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Construction Phase Fire Strategy

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AI / BC	

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1. General

SPL Fire Engineering have been appointed to provide a construction site fire strategy assessing the active and passive fire safety measure that Kier should consider throughout the construction.

The first stage in any major project is to establish the basic safety parameters relating for each project by reviewing and refining;

- Site specific fire risk assessments,
- Review of the potential threats on or around the site,
- Safety of site operatives and any other relevant persons
- Identification of any overriding constraints and
- Clarity of the objectives.

SPL Fire Engineering propose to carry out construction site Fire Risk Assessments (FRA) throughout the project life cycle. The purpose of the construction site fire strategy is to establish good working practices relating to planning, scheduling, maintenance, implementation of principles and the establishment of construction site parameters with regards to welfare for staff, sub-contractors and other relevant persons.

Kier require that the site be made as safe as reasonably practicable with regards to means of escape for staff and sub-contractors. It can be difficult to establish a level of safety achieved in absolute terms. However, with the implementation and adoption of the proposals made in this report, it is believed that Kier will have demonstrated the equivalence to that required for insurance purposes and made the site as safe as reasonably practicable.

Contact with Interested Parties

The following communications will be required with relevant stakeholders.

- Principal designer or designer should liaise with the Manchester Aquatics Centre (MAC) safety team to alleviate any of their concern's re-access, fire alarms etc.
- During the design phase, the principal designer or designer should contact the Fire and Rescue Service (FRS) to identify any operational requirements.
- During construction phase - The local FRS should be invited to attend site for familiarisation, review the access, water supplies and firefighting arrangements.
- The FRS will also be able to assist in the identification / location of the nearest fire hydrants. These should be overlaid onto the fire strategy drawings and amendments made if hydrants become unavailable during specific construction phases.

Referenced Drawings

This report should be read in conjunction with the drawings produced by the client, which are highlighted in Table 1

Drawing Name	Reference Number	Issue	Date
MAC Option 1 Phasing Basement		Rev A	04/03/2020
MAC Option 1 Phasing Ground floor		Rev A	04/03/2020
MAC Option 1 Phasing First floor		Rev A	04/03/2020
MAC Option 1 Phasing Second floor		Rev A	04/03/2020
Proposed Level 00	P5471- PAL- XX- 00- DR- A- 2001	Rev B	25/11/2019
Proposed Basement	P5471- PAL- 2000	Rev B	02/12/2019

Table 1 - Referenced Drawings

Legislation

With the implementation of this review and the construction site FRA's, the project will comply with the following relevant legislation / guidance:

- HSE 168 (Fire Safety in Construction)
- Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing renovations, 9th edition July 2015 (JCOP)
- Regulatory Reform (Fire Safety) Order 2005
- The Construction (Design and Management) Regulations 2015 (CDM).

Construction, Design and Management Regulations (CDM Regs)

Projects undertaken within Great Britain and Northern Ireland are subject to the requirements of the Construction (Design and Management) Regulations 2015 (CDM Regs). The object of the CDM Regs is to reduce risk as low as reasonably practicable concerning Health and Safety during construction and maintenance of construction sites and occupied buildings.

This report defines the strategy for meeting the functional and performance requirements for fire safety in the finished building. It is primarily intended to form part of the submission for Building Regulation Part B approval. Where any conclusions or recommendations have been arrived at which specify particular materials, products or forms of construction these will have been assessed, in accordance with CDM Regulations 9 (duties for designers).

In addition, this fire safety strategy plays an important role in providing appropriate fire safety measures for people in and around the building in the event of fire. Where aspects of the strategy involve significant residual risks or health and safety critical assumptions when the building is in use, appropriate information will be made available to the CDM Coordinator (for example, this might include a tailored management regime, or controls on certain aspects of the building).

External logistics

This report should be read in conjunction with Kiers own external logistic plan.

2. Means of Escape

Evacuation Principle

The general evacuation policy for the construction site and the occupied parts of the premises will be simultaneous evacuation. However, the Manchester Aquatic Centre (MAC) have a double knock management policy and procedure in place for the occupied parts. This is discussed further in the fire alarm section.

Temporary fire alarms will be installed throughout the construction site, these should compile with EN 54. A wireless manual break glass call point should be affixed to each fire point. The manual break glass call points should include a sounder and strobe as depicted below.



A sound check should be carried out onsite once the call points are in position. The audibility of the fire alarm should be a minimum of 10db above background noise and should be audible throughout the site. If it is found that there be dead spots on site, whereby the alarm cannot be heard, then further call points will be required in these areas.

Fire points should be positioned throughout the construction site and each fire point should consist of the following firefighting equipment.

- 1 x 6L Foam extinguisher or 1 x 9L Water extinguisher,
- 1 x 2Kg CO2 fire extinguisher,
- 1 x stand for the extinguishers to be stored on,
- 1 x foam or water extinguisher sign
- 1 x CO2 fire extinguisher sign.
- Fire escape plan from the area the fire point is located

See appendix A for location of fire points – the locations are dependent on the sound levels from the manual call points. When a sound test is carried out there may be a need to increase the number of fire points, however, the number of fire point must not be resuced.

Construction phase 1

Phase 1 consists of the closure and refurbishment of the ground and first floors (enclosed in red below (figures 1 & 2)). The works includes the closure of the main swimming pool area on the ground floor and the first-floor accommodation. The work is anticipated to be completed within 76 weeks. Management of the ground and upper floor areas once operational is discussed in the fire alarm section.

MAC Ground Floor Works

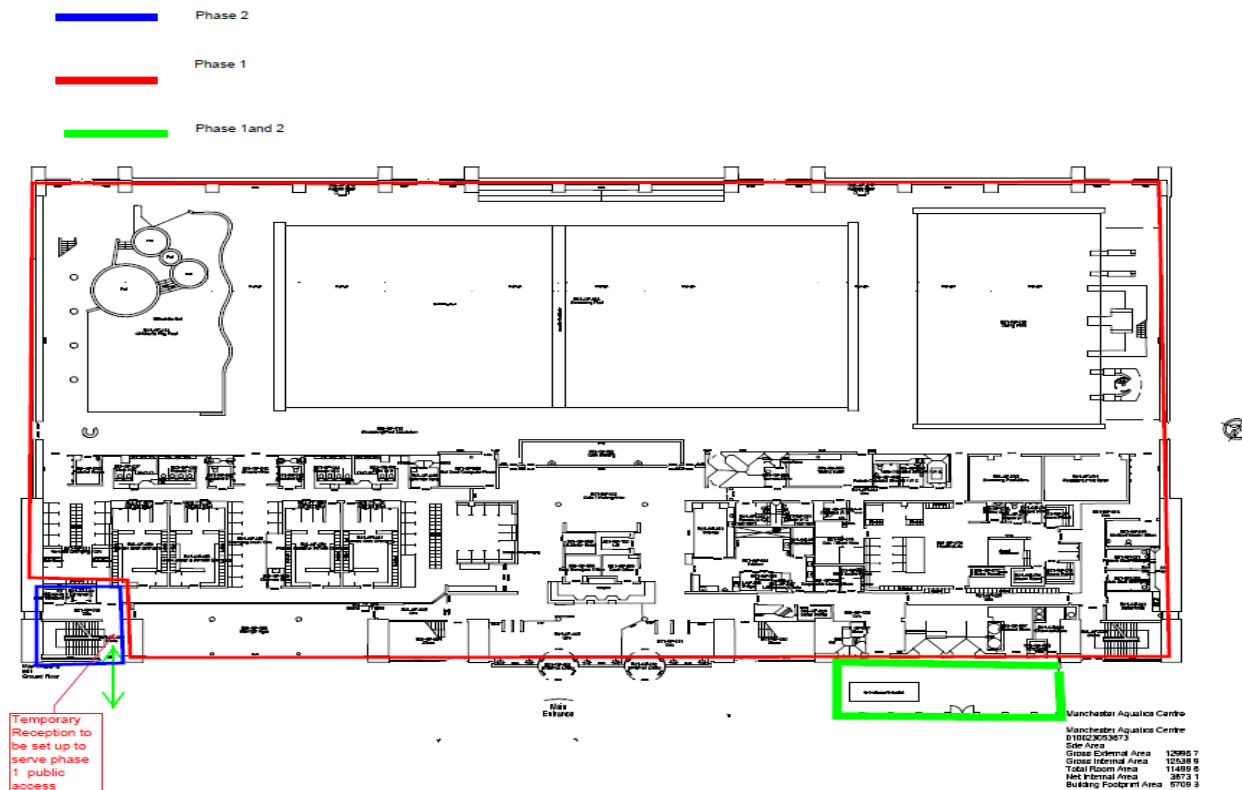


Figure 1 - Ground floor phase 1



Figure 2 - First floor phase 1

Fire Detection and Alarm

At present, MAC have a BS 5839 part 1 L2 fire detection and alarm system installed throughout the premises, linked to the public address and voice alarm system (PAVA). As part of the refurbishments being carried out, this will be decommissioned and replaced with a new fire detection and alarm system conforming to BS 5839 part 1 2017. (The new fire detection and alarm system is discussed further in fire alarm (section 4)).

In phase 1, the installed fire alarm will be decommissioned and removed from site. To compensate for the removal of the fire alarm system, Kier propose to install a wireless fire detection and alarm system (WES system). The wireless fire alarm should be interfaced with the hard-wired fire detection and alarm system still operational in the basement.

Management of the fire alarm in ground and upper floors once the first phase has been completed –

In the normal state, the management of MAC will operate a double knock situation for detectors and immediate full evacuation on activation of a manual break glass call point. For a single activation of a smoke or heat detector there is an investigation period (time period for investigation to be discussed with MAC management).

Management of the fire alarm in the temporary state – In phase 1, the fire alarm will be decommissioned on the ground and first floor construction site areas. The system will be replaced with a WES wireless fire alarm system on the construction site, the temporary alarm must be interfaced with the old fire alarm system. Should the fire alarm activate (basement area), MAC should operate as normal i.e., investigation, double knock and immediate evacuation. However, should the fire alarm operate on the construction site (phase 2) then the fire alarm should go into full evacuation with no investigation time.

Compartmentation

The ground and first floor red sections highlighted in figures 2 & 3 are to be separated from the live operational section of the premises by 60 minutes fire resisting boarding. The boarding should run from floor to ceiling height. Under no circumstances should members of the public be allowed to enter the construction site.

Basement area - The east staircase highlighted in red in figure 4 should be separated from the construction site by 60-minute fire resistance.

Ground floor – the east staircase must be separated from the construction site by 60-minutes fire resistance as shown in figure 3

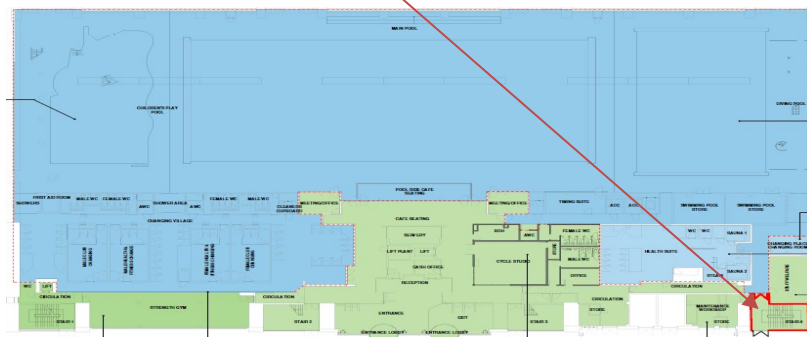


Figure 3 - Diagram showing east staircase in red

Construction Phase 2

Construction phase 2 consists of the closure and refurbishment of the basement pool area (figure 4), the ground floor west staircase (figure 1). Phase 2 areas are highlighted in blue on the figures 4 & 5.

Phase 2 works is estimated to take approximately 38 weeks; however, Phase 1 works will be running in conjunction with phase 2 in the basement area for 2 weeks of this phase. Phase 1 construction works in the plant room must be taken into consideration alongside Phase 2 from a construction site fire safety prospective and the management of escape routes.

The main entrance to the construction site will be through the doors highlighted with a green arrow in figure 2 overleaf. Means of escape from the basement area will be via the West or East staircases; in addition, there are 2 means of escape from the plant area which are shown in (figure 6). The means of escape from both the plant areas and the pool area must be maintained at all times whilst construction works are undertaken.

Under normal circumstances, a construction site should be separated from a live operational site with 60 minutes fire resisting construction to conform with the Regulatory Reform (Fire Safety) Order 2005. However, it would be almost impossible to achieve this in the plant room, due to the amount of plant in there and the fact that all the plant is being stripped out and removed from site through the storeroom (bottom right in figure 4). A managed process can be implemented to compensate for this as the only persons who will be allowed in the plant room other than Kier construction workers are GLL staff. As there will be no physical barriers installed between the operational side of the plant room and the construction site the following procedures must be adopted.

1. All Kier staff are to be made aware that GLL staff may be required to work in the plant room whilst refurbishment is being carried out.
2. All GLL staff will receive the same induction training / procedures as Kier staff.
3. GLL staff are to work in pairs in the plant room
4. GLL staff must inform the project manager that they will be working in the plant room (if necessary, a permit to work will be implemented)
5. GLL staff to wear construction site PPE whilst carrying out work on the plant.
6. Whilst stage 1 is in progress GLL staff must only enter the plant room through the east staircase area.
7. As the refurbishment progress on to stage 2 GLL staff can use either the west or east entrance dependant which side of the construction site they need to work
8. At stage 3 GLL staff must only use the west entrance to access the plant room.

MAC BASEMENT WORKS

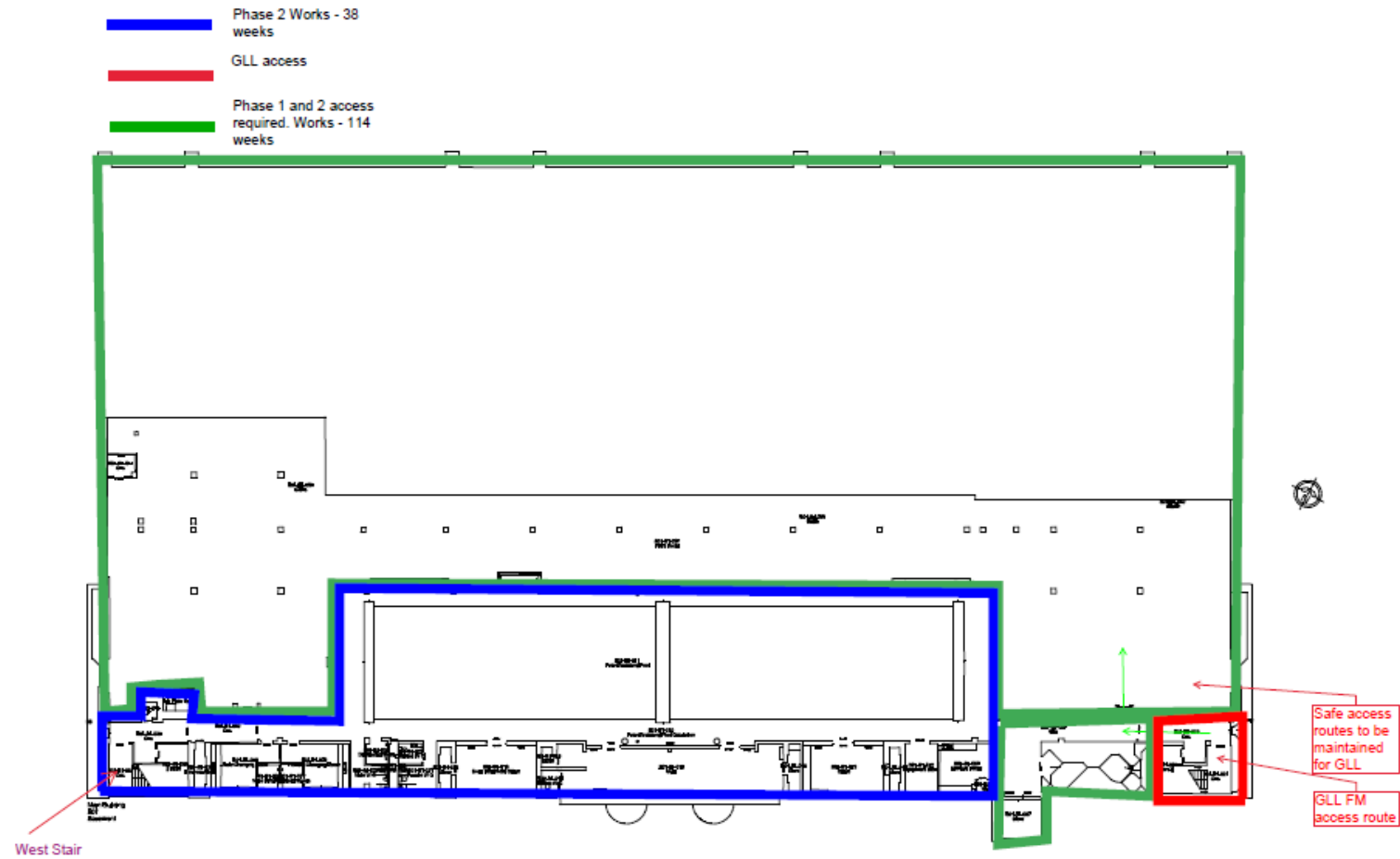


Figure 4 - Basement pool area highlighted in blue

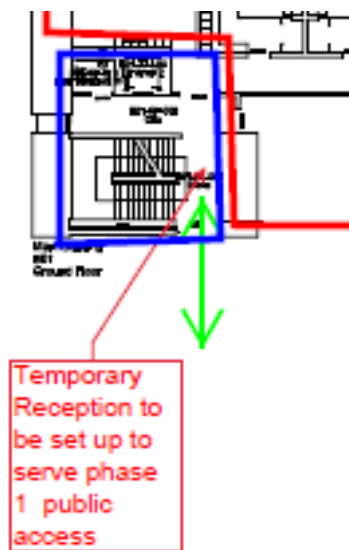


Figure 5 - Ground floor phase 2 refurbishment in highlighted in blue

Figure 6 - Means of escape basement area

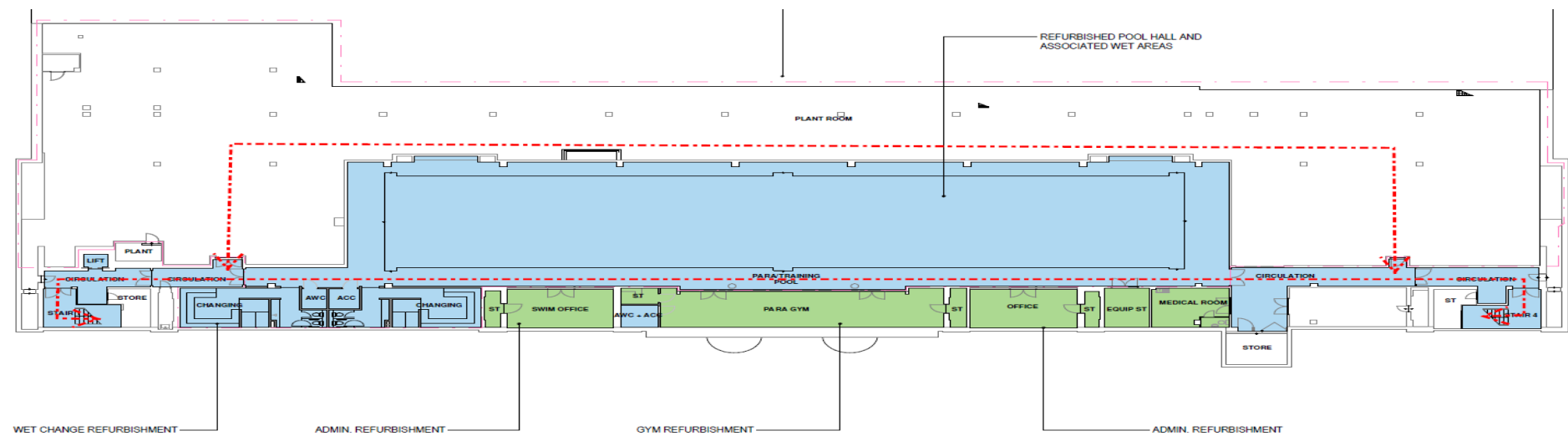
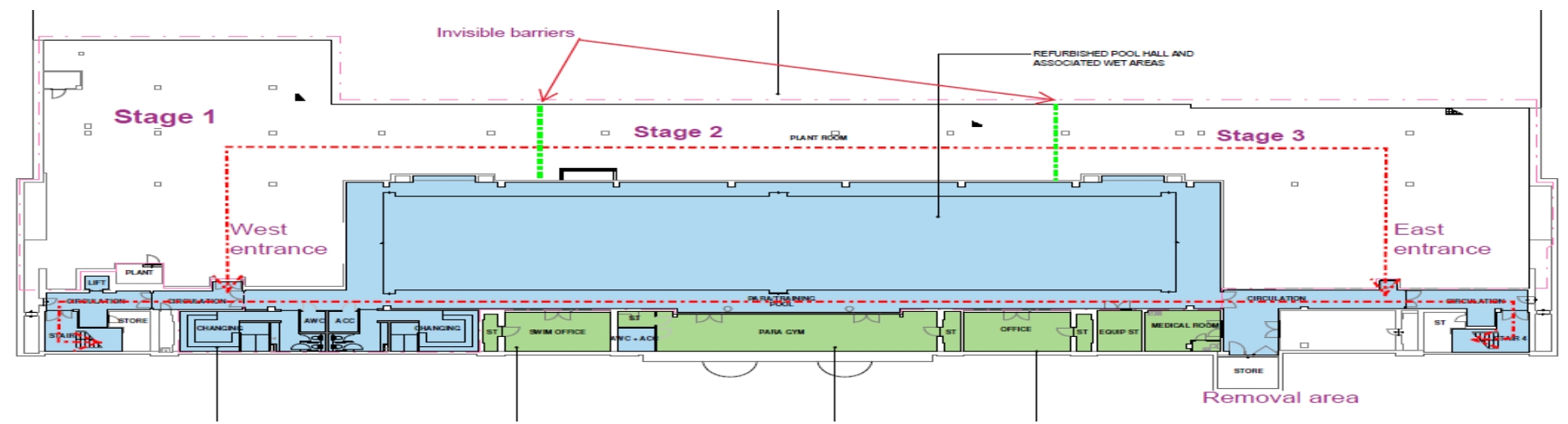


Figure 7 - Stages in plant room



Fire Detection and Alarm

At present MAC have a BS 5839 part 1 L2 fire detection and alarm system installed throughout the premises, linked to the public address and voice alarm system (PAVA). As part of the refurbishments, this will be removed and replaced with a new fire detection and alarm system conforming to BS 5839 part 1 2017. Note - the new fire detection and alarm system is discussed in finished fire alarm section.

In phase 2, the installed fire alarm will be decommissioned and removed from site. To compensate for the removal of the fire alarm system, Kier propose to install a wireless fire detection and alarm system (WES system). The wireless fire alarm should be interfaced with the new hard-wired fire alarm system installed in the phase 1 areas.

Management of the fire alarm in the normal state – In the normal state, the management of MAC operate a double knock situation for detectors and immediate full evacuation on activation of a manual break glass call point. An investigation procedure is in place for a single activation of a smoke or heat detector.

Management of the fire alarm in the temporary state – In phase 2 the fire alarm will be decommissioned in the basement. This will be replaced with a WES wireless fire alarm system, which will be interfaced with the new fire detection and alarm system on ground and upper floors. Should the new fire alarm activate, MAC should operate as normal i.e., investigation – single activation & evacuation for a double activation. However, should the fire alarm operate in the basement then the fire alarm should go into full evacuation immediately with no investigation time.

Smoke extraction plant room

The heat and smoke extraction system in the basement plant area will remain operational throughout the refurbishment. Therefore, consideration must be taken into account of how the extracts can be powered and also linked into the fire alarm system whilst work is being carried out in the basement area.

3. On completion

On completion of all works the following will apply.

The New Fire Alarm & Detection System

A new BS 5839 Part 1 2017 L2 Fire detection and alarm system will be installed throughout the premises, except in the pool areas where there will be an L5 consisting of manual break glass call points only. As the refurbishment of the building is being completed in phases, this means that the new fire alarm will have to be installed in 2 Phases.

Phase 1 – as part of the refurbishment of the ground and upper floors a new fire detection and alarm system will be installed. The fire alarm should be linked a control panel that will be located in the temporary reception area on the ground floor adjacent the West staircase.

Phase 2 – A new fire detection and alarm system will be installed throughout phase 2. The control panel will be located close to the main entrance (subject to MAC approval).

The new fire alarm system in Phase 1 should be connected to the new system from phase 2 to complete the full BS 5839-part 1 LS system. The panel in phase 1 can remain in situ and be utilised as repeater panel.

Emergency Lighting

Emergency lighting will be provided throughout the building in accordance with BS 5266-1:2016. Emergency lighting – Part 1: Code of practice for the emergency lighting of premises.

Emergency lighting will be provided in escape routes, open areas, high-risk areas and strategic points of importance including:

- Near each exit door intended to be used in an emergency
- Near to stairs so that each flight of stairs receives direct light & at level changes
- Mandatory emergency exit and safety signs
- At each change of direction and intersection of corridors
- Near to each final exit and outside the building to a place of safety
- near each piece of fire-fighting equipment and call points
- Disabled toilets
- All facilities exceeding 8m²

“Near” is normally considered to be within 2m measured horizontally

Emergency Escape Signage



All exits and exit routes should be clearly marked with appropriate escape signs so that all contractors / staff can easily determine their most direct route to a place of safety in the event of an emergency.

Fire escape signs are to be provided to guide occupants from any point in a building, via a place of relative safety (the escape route) to the place of ultimate safety (outside the building). Exit and directional signage should be provided in accordance with the requirements of BS 5499: Part 4 and conform to BS EN ISO 7010.

Signage is provided to identify the available escape route / routes from each location within the building. To achieve this, the following principles have been adopted.

- Escape routes or doorways leading to a means of escape should be visible from any place within a room.
- If it is not possible to see the direct means of escape, then intermediate / additional signage to be considered.
- All changes of direction in corridors, stairways and open spaces forming part of the means of escape will be marked with intermediate signs.
- Signs are not to be fixed or sited where they could be obscured by open doors.

4. Fire Safety Management

Fire Marshal

Kier will provide Fire Marshals throughout the site, as an absolute minimum there must be at least 2 nominated Fire Marshals on site. The PM must nominate 2 Fire Marshal and an appropriate number of Deputy Fire Marshals. A Fire Marshal and or Deputy Fire Marshal should at the end of each working day carry out a fire inspection of the site. The end of day inspection should **not** be carried out by the security guard.

The Fire Marshal and Deputies should receive the appropriate fire safety training to assist him / her in their duties.

The Daily, Weekly, Monthly inspections and tests for both passive and active fire systems should be carried out by the Fire Marshal, or the Deputy Fire Marshal and records of these tests recorded.

Fire Alarm Testing

A wireless fire alarm system will be installed throughout the construction site, this type of system allows the flexibility in movement of individual call points as the construction site develops. The system to be adopted will allow early warning of fire, enhancing the safe evacuation of the building and construction site.

The control and indicating equipment should be checked daily to ensure there are no fault conditions in accordance with BS 5839-1:2017 section 47.2 (b). Fire detection and fire alarm systems for buildings - Code of practice for system design, installation, commissioning and maintenance.

(47.2 (a) The responsible person should ensure that the control and indicating equipment is checked at least once every 24 hours to confirm that there are no faults on the system).

A manual call point should be tested every week, in accordance with BS 5839-1:2017 section 44.2 (a). Fire detection and fire alarm systems for buildings - Code of practice for system design, installation, commissioning and maintenance.

(44.2 (a) Every week, a manual call point should be operated during normal working hours. It should be confirmed that the control equipment is capable of processing a fire alarm signal and providing an output to fire alarm sounders).

Daily and weekly tests should be recorded in the logbook, any faults should be repaired immediately and recorded in the logbook – on this project the log should be kept and recorded on Fieldview.

Emergency Lighting testing

The temporary electrical sub-contractor installing the emergency lighting will provide commissioning certificate(s) for the emergency lighting prior to handover and when additions are made to the system.

Emergency lighting is to be visually checked daily. Any defects should be repaired immediately and recorded in a suitable logbook. In addition, the emergency lighting system should be tested once a month in accordance with BS 5266 Part 8, 2011. Records of the test should be recorded in a suitable logbook.

As this is a construction site and a rapidly evolving environment, SPL advise that the emergency lighting be tested once a week as opposed to once a month.

Fire extinguishers commissioning and testing

People with no training should not be expected to attempt to extinguish a fire. You should, therefore, have a suitable training scheme in place that will enable enough staff on your construction site to safely use the fire-fighting equipment provided.

Although fire extinguishers are not permanent fittings on the construction site, they form part of the overall concept of fire protection. It is, therefore, required by legislation that persons be trained in the correct operation of fire extinguishers.

The fire extinguishers used on site should be commissioned on site by a qualified fire extinguisher engineer in accordance with BS 5306-3:2009 Commissioning and Maintenance of Portable Extinguishers – Code of Practice. The equipment also requires servicing on an annual basis. Commissioning and testing to be carried out by Vinci Fire Warden and recorded onto Fieldview for records.

Fire Extinguishers should be properly signed so that they are easily identifiable. Proper use of signage will allow the site Fire Marshal or Deputy to ensure that all correctly identified fire extinguishers are on their stand during their end of day inspection of site.

Hot Work guidelines

- All hot work should be subject to a hot work permit
- Hot work permits must only cover specific, identified activities and locations and be signed off at the end of each work period. Blanket permits covering hot work activities over an extended period or several days must not be allowed.
- Before starting hot work, the area must be cleared of all loose combustible material and, if work is to take place on one side of a wall or partition, the opposite side must be examined to ensure no combustible material will be ignited by conducted heat.
- At least two appropriate fire extinguishers must be at hand and careful watch maintained for fire breaking out whilst work is in progress.
- Exposed wooden flooring and other items of combustible material which cannot be removed must be covered with sand or other non-combustible materials
- When welding, cutting or grinding, the work area must be suitably screened using non-combustible material.
- Equipment and hoses used with oxy-acetylene and similar equipment should be in good condition, set up in accordance with the manufacturer's instructions and be subject to a visual inspection before each period of use. A flashback arrestor should be fitted.
- Gas cylinders must be adequately supported in the vertical position, preferably by securing on purpose-built trolleys using straps or chains. Cylinders should be fitted with a regulator that is not more than five years old.
- Welding and cutting procedures should only be carried out under the supervision of trained and competent personnel.
- Any area specified in hot work permit must be subject to a fire watch
- In all cases a continuous fire watch should be maintained for at least 30 minutes after hot work is completed, with further checks being made at regular intervals, up to 60 minutes after completion before the permit is signed off. Therefore, all hot work permits should only be issued up to 70 minutes prior to the operators leaving site. This will ensure that the correct checks can be carried out before the hot work permit is signed off.

- On sites where hot work has been undertaken in high fire hazard areas the work area should be subject to a continuous fire watch for at least 60 minutes following cessation of hot work.
- Where hot work has been undertaken within or adjacent to a timber frame structure a continuous fire watch for at least 60 minutes and the area be carefully inspected at regular intervals for at least two hours after completion of the hot work prior to closing the permit.

Regulatory Reform (Fire Safety) Order 2005

The Regulatory Reform (Fire Safety) Order came into force on the 1st October 2006. The order consolidates nearly all previous fire safety legislation revoking the Fire Precautions Act and the Workplace Regulations. The Order places a general duty of fire safety care on employees, occupiers and / or owners of businesses to provide and maintain adequate fire precautions throughout their premises.

The responsible person has a duty to carry out a fire risk assessment which must focus on the safety in case of fire of all 'relevant persons'. The risk assessment should pay particular attention to following areas:

- Identifying Fire hazards – sources of ignition, fuel, oxygen
- Identifying people at risk
- Reducing the risk
- Recording the findings
- Reviewing the outcomes

Appendix A – Fire point locations.

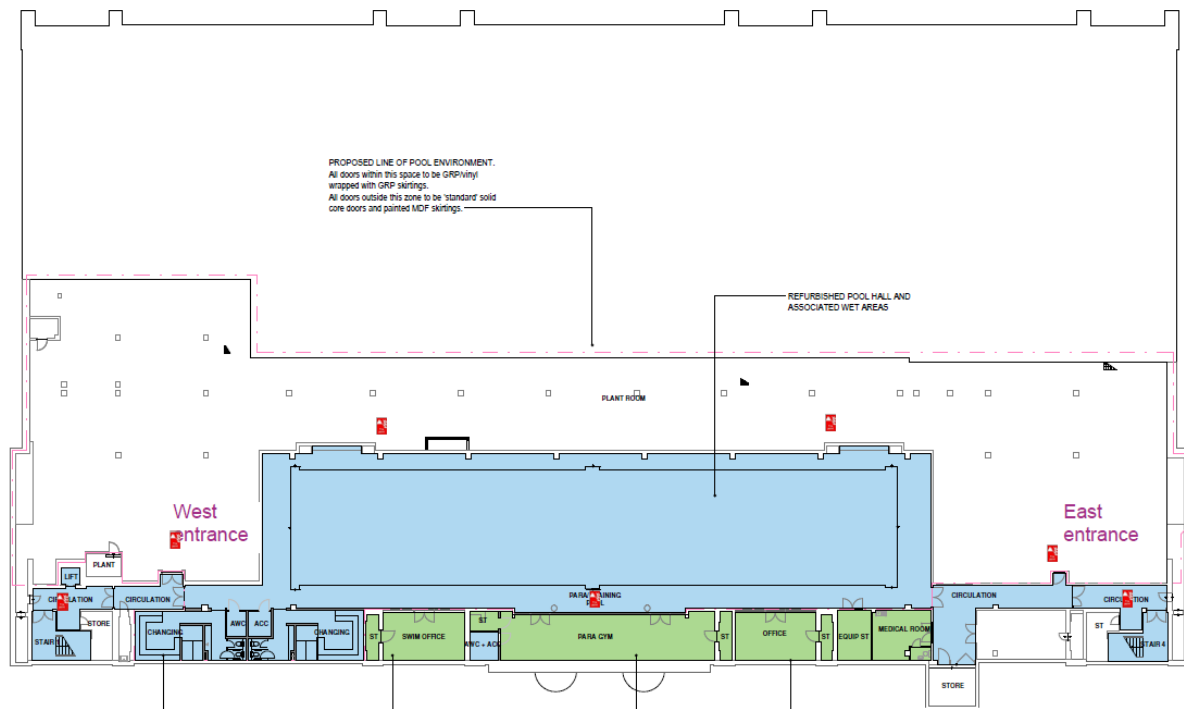


Figure 8 - Basement fire point locations

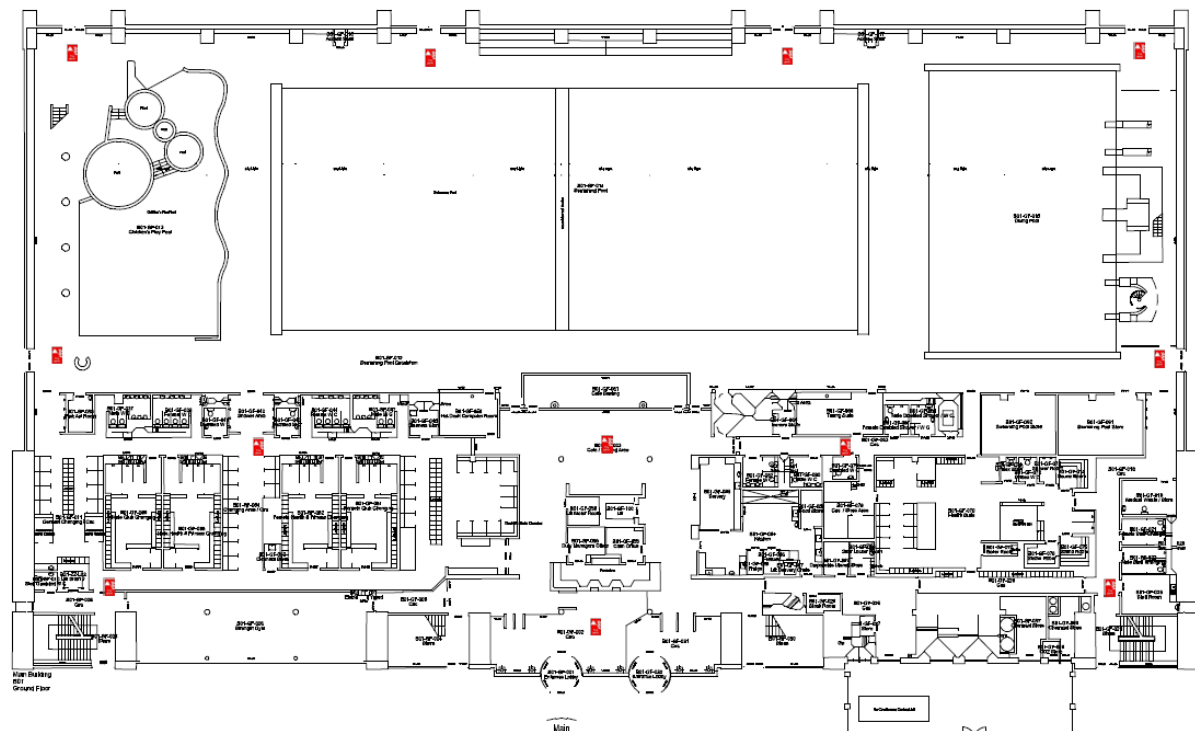


Figure 9 - Ground floor fire point locations

NOTE – There may be a case for reducing the amount of fire points in the pool area, this can be assessed / discussed at the first fire risk assessment on site.

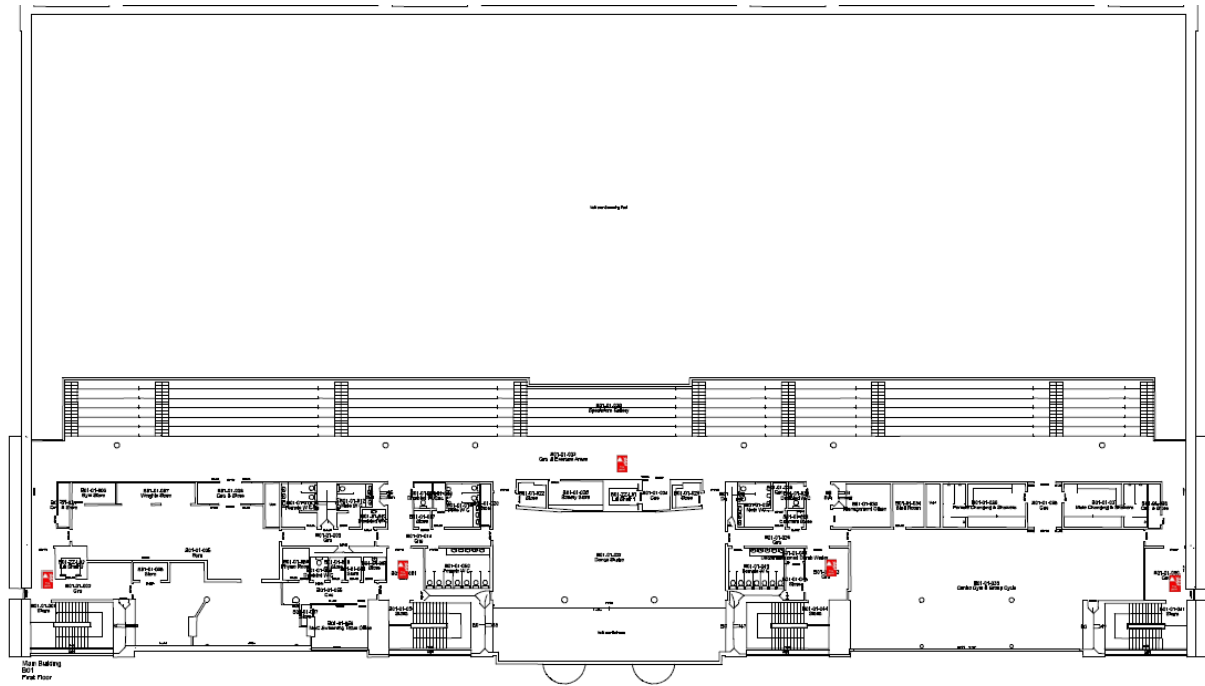


Figure 10 - First floor fire points

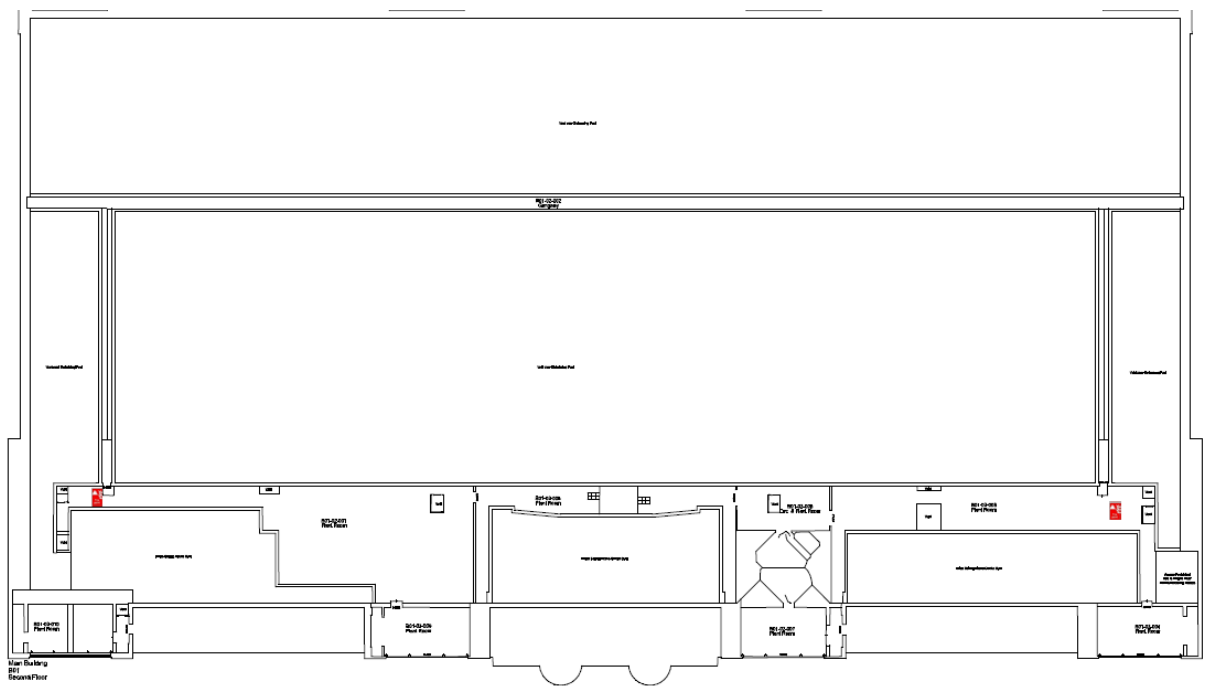


Figure 11 - second floor fire points