined by the relevant stake holders and building control.

The current requirements within Part S of the building regulation state that where a site has more than 10 parking spaces then at least 1 charger must be provided, and at least 1 in every 5 remaining spaces shall be provided with access to cable routes for future EV.

In these budgets 4x 7.2kW EV chargers have been included within the proposed costs, the exact quantity, type and back-end monitoring for billing. Etc will need to be determined at design stage.

7.4.3 Pool Services

7.4.3.1 General Comments

The generally theme for this option is full strip out and removal, with the relocation of all possible plant out of the pool access tunnels and into the existing plant room at the rear of the gym, this will require the exposing of the existing services within the floor void of the gym, for the initial removal and then widening of the trenching to accommodate the additional pipework for the Heating, Suction, Inlets, & Drainage lines. Exact details will be confirmed at design stage with a civil engineer.

The relocation of this equipment will aid in the longevity of these systems through ease of maintenance and corrosion from moving from a wet environment will very little space & height to a new dry plant room with better access & lighting.

7.4.3.2 Pool Skimmers

New pool skimmers will be installed, existing pipework & equipment will be removed and disposed of by others and new installed to ensure sufficient surface water is drawn from the pool into the filtration system, and debris traps to ensure the changeover rate of the pool meets modern standards and also the Sport England Requirements.

7.4.3.3 Suctions & Inlets

Looking at the current pool inlets and suctions there will need to be additional units installed to ensure sufficient water is drained from the pool into the filtration system and also to run sufficient volumes of water through the heat exchanger unit for heating, all existing suction/inlets shall be replaced with new, all existing pipework and equipment will be removed and disposed of by others and new installed.

7.4.3.4 Filtration Equipment

A new sand type filtration system with pumps shall be installed within the existing plant room to the rear of the gym, all existing pipework & equipment will be removed and disposed of by others and new installed, on this option, the existing doorway will need to be enlarged to remove the large sand filter units from site.

7.4.3.5 Pool Chemical Dosing Equipment

The existing chemical dosing system shall be stripped out removed disposed of by others and a new cloud based automatic dosing system that can track and provide real time data on the quality of the water in regards both temperatures and chemical levels.

7.4.3.6 Pool Heating & Heat Exchanger

The heating system is designated for replacement as part of the mechanical section, the existing heating pipework including the existing HEX & pumps shall be stripped out removed disposed of by others.

A new high efficiency HEX unit & Circulation Pumps shall be installed suitably sized to accommodate for the lower flow & return temperatures and increased flow rated required when connected to the new ASHP primary plant, all linked up to a new pool equipment control panel.

An estimated pool heating demand of 120kW will be required.

7.4.3.7 Pool Evaporation Cover

A new pool cover shall be installed which will insulate the pool and reduce evaporation for when not in use and helping to reduce the pool heating costs.

7.4.3.8 Budget Costs

A budget cost of around £277,500 should be allowed at this stage to cover the above works.

7.4.4 Budget Costs

Section	Description	Total (£)
M01	PRELIMINARIES	£ 3,300
M02	STRIP OUT EXISTING REDUNDANT SERVICES	£ 6,020
M03	REPLACE INCOMING MAINS COLD WATER SERVICE	£ 8,250
M04	ABOVE GROUND DRAINAGE	£ 7,820
M05	DOMESTIC SERVICES	£ 71,629
M06	LTHW HEATING	£ 187,145
M07	NATURAL GAS SERVICE	NOT REQUIRED
M08	VENTILATION TO POOL AREA	£ 72,675
M09	LOCAL VENTILATION	£ 56,675
M10	AIR CONDITIONING	£ 44,000
M11	HVAC AUTOMATIC CONTROLS	£ 49,500
M12	TEST & COMMISSION AND O&M MANUALS	£ 12,207
	Mech Sub-Total (£):	**£ 513,471**
E01	PRELIMINARIES - ELECTRICAL SERVICES	£ 5,500
E02	NEW SUBMAINS	£ 7,260
E03	ELECTRICAL DISTRIBUTION BOARDS	£ 20,900
E04	ELECTRICAL CABLE CONTAINMENT SYSTEMS	£ 13,871
E05	GENERAL & EMERGENCY LIGHTING	£ 133,953
E06	FIRE ALARM SYSTEMS	£ 29,942
E07	SECURITY SYSTEMS	£ 37,915
E08	GENERAL POWER	£ 48,026
E09	DATA SERVICES	£ 25,234
E10	ELECTRICAL WORKS FOR MECHANICAL SERVICES	£ 8,745
E11	LIGHTNING PROTECTION	£ 9,350
E12	STRIP OUT OF EXISTING SERVICES	£ 2,200
E13	CONTINGENCY	£ 5,500
E14	NEW ELECTRICAL SUPPLY	£ 49,500
E15	PHOTOVOLTAICS	£ 22,000
E16	EV CHARGING	£ 11,000
E17	INSPECTION, TESTING & COMMISSIONING	£ 2,695
E18	HANDOVER, O&M MANUAL AND AS-INSTALLED DRAWINGS	£ 1,320
	Elec Sub-Total (£):	**£ 434,910**
	Total (£):	**£ 948,381**

All costs exclude the following: -

- Value Added Tax
- Professional fees
- Principal Contractor management fees, overhead and profit
- CDM Principal Contractor's duties
- Asbestos survey and/or mitigation works.
- Sanitary ware and IPS systems
- Sanitary ware and IPS systems
- Rainwater disposal and below ground drainage
- Firefighting services (sprinklers, smoke ventilation etc.).
- Builders work in connection.
- Premium-time working

7.5 Recommended M&E Works – Option 3

7.5.1 Mechanical Services

7.5.1.1 General Comments

This option comprises of a full replacement of the existing building complete with new foundations, services with the sympathetic retention of the front historic façade,

7.5.1.2 Incoming Natural Gas Services

To comply with the spirit of the Building Regulations, and Government policy in general, we would recommend that no new gas-fired equipment is installed. As such, we recommend that the existing gas service to the site is decommissioned and stripped out.

7.5.1.3 Incoming Mains Cold Water Service

Further investigation will be required to ascertain the capacity of the incoming mains cold water service. Since the incoming service pipe material is metallic, it is highly likely that a new incoming supply will be required to ensure long-term water quality.

7.5.1.4 Above Ground Drainage

The existing above ground drainage system would be stripped out and replaced with new throughout to suit the proposed layout.

7.5.1.5 Domestic Services

The existing hot and cold water services would be stripped out and replaced with new throughout to suit the proposed layout.

A new potable cold water storage cistern and packaged booster set would be provided to ensure adequate flow rates and pressure at all outlets.

The pool equipment would be provided with a dedicated Cat 5 packaged cold water storage cistern / booster set assembly to ensure compliance with water regulations.

Hot water would be generated by a series of unvented hot water storage calorifiers, each with twin indirect heating cold and electric immersion heaters. The hot water distribution circuit would be a flow & return type with pump.

All wash hand basins would be provided with a thermostatic mixing valve. All showers would be thermostatic types.

7.5.1.6 LTHW Heating

A new LTHW Heating system would be provided, utilising air-source heat pumps (ASHP) as the heat source. These units would be located externally, preferably in a position that's not susceptible to vandalism (on the roof of the building or protected in a cage at ground level).

A series of individual pumped circuits would be provided to serve the various heat emitters, HWS calorifiers, AHU heating coils and pool equipment.

The heating plant would be provided with all necessary equipment to allow system filling, air venting and chemical dosing.

Heating to the redeveloped areas would generally be via wet underfloor heating, with wall-mounted radiators and fan convectors also used where additional heating is required.

Typical Air-Source Heat Pumps

7.5.1.7 LTHW Heating to Pool Equipment

Following on from the issue of our report and budget costs for options 1 and 2, we have subsequently been advised by the pool specialist that the heat load requirement for the new pool equipment will be circa 165kW.

To meet this requirement, the LTHW Heating boiler plant detailed in the previous section would be increased in size accordingly.

7.5.1.8 Natural Gas Service

A natural gas service is not required.

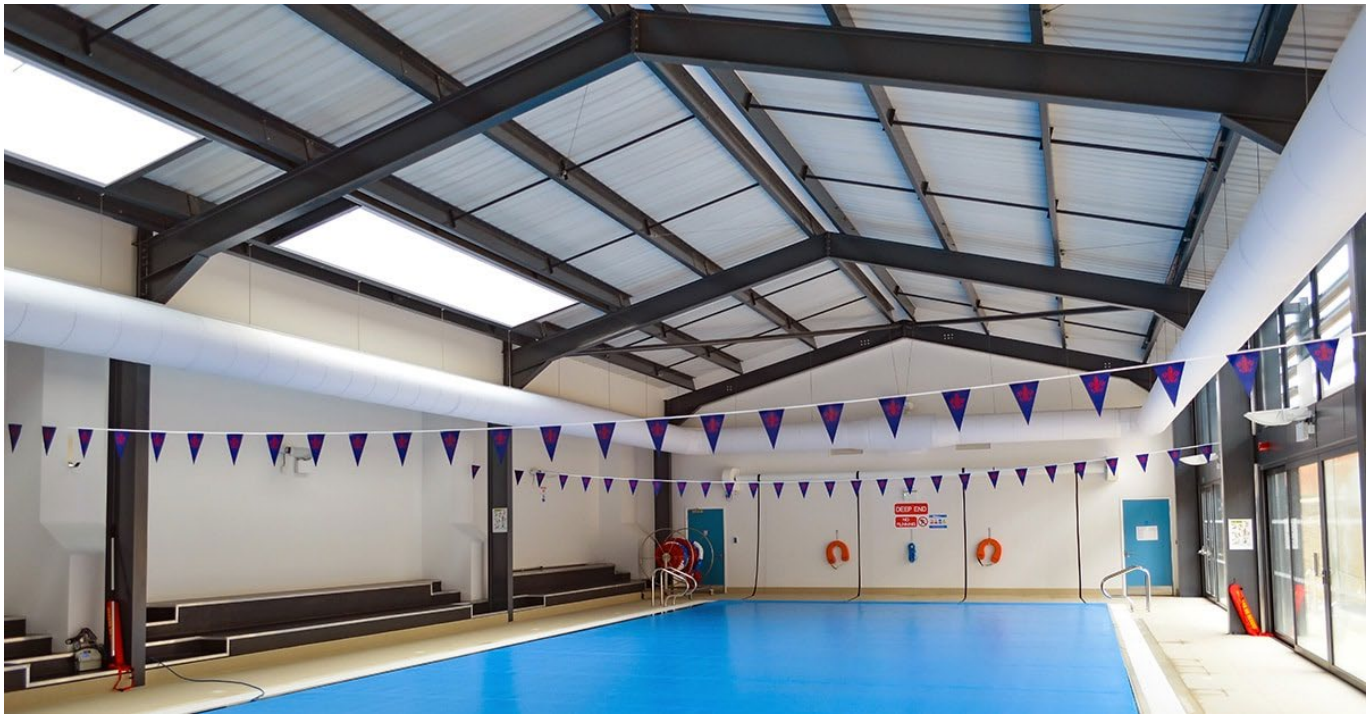
7.5.1.9 Ventilation to Pool Area

The Pool Area would be provided with a dedicated heat recovery ventilation system.

The associated air handling unit (AHU) would be located in the main Plantroom, with heating provided by the ASHP plant. The unit would incorporate a heat recovery thermal wheel and would be selected to work with a high-humidity environment.

The supply ventilation ductwork routed within the main Pool Hall would be either a textile duct or a traditional galvanised mild steel duct, routed at high level. The exact details would be confirmed at detailed design stage.

Attenuators would be fitted to ensure quiet operation.



Typical Textile Ventilation Duct to Pool Hall

7.5.1.10 Local Ventilation Systems

The ancillary areas, such as the Gym, Changing Areas etc. would be provided with heat recovery ventilation.

The associated air handling unit (AHU) would be located in the main Plantroom, with heating provided by the ASHP plant. The unit would incorporate a heat recovery thermal wheel.

Local extract ventilation would be provided to comply with current Building Regulations.

Attenuators would be fitted to all ventilation systems to ensure quiet operation.

7.5.1.11 Air Conditioning

Air conditioning would be provided to the following areas, subject to detailed design confirming that these areas would overheat without AC: -

- GF Reception / Spectators Area
- GF Café
- FF Pool Spectator Viewing gallery
- FF Activity Space 1
- FF Activity Space 2
- FF Break Out Space
- FF Gym 1
- FF Gym 2

The system would be a high-efficiency variable refrigerant flow (VRF) type, with a single outdoor unit serving all indoor units and allowing for simultaneous heating and cooling.

7.5.1.12 HVAC Automatic Controls

A new BEMS would be provided, giving automatic control and monitoring of the Mechanical Services equipment.

7.5.2 Electrical Services

7.5.2.1 General Comments

This option comprises of a full replacement of the existing building complete with new foundations, services with the sympathetic retention of the front historic façade.

7.5.2.2 Electrical Incoming Supply

The existing electrical supply will be stripped out and removed so the building can be demolished.

An estimated 231kVA supply with an expected main fuse size of 355A has been budgeted for, however at this stage it has been assumed that the DNO will be able to provide the site with the required capacity using an LV point of connection.

If the DNO determines upon application that there is insufficient capacity in the area at LV, then they will provide a HV point of connection where a new substation will be required at an agreed location on the site, this in turn will increase the cost of the new supply up to an estimated budget of around £ 100,000.00.

The new incomer shall enter the site in the new plant room at the rear of the site.

This item should be highlighted as a potential risk item.

7.5.2.3 Electrical Distribution

The new section panel shall be located in the new plant room adjacent to the new electrical supply.

The section panel shall be a 400A rated section panel with submetering, SWA XLPE submains shall be installed run above the flat ceiling in the pool area on new hot dip galvanised tray containment to feed distribution boards for:

- Mechanical services within the Boiler Plant Room.
- Mechanical Services within the Pool Plant Room.
- General lighting & Power 2 locations to be agreed.

7.5.2.4 Mechanical Power

All mechanical service wiring shall be new and wired either from the new BEMS panel or directly from the Mechanical distribution boards where the energy usage for these items of equipment can be monitored.

7.5.2.5 Small Power

All new services for sockets, switched fused connection units and the like shall be provided to serve the duties of the building.

7.5.2.6 Lighting

As the building is new a full new lighting scheme has been budget for, this shall comprise of LED luminares with automated controls as appropriate. Due to the nature of the pool area's chlorine rich environment special chlorine resistant luminares have been proposed, these will generally be LED flood lights shone upwards to illuminate the pool using indirect lighting as per the Sport England Lighting Guide.

External building mounted lighting has been allowed for with some inground architectural uplighting for the front façade to emphasize the historic features of the building.

The carpark area will be provided with some lighting columns to help safe access around site.

7.5.2.7 Emergency Lighting

A new scheme fully compliant with the current British standards and regulations will be provided.

7.5.2.8 Fire Alarm System

A new fire alarm system to an L1 standard has been proposed, this will be a fully addressable system with an Aspiration system for detection within the inaccessible voids greater than 800mm if they pose such a risk as to

require detection. Prior to design a fire risk assessment should be carried out by a suitably qualified fire engineer to determine the risk and determine what level of system should be provided to manage the perceived risks.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.5.2.9 Data and Telecoms

A new fibre service will be brought into site with new services installed throughout to future proof the site, this shall include but not limited to:

- New Data Cabinet complete with switches, patch panels, PDU's & routers
- Wi-Fi access points.
- New Cat6A data cabling to RJ45 data outlets where required for PC's, Phones, Vending Machines. Etc
- The CCTV network video recorder shall also be placed within the new Data cabinet.

7.5.2.10 CCTV System

A new CCTV system shall be provided throughout this shall include internal CCTV services, consideration around the placement of cameras will need to be discussed during the design to avoid invasion of privacy but also to help with safeguarding procedures.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.5.2.11 Intruder Alarm System

A new Intruder alarm system shall be provided throughout to provide early warning of intruders.

This shall be linked to a monitoring station; the exact strategy will need to be determined during design.

7.5.2.12 Lightning Protection

The building will require a lightning protection system.

7.5.2.13 Photovoltaics

As this option requires SBEM additional renewable technologies may be needed, therefore for budget purposes an allowance of £ 26,400.00 has been added to the costs. The minimum size of the PV array will need to be determined at design stage when the SBEM model is run as this will determine the quantity of panels required to meet the carbon emission targets any additional panels above the minimum required can be discussed at this stage also.

An application will need to be put into the DNO at design stage to inform them of the intentions and to gain approval for connecting the electrical generation equipment to their network.

7.5.2.14 Electric Vehicle Charging

The requirement for EV charging will need to be determined by the relevant stake holders and building control.

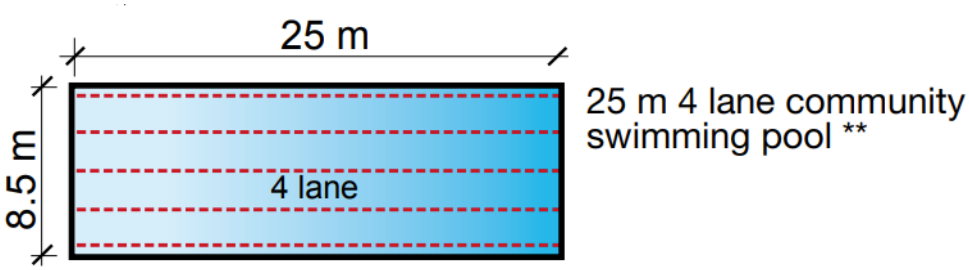
The current requirements within Part S of the building regulation state that where a site has more than 10 parking spaces then at least 1 charger must be provided, and at least 1 in every 5 remaining spaces shall be provided with access to cable routes for future EV.

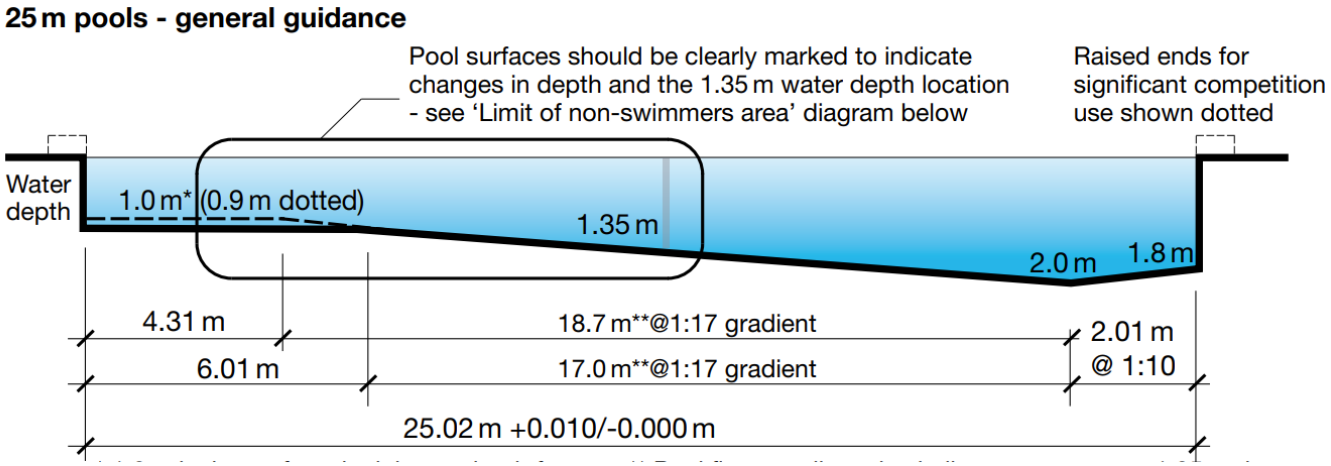
In these budgets 4x 7.2kW EV chargers have been included within the proposed costs, the exact quantity, type and back-end monitoring for billing. Etc will need to be determined at design stage.

7.5.3 Pool Services

7.5.3.1 General Comments

The high-level budget for this option is for the building of a new 25m 4 lane community swimming pool to Sport England Standards.





Within this budget is the building of the concrete swimming pool shell along with all water proofing, tiling to Sport England requirements with all lane markings inside the pool, and tiling up to the finger grip edge of the pool only, plus all services, and equipment as required to heat and filter the pool plus a pool evaporation cover.

All equipment and plant will be located within the 2-storey plant room.

The ventilation unit for the pool has been included within the mechanical services budgets.

7.5.3.2 Pool Skimmers

New pool skimmers will be installed to ensure sufficient surface water is drawn from the pool into the filtration system, and debris traps to ensure the changeover rate of the pool meets modern standards and also the Sport England Requirements.

7.5.3.3 Suctions & Inlets

New pool suctions & inlets will be installed to ensure sufficient water is drained from the pool into the new filtration system and also to run sufficient volumes of water through the heat exchanger unit for heating.

7.5.3.4 Filtration

A new sand type filtration system with pumps shall be installed within the new plant room.

7.5.3.5 Pool Chemical Dosing Equipment

A new cloud based automatic chemical dosing system that can track and provide real time data on the quality of the water in regards both temperatures and chemical levels shall be installed.

7.5.3.6 Pool Heating & Heat Exchanger

A new high efficiency HEX unit & Circulation Pumps shall be installed suitably sized to accommodate for the lower flow & return temperatures and increased flow rated required when connected to the new ASHP primary plant, all linked up to a new pool equipment control panel.

An estimated pool heating demand of 165kW will be required.

7.5.3.7 Pool Evaporation Cover

A new pool cover shall be installed which will insulate the pool and reduce evaporation for when not in use and helping to reduce the pool heating costs.

7.5.3.8 Under Water Lighting

New under water lighting shall be installed as required, this shall be determined at design stage.

7.5.3.9 Pool Shell

A new concrete pool shell to the Sport England 25m 4-lane standard shall be built, rendered and waterproofed.

7.5.3.10 Pool Tiling & Lane Marking

The pool shall be tilled internally and the pool top 100mm back from the pool edge will all line marking to the Sport England Standard.

7.5.3.11 Budget Costs

A budget cost of around £277,500 should be allowed at this stage to cover the mechanical services serving the pool.

A budget cost of around £500,000 should be allowed at this stage to cover the building of the pool.

7.5.4 Budget Costs

Section	Description	Total (£)
M01	PRELIMINARIES	£ 3,300
M02	STRIP OUT EXISTING REDUNDANT SERVICES	£ 6,020
M03	REPLACE INCOMING MAINS COLD WATER SERVICE	£ 8,250
M04	ABOVE GROUND DRAINAGE	£ 7,820
M05	DOMESTIC SERVICES	£ 71,629
M06	LTHW HEATING	£ 198,645
M07	NATURAL GAS SERVICE	NOT REQUIRED
M08	VENTILATION TO POOL AREA	£ 72,675
M09	LOCAL VENTILATION	£ 71,325
M10	AIR CONDITIONING	£ 66,000
M11	HVAC AUTOMATIC CONTROLS	£ 49,500
M12	TEST & COMMISSION AND O&M MANUALS	£ 12,207
	Mech Sub-Total (£):	**£ 567,371**

E01	PRELIMINARIES - ELECTRICAL SERVICES	£ 5,500
E02	NEW SUBMAINS	£ 7,260
E03	ELECTRICAL DISTRIBUTION BOARDS	£ 20,900
E04	ELECTRICAL CABLE CONTAINMENT SYSTEMS	£ 16,225
E05	GENERAL & EMERGENCY LIGHTING	£ 155,507
E06	FIRE ALARM SYSTEMS	£ 29,744
E07	SECURITY SYSTEMS	£ 37,915
E08	GENERAL POWER	£ 52,591
E09	DATA SERVICES	£ 26,543
E10	ELECTRICAL WORKS FOR MECHANICAL SERVICES	£ 10,945
E11	LIGHTNING PROTECTION	£ 9,350
E12	STRIP OUT OF EXISTING SERVICES	£ 1,500
E13	CONTINGENCY	£ 5,500
E14	NEW ELECTRICAL SUPPLY	£ 54,450
E15	PHOTOVOLTAICS	£ 26,400
E16	EV CHARGING	£ 11,000
E17	INSPECTION, TESTING & COMMISSIONING	£ 2,695
E18	HANDOVER, O&M MANUAL AND AS-INSTALLED DRAWINGS	£ 1,320
	Elec Sub-Total (£):	**£ 475,345**

Total (£):	**£ 1,042,715**

All costs exclude the following: -

- Value Added Tax
- Professional fees
- Principal Contractor management fees, overhead and profit
- CDM Principal Contractor's duties
- Asbestos survey and/or mitigation works.
- Sanitary ware and IPS systems
- Sanitary ware and IPS systems
- Rainwater disposal and below ground drainage
- Firefighting services (sprinklers, smoke ventilation etc.).
- Builders work in connection.
- Premium-time working

8 Estimated Services Running Costs & Emissions

Assumed Operating Hours:

Gym, Swimming Pool & Ancillary Areas - 12 hours a day 7 days a week.

Café – 4 hours a day 7 days a week.

Mechanical Services

The mechanical services running costs have been estimated using high level global heat losses using the anticipated building fabric efficiencies for each option whilst considering degree days to give more accurate operating hours.

Hot water demand is based on relevant UpToDate CIBSE guidance.

Pool running costs have been based on energy input demand estimation provided by the specialist.

Electrical Services

The building has been subdivided into each categorised areas and w/m2 values used taken from the most recent edition of the BISRIA BG86 Guidance.

Where the options have PV proposed the UK average maximum value of 207kWh per annum per m2 of array has been used.

The electricity usage for EV charging has been omitted as it is assumed this will be cost neutral as any electric used will be chargeable to the user, as such is cost neutral to the building operator.

Note:

All costs do not account for market fluctuation. The costs do not account for standing charges as these will be negligible in relation to the overall demand.

The cost per unit rate along with CO2 conversion factors used are as per the table below:

INPUT DATA	
CO2 CONVERSION FOR GAS	**0.18362**
COST FOR GAS	**£0.06**
CO2 CONVERSION FOR ELEC	**0.19338**
COST FOR ELEC	**£0.20**

All Energy units unless stated are kWh.

	OPTION 1	OPTION 2	OPTION 3
SPACE HEATING			
HEAT LOSS	207.70	115.70	127.81
RUNNING HOURS	2,000.00	1,800.00	1,800.00
ANNUAL ENERGY OUTPUT	415,394	208,264	230,049
SEASONAL EFFICIENCY	0.85	2.50	2.50
HEATING ANNUAL ENERGY INPUT	488,699	83,305	92,020
FUEL TYPE	Gas	Electric	Electric

POOL SERVICES			
HEAT REQUIREMENT	120.00	120.00	160.00
RUNNING HOURS	730.00	730.00	730.00
ANNUAL ENERGY OUTPUT	87,600	87,600	116,800
SEASONAL EFFICIENCY	0.85	2.50	2.50
HEATING ANNUAL ENERGY INPUT	103,059	35,040	46,720
FUEL TYPE	Gas	Electric	Electric

AIR CONDITIONING			
FLOOR AREA	120.00	414.00	644.00
COOLING LOAD	15.00	51.75	80.50
RUNNING HOURS	1,000.00	1,000.00	1,000.00
ANNUAL ENERGY OUTPUT	15,000	51,750	80,500
SEASONAL EFFICIENCY	3.00	2.50	2.50
COOLING ANNUAL ENERGY INPUT	5,000	20,700	32,200
FUEL TYPE	Electric	Electric	Electric

HOT WATER GENERATION			
HWS CONSUMPTION (LITRES/DAY)	2,000	2,000	2,000
NO. OF DAYS PER YEAR	365.25	365.25	365.25
HWS STORAGE (LITRES)	1,500.00	1,500.00	1,500.00
HWS PIPEWORK HEAT LOSSES	2.5%	2.5%	2.5%
HWS GENERATION PLANT SEASONAL EFFICIENCY	95.0%	95.0%	95.0%
HWS STORAGE HEAT LOSSES (KWH/DAY)	4.13	4.13	4.13
DAILY ENERGY INPUT (KWH)	4.34	4.34	4.34
ANNUAL ENERGY REQUIREMENT	1,586	1,586	1,586
SEASONAL EFFICIENCY	0.85	2.50	2.50
HWS ENERGY INPUT	1,866	635	635
FUEL TYPE	Gas	Electric	Electric

GAS SERVICE LOADS			
GAS TOTAL ENERGY INPUT	593,624		
CO2 EMISSION	109.001	0.000	0.000
ANNUAL COST GAS	£35,618.00	£0.00	£0.00

ELECTRIC SERVICE LOADS			
ELECTRIC TOTAL ENERGY INPUT	5,000	139,680	171,574
CO2 EMISSION	0.967	27.011	33.179
ANNUAL COST ELEC	£1,000.00	£27,937.00	£34,315.00

ANNUAL ENERGY - MECHANICAL SERVICES			
TOTAL ANNUAL ENERGY INPUT	598,624	139,680	171,574
TOTAL ANNUAL CO2 EMISSION	109.968	27.011	33.179
TOTAL ANNUAL ENERGY COST	£36,618.00	£27,937.00	£34,315.00

ANNUAL ENERGY - GENERAL LIGHTING & POWER			
CAFE &4HRS/D OTHER AREAS 12HRS/D			
TOTAL ANNUAL ENERGY INPUT	125,381	109,080	129,321
TOTAL GENERATED FROM PV	0	-34,983	-43,470
TOTAL ANNUAL CO2 EMISSION	24.246	21.094	25.008
TOTAL ANNUAL ENERGY COST	£25,076.20	£21,816.00	£25,864.20

ANNUAL ENERGY - TOTAL COST			
TOTAL ANNUAL ENERGY INPUT	**724,005**	**248,760**	**300,895**
TOTAL ANNUAL CO2 EMISSION	**134.214**	**48.105**	**58.187**
TOTAL ANNUAL ENERGY COST	**£61,694.20**	**£49,753.00**	**£60,179.20**