British Museum Energy Centre Programme - SWEC MEP Plant Access and Maintenance Strategy

Project No. 224022

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Document Revision and Status

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1.0 Introduction

This report outlines the primary maintenance, removal and replacement considerations for the mechanical, electrical and public health services in SWEC building as an overview strategy document.

It shall be noted that this document is not intended to be used as a prescriptive methodology for the site maintenance/replacement activities that will be required throughout the life of the development. Detailed method statements must be provided by the main Contractor or designated plant movement specialists, tailored to the specific nature of the tasks being performed.

The main Contractor shall have full responsibility for producing any site-specific project RAMs and producing H&S assessments on their chosen methodologies ensuring operative safety prior to any works being undertaken.

It shall be noted that the information of the services design included in this report is based on the RIBA Stage 4 Tender Issue at the time of production and it is the Contractor's responsibility to confirm that all weights and sizes of the equipment prior to commencement of replacement of parts.

The intended services maintenance regimes and requirements that shall be adopted for each individual item of plant shall be described and included in the Operations and Maintenance (O&M) Procedures Manual, which will be produced by various contractors that will be handed over at the completion of the installation works.

Small items of plant, equipment, and fixtures (e.g. DB's, light fittings, valves etc.) that can be replaced without special access or lifting equipment are not considered within this document.

This document should be read in conjunction with the MEP services drawings and equipment schedules.

It shall be noted that the construction of the SWEC building is to be carried out in two phases, i.e.,

- Phase 1 installation – Southern part of the SWEC building and associated central infrastructure, including electrical and mechanical services on the ground floor, first floor and second floor.
- Phase 2 installation – Northern part of the SWEC building as well as the bridge over. This will include the central plant to be installed in Phase 2 areas on the ground floor, first floor and second floor. All local services serving the office floors will also be part of Phase 2 installation.

Refer to the Steensen Varming's specifications for detailed phasing strategy.

Upon completion of Phase 1 installation, the Phase 1 central infrastructure will be required to be commissioned to serve the museum, whilst the Phase 2 installation is being carried out. It is the Contractor's responsibility to provide all necessary access and transportation equipment as well as any protective measures for all routine plant and equipment maintenance/ removal prior to Phase 2 completion.

This report addresses major items of plant and equipment only. We have assumed where possible items shall be broken down to their smallest component for ease of lifting, moving and access.

2.0 General considerations

2.1.1 General

All plant replacement methods outlined in this document are recommended practices. Should the contractor or maintenance teams propose any deviations from the specified routes, weights, or item sizes documented herein, they must seek validation from the structural engineer.

For large and heavy items of equipment, specialist moving and lifting equipment will be required. Due to the limited frequency of these operations we have assumed that specialist equipment will be hired or provided by the contractor employed to undertake these works. This minimises the amount of storage space needed to house such equipment. See next section for dimensional information on major items of plant and equipment to be hosted in the SWEC building. It is for the main contractor to ensure that specialist lifting/moving equipment will not exceed clear working distances.

It is assumed that all handling of plant and equipment will be carried out by experienced specialists using certified, industry-standard lifting and moving equipment.

Refer to the structural drawings for floor loading limits. Where specialist moving or lifting equipment is used the specialist contractor shall make the necessary checks to ensure point loads and distributed loads do not exceed the design parameters of the structure.

Drainage gullies and channel gratings located on access routes that cannot support wheel loads must be removed and replaced with temporary load-bearing blocks. When heavy plant equipment is being moved, spreader plates should be used to distribute the load.

Plant room floors, lift car access and thresholds, routes between plant rooms and outside shall be suitable for the wheel loadings. Similarly, the floor finishes along the designated routes between plant rooms and the external access points for delivery vehicles must also be suitable for the expected wheel loadings.

Temporary protection will need to be provided to protect other services, lift interiors and wall and floor finishes, especially at changes in direction. The Contractor is responsible for ensuring that sufficient temporary protection is in place.

The above information provides guidance only. The detailed and specific method statement and risk assessment should be undertaken by the contractor prior to any works taking place.

2.2 Design Guides

The overall plant access and maintenance strategy have been set out in accordance with the BSRIA BG 84/ 2024 Space and Weight Allowances guidance, BS 8313: 1997 Code of practice for accommodation of building services in ducts as well as the manufacturers' installation and maintenance recommendations.

This document provides guidance for the movement of major items of plant and equipment, it is essential that those carrying out such operations shall carry out specific risk assessments and prepare method statements prior to carrying out works in accordance with the client's health and safety requirements.

The Contract shall ensure that safe working environments must be provided for personnel during the installation, operation, maintenance and decommissioning of buildings and the systems in accordance with legislation and regulations, including:

- The Building Regulations
- HSE The Health and Safety at Work Act 1974
- HSE The Management of Health and Safety at Work Regulations 1999
- HSE The Workplace (Health, Safety and Welfare) Regulations 1992
- HSE The Provision and Use of Work Equipment Regulations 1999
- HSE The Construction (Design and Management) Regulations 2015
- HSE Manual Handling - The Manual Handling Operations Regulations 1992
- The Electricity at Work Regulations

2.3 Access /Handling Equipment

Typical plant lifting and movement methods to be considered include below. It shall be noted that it is the main Contractor, or appointed plant movement specialists' responsibility to detail the appropriate methodologies to suit the relevant site activities.

- Vehicular transport (i.e. lorry loader) – Vehicle access is via the SW gate and NE gate through the tunnel.
- Site tower cranes – Crane access to the West Road is available via the SW gate. This will be required for installation of most of the heavy plant, including ASHPs, WSHPs, buffer tanks, etc. Where required, cranes shall be selected to ensure that they have a maximum carrying capacity at least 20% greater than the load they are lifting and shall take into account the distance to which they have to reach.
- Lift access (Phase 2 only) – Lift access is available for plant maintenance and replacement upon completion of Phase 2 installation. Majority of small plant, including pumpsets, pressurisation units, expansion vessels, valves and electrical devices shall use the lift for plant replacement/ repair.
- Forklift – Forklift shall be considered for installation of the large electrical plant on the ground floor.
- Trolly – Trucks and trolleys must be used when transporting plant and equipment across internal floors. These should be equipped with rubberized, load-spreading wheels to minimize potential damage to the raised floor system. Where appropriate, motorised trolleys may be used.
- Multi wheel pads – 'Machine skates'
- Constructional sequencing – Sequencing of installation of the mechanical plant shall be considered due to the spatial restriction within the space.
- Temporary/portable lifting structure such as an 'A' frame or of mobile lifting equipment – Temporary A frame lifting gantry shall be considered for plant replacement in the mechanical plant room, such as pumpsets and other accessory equipment.
- Temporary builders work holes and soft spots – soft spot through Phasing line, i.e. temporary northern wall of the Phase 1 build shall be provided for plant replacement prior to Phase 2 completion.
- Manual handling - within safe weight limits

It shall be noted that the plant movement method shall be reviewed together with the installation/ construction sequencing of the SWEC building.

2.4 Access at high level

- Mobile Elevation working platform - i.e. 'Cherry picker', 'Scissor' platform etc.
- Temporary scaffolding

- Cat ladder
- Mobile platform

2.5 Temporary Protection

The movement of heavy and bulky items will often result in surface damage to services and surfaces, therefore it is strongly recommended that adequate temporary protection is installed prior to any plant movements during the Phased installation.

It is suggested that plywood/chipboard protection shall be considered to be applied to walls and door frames especially at changes in direction. It is also recommended that plywood protection or drapes to be fitted to the interior of lift cars and lift doors.

2.6 Vertical Transportation

2.6.1 Stair core

There are two cores within the SWEC building, one in each phase, with stair access to all floors in each core. There is lift access to all floors in Phase 2 only.

The roof access is via the North core stairs and lift.

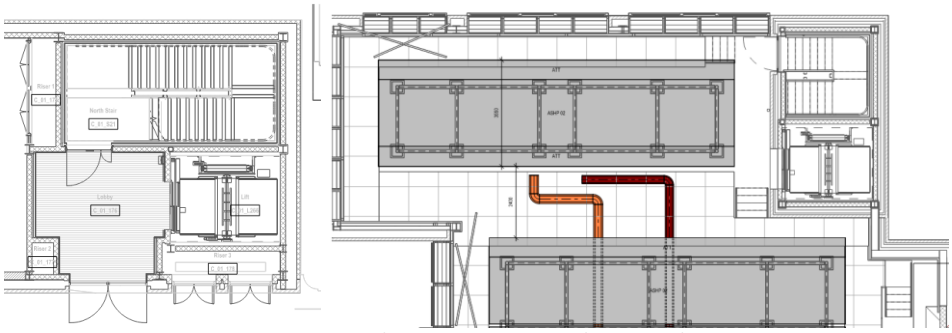

Figure 1&2. North core stair and lift access (Ground floor) (left), North core stair and lift access (roof) (right)

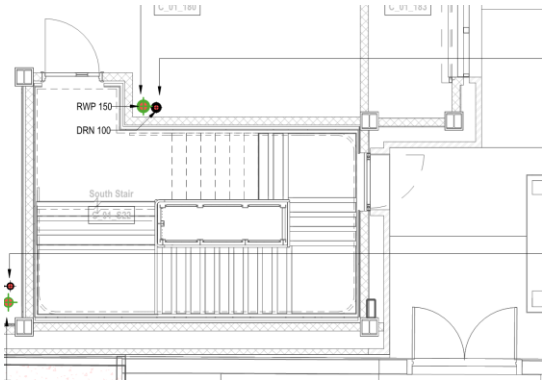

Figure 3. South core stair and lift access (Ground floor)

2.6.2 Lift access

Lift access is provided in Phase 2 area of the SWEC building only. The lift serves combined purposes for personnel movement as well as plant access and maintenance.

Refer to the SWEC vertical transportation specification SW001-STV-1060-C-TSP-E-0001 for more details.

Lift	Floors served	Lift car dimension	Door	Rated capacity
Public/Goods Lift	Level 1 – Roof (across 6 levels)	1500mm W x 2700mm D x 2200m H	Two panel centre opening 1300mm W x 2100mm H	2000kg, 26 passengers

Table 1. SWEC public/goods lift size.

Note that the lift is not designed for firefighting purposes.

3.0 Plant access and maintenance

3.1 SWEC Level 1

3.1.1 Transformer rooms

Figure 4 below indicates the general plant access and maintenance strategy to the transformer rooms as well as the generator room.

There are 5no. transformers located in their own dedicated rooms on this floor, i.e., three within the phase 1 installation and two within the phase 2 installation.

They are all proposed to be Client owned and operated.

Maintenance and Replacement Key Points

- Entry to transformer rooms is by permit for authorised and trained individuals only with direct access to outside allowed for all transformer rooms.
- Managed site access to the two transformer rooms with access to the north shall be allowed during Phase 2 installation. Secondary escape access via the transformer room is provided for these two rooms in accordance with the fire strategy report.
- Louvred façade /doors to the transformer rooms shall be allowed to provide general ventilation.
- Transformer replacement will require associated shut-down and management measures in-place.
- Direct access to outside between Phase 1 and Phase 2 areas shall be allowed for the Phase 2 transformer room TX-E 3 upon completion of Phase 2 installation.
- Direct access to outside via west façade is allowed for TX-D2 transformer room at Phase 2.
- Switch board MSB- E3 within the

3.1.2 Generator room

The generator room is located within Phase 1 area on the ground floor.

There are space provisions for 2no. Generators (Backup duty/ standby) and associated fuel store within the generator plantroom.

Fuel delivery is via an inlet on the façade at Ground Floor directly above the generator room. Fuel stores are provided in a floor standing storage tank within the plant room.

Direct access to outside via the southern stairs is allowed for the generator room. This provides personnel access to the plant room.

The fully louvred west facade of the generator room shall be demountable for major plant replacement. This will require local dis-assembly of the associated ducted systems to the generators for plant replacement if any major failure occurs.

The fuel tank is to be double skinned tank and bunded with low maintenance requirements and the likelihood for major replacement is low. The tank shall be disassembled for major replacement.

The make-up air shaft to the generator room will also contain a fire curtain between the facade louvre with single door access from the generator room.

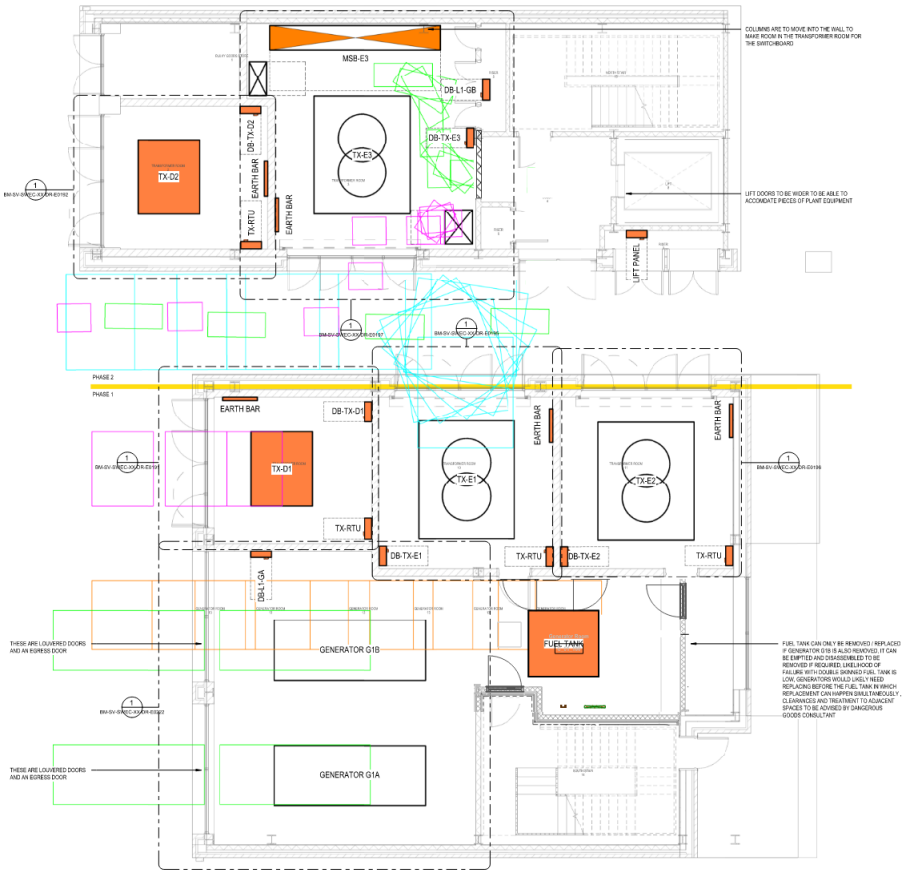

Figure 4. SWEC level 1 – Transformer rooms and generator room plant access

3.2 SWEC level 2 - Switch rooms and ICT comms room

Figure 5 below indicates the general plant maintenance and replacement routes for the electrical plant rooms on level 2.
In general, upon phase 1 installation, the general plant maintenance and replacement route is via the southern stairs. The switch boards are to be modulated so any small components will be taken apart and replaced locally without the need for major requirement.

Upon completion of phase 2 installation, the general plant access route is via the lift within the northern core. This will also include the ICT /comms room that is located within the Phase 2 area.

All electrical plant rooms have been provided with direct access to the protected services corridor in between the plant rooms. Secondary escape route is also

provided to all the switch rooms in Phase 1 areas in accordance with the fire strategy report.

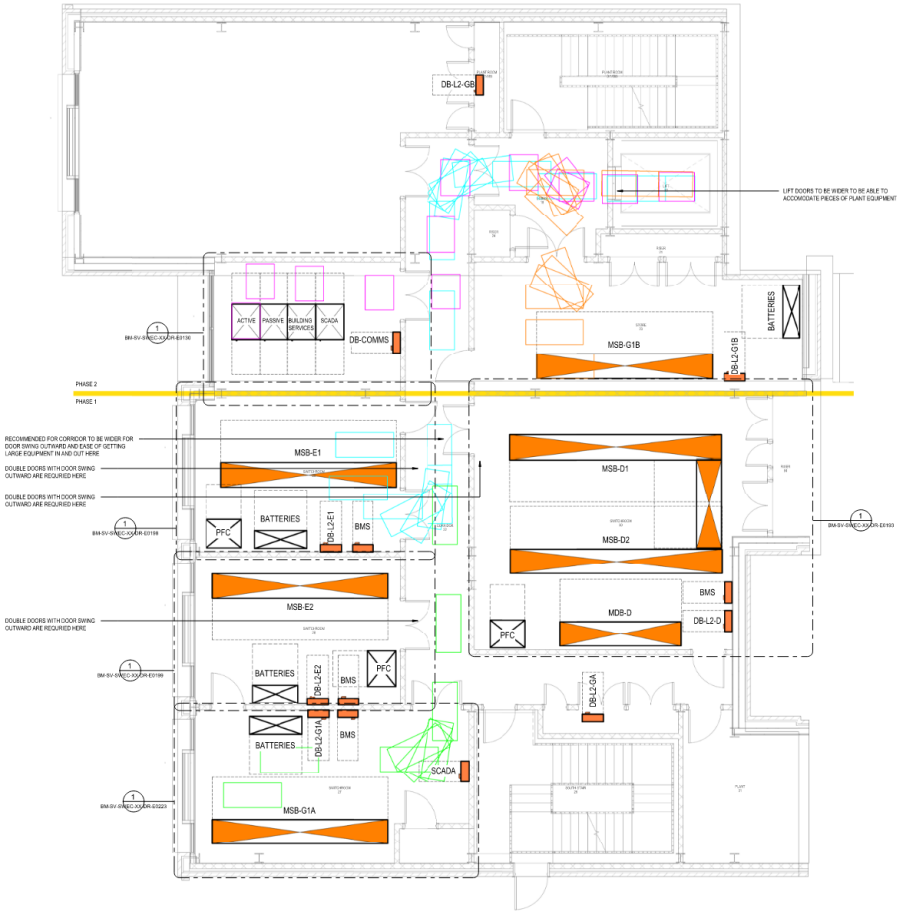

Figure 5. SWEC level 2 – Switch rooms plant access

A min. 1m front clearance has been allowed to gain access to the vertical risers, including.

- Combined services risers by the Southern stair core (Phase 1 installation)
- Combined services riser by the light well at East (Phase 1 installation)
- Generator flue riser access by the southern stair core within the switch room C_02_6 (Phase 1 installation)
- Combined services riser by the lift (Phase 2 installation)
- Combined services riser by the Northern stair core (Phase 2 installation)

3.3 SWEC level 3 - Central mechanical plant room

Figure 6 below shows the general plant maintenance and access strategy for the central mechanical plant room upon completion of Phase 1 works prior to completion of phase 2 installation.

A min. 1000mm clearance access route shall be provided for plant access and maintenance in the centre of the plant room north to south within the plant room.

A min. 550mm clearance access route shall be provided for passage personnel access in accordance with BSRIA 84 guidance.

A min. clear height of 2400mm from the slab to bottom of the services throughout the access route within the plant room shall be retained for personnel access beyond the minimum requirements as set out in the BSRIA guidance.

It shall be noted that no lift access is allowed prior to completion of Phase 2 installation. Temporary knock out panels at 3no. x 1000mm wide x 2000mm tall (dimensions to be confirmed subject to final selection of the equipment, will be required on the northern facade of the Phase 1 installation to allow for plant maintenance and replacement, i.e. any heavy components will need to be taken out via the facade with lifting equipment allowed by the contractor. This will also require secured managed site access within Phase 2 areas.

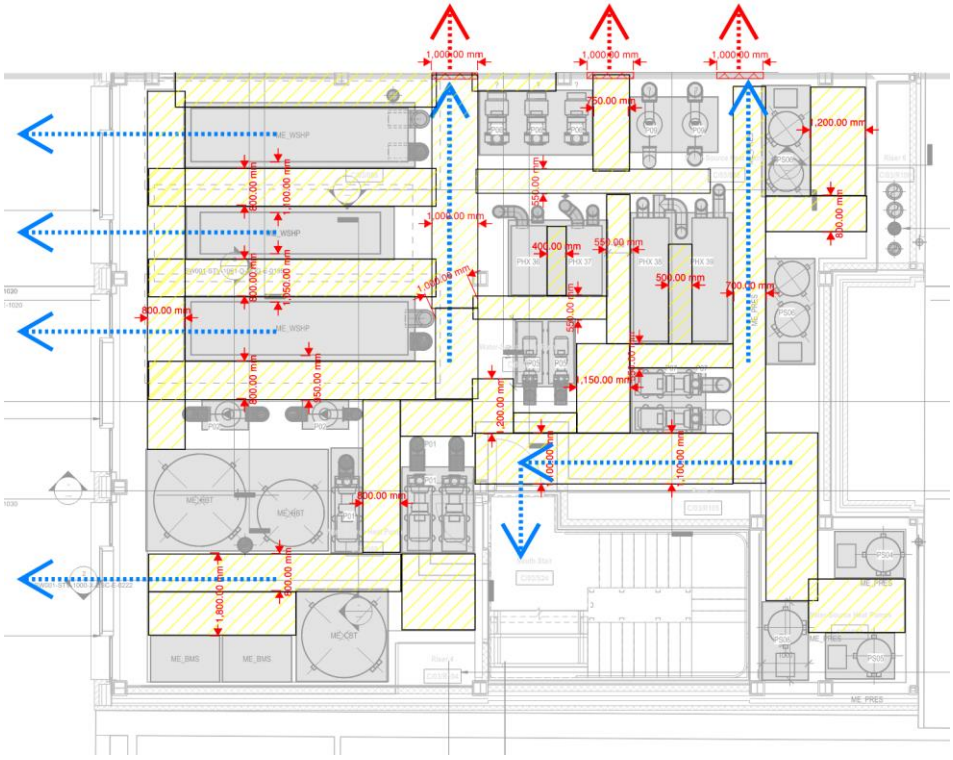

Figure 6. SWEC level 3 – Central mechanical plant room (Phase 1) access

The plate heat exchangers to be installed within Phase 1 areas shall be dis-mounted and taken out for replacement due to the spatial restriction.

Major plant replacement will be via the west facade by demounting the full height facade louvres. This will include the replacement of the WSHPs and larger buffer tanks.

It shall be noted that the likelihood of failure of the buffer tanks is low and if required they can be cut in situ so it can be taken out via the lift/ stairs instead of the facade to ease the replacement process.

Temporary plywood shall be provided over and around the bunded upstand by the doors to allow for ramped access for manual handling of the plant equipment within the space.

See next section for plant and equipment schedule with regard to the weight and sizes.

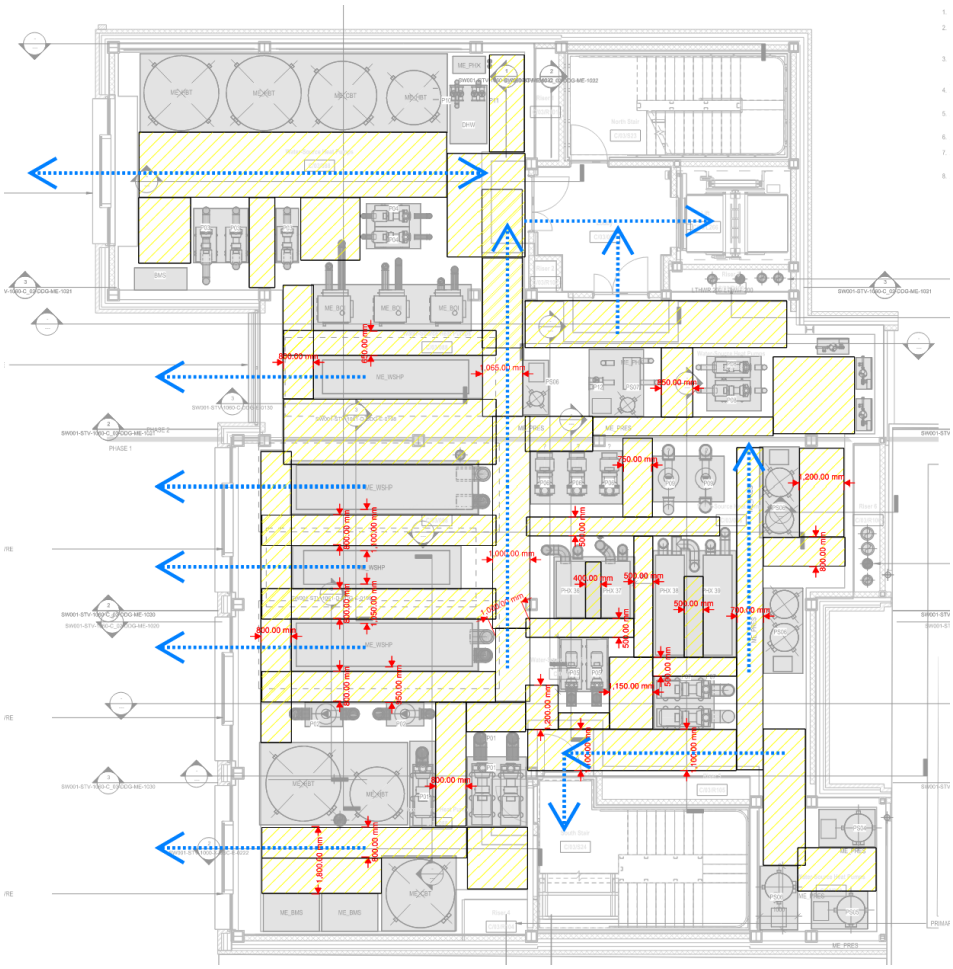

Figure 7. SWEC level 3 – Central mechanical plant room (Phase 2) access

Figure 7 shows the plant and equipment access and maintenance route upon completion of Phase 2 installation. Key points include:

- Temporary knockout panels/ phasing wall is removed, i.e. the Phase 1 and Phase 2 plant room become one large central mechanical plant room.
- The main plant access a maintenance route is via the central of the plant room North to South with a minimum width of 1000mm wide.
- A min. 550mm clearance access route shall be provided for passage personnel access.
- A min. clear height of 2400mm throughout the plant room shall be retained for personnel access.
- Lift access via the northern core for small plant replacement.
- Major plant requirement via the louvred façade. This includes the WSHPs and large buffer tanks.
- Secondary fire escape access provided via southern stairs in accordance with the fire strategy report.

3.4 SWEC level 4 & 5 office floor services maintenance

The level 4 and level 5 are both office floors with all local services to be installed as part of Phase 2 fit out installation.

Figure 8 shows the general plant access route. The key points include.

- All local services to be installed as part of Phase 2 fit out installation.

- Phase 1 installation include the primary service within the vertical riser by the lift well and the southern stair core.
- Phase 2 plant maintenance and replacement is via the lift in northern core.
- Plant access to the generator flue shall be allowed with 1m. clearance at front.
- All local services to be installed above the 'demountable' raft in the office and mess areas. Clearance to the side of the MVHR shall be allowed for access to the control panels as per the manufacturer's recommendations.
- Clearance is allowed below the FCUs and the above the raft for plant access as per the manufacturer's recommendations, i.e. 300mm deep.
- A min. 1m clearance shall be allowed at front of all vertical risers.

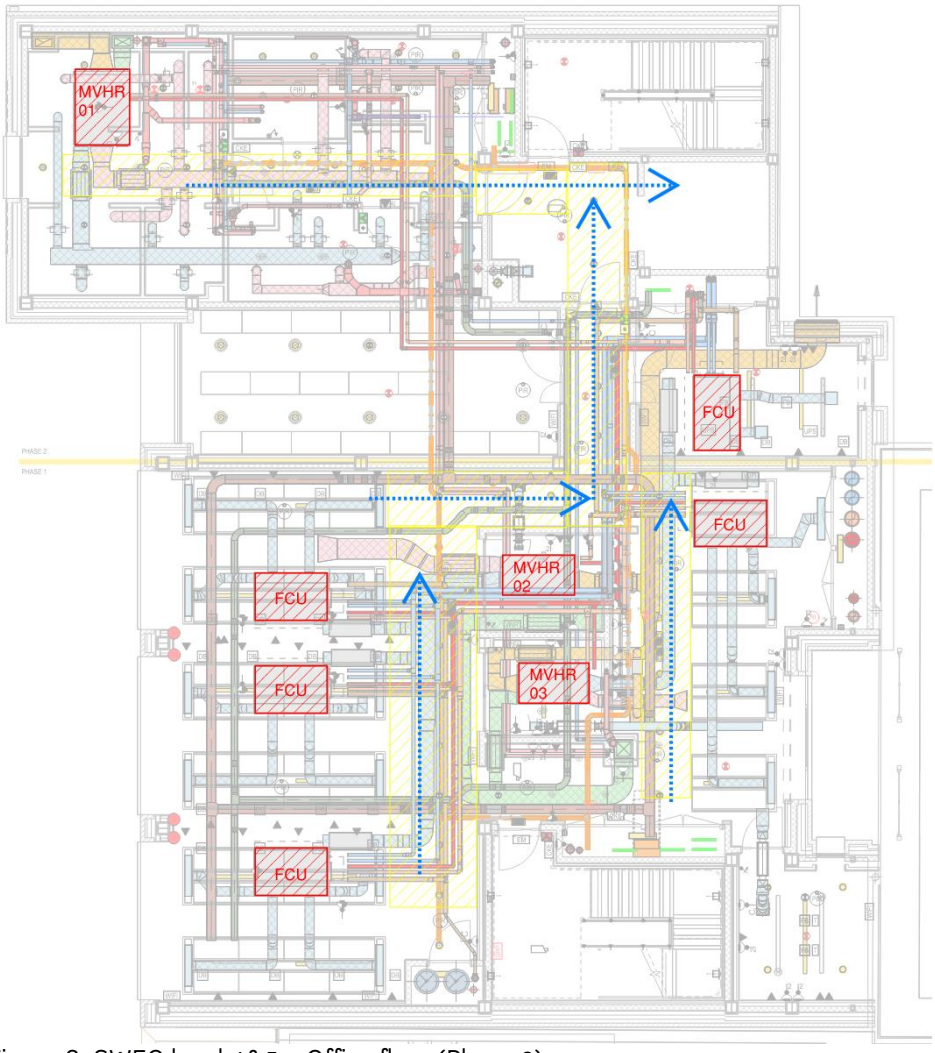

Figure 8. SWEC level 4&5 – Office floor (Phase 2) access

3.5 SWEC Rooftop services maintenance

Figure 9 below indicates the plant access to the roof of the SWEC building upon completion of Phase 1 installation. The main roof is back of house plant space only with restricted access for the maintenance staff only.

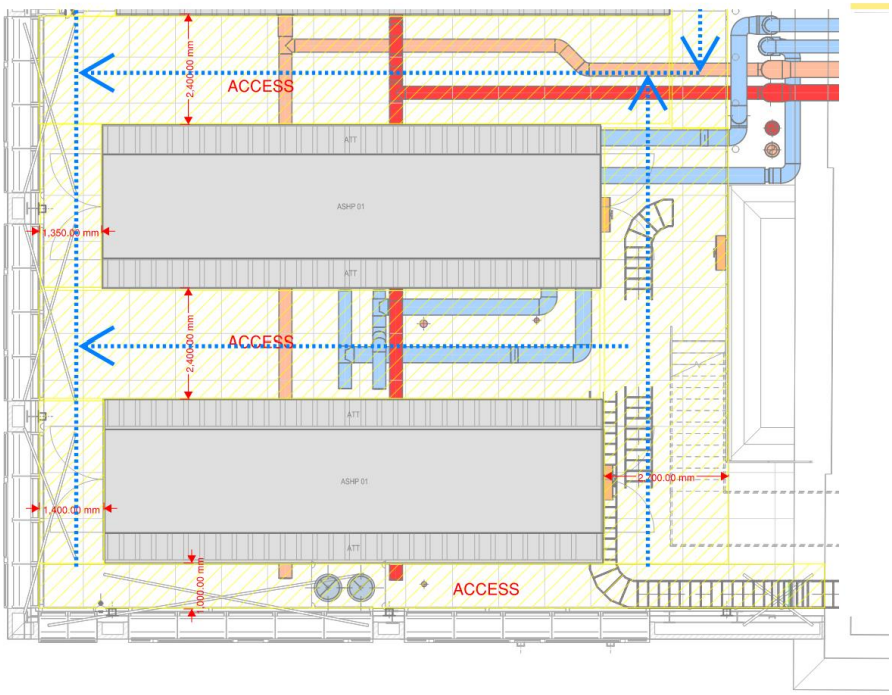

Figure 9. SWEC roof access – Phase 1

2no. ASHPs are located on the southern roof of the SWEC building. A raised metal gantry, at 600mm deep, has been allowed for services distribution. Personnel walkway has been allowed above the gantry. The ASHPs will be placed on concrete upstand above the raised platform. Demountable acoustic enclosure has been allowed to the sides and top of the units. Additional access can be gained to reach the services behind after the attenuator is removed at the sides.

Personnel access to the Phase 1 roof will be available via the Lycian building, i.e. from Lycian roof walk down the new external stairs that is to be installed on the roof of the SWEC building. Any major plant replacement will need to be craned across the west facade on the west road.

The plant access and maintenance to the rooftop plant of the SWEC building will be mainly via the lift upon completion of Phase 2 installation. Key points include:

- Lift access to the SWEC roof for plant access and maintenance.
- Major plant access replacement, i.e., ASHP replacement at end of services, shall be via Crane over the west façade off the West Road by the appointed plant movement specialist.
- Additional plant clearance to be gained via demountable attenuators at the sides.
- Plant access requirement to the manufacturer's recommendation, i.e. 1200mm at long side and 1100mm at short sides (incl. attenuators).
- 600mm metal gantry is provided for services distribution at low level. Walkway above the gantry is provided.
- External stair access to the Lycian roof is provided.

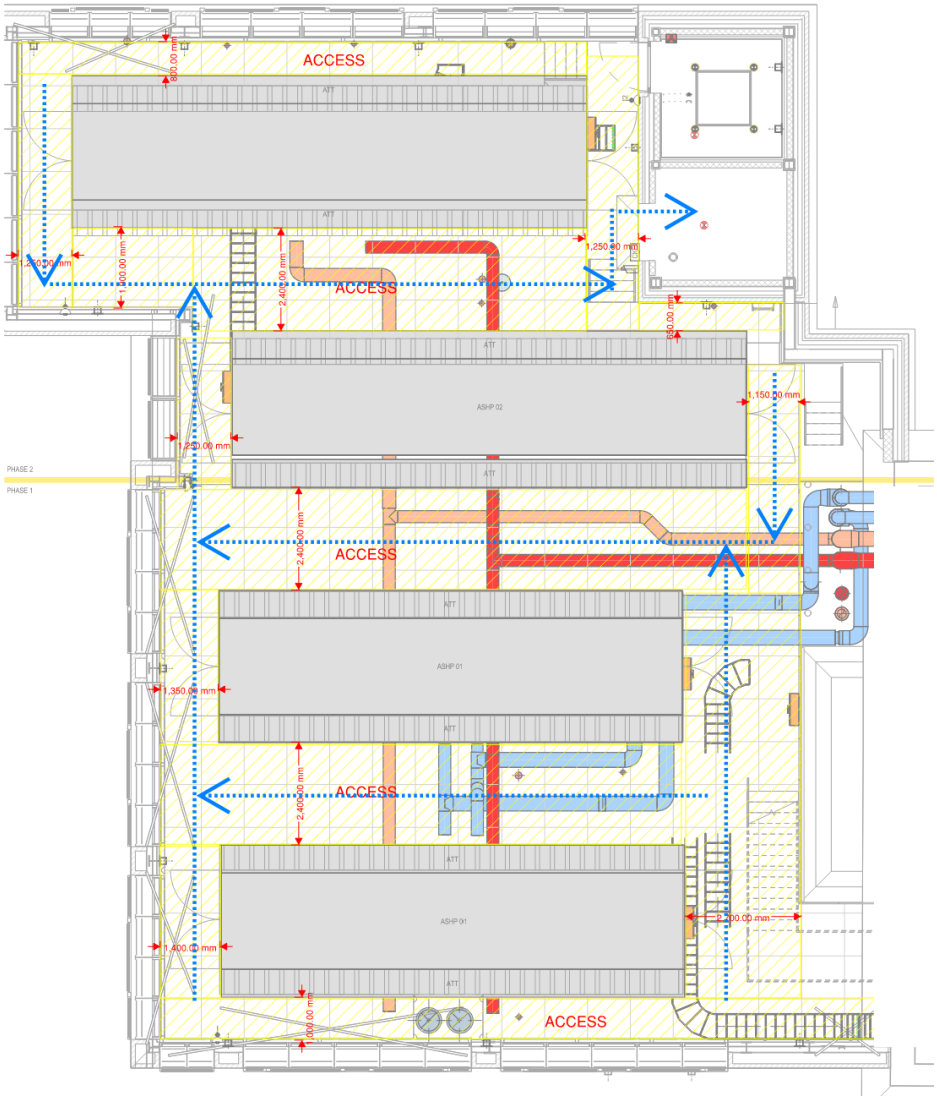

Figure 10. SWEC roof access – Phase 2

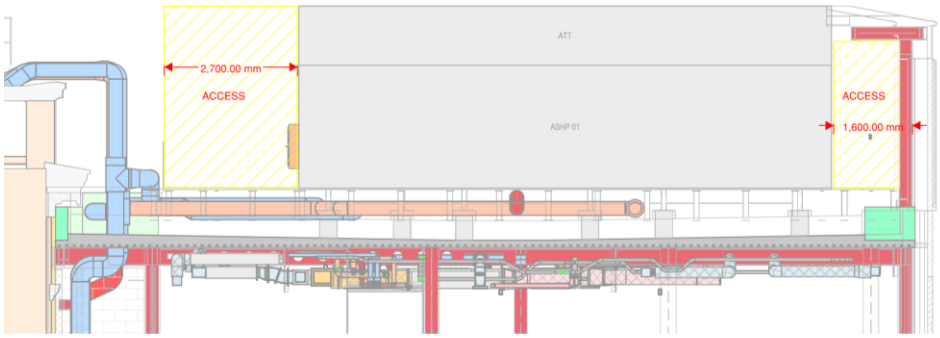

Figure 11. SWEC roof access – short section

3.6 Recommended maintenance regime

Item	Frequency	Key activity	Component replacement	Major replacement/ end of life replacement	Notes
ASHP	12 months	Condition, routine maintenance, connection checks, control checks, operation checks, refrigerant charge checks	10 years	20 years	
WSHP	12 months	Condition, routine maintenance, connection checks, control checks, operation checks, refrigerant charge checks	10 years	20 years	
Buffer tanks	12 months	Condition, control valves and sensors, safety valves and drain	10 years	20 years	
Boiler	12 months	Condition, control valves and sensors, safety valves and drain	10 years	20 years	
Plate heat exchanger	12 months	Condition, control valves and sensors, safety valves and drain	10 years	15 years	
Pumpsets	12 months	Condition, routing maintenance, connection checks, controls and operation	10 years	10 – 15 years	
Side-stream filters	3 months	Condition, routine maintenance, connection checks	5 years	15 years	
Pressurisation sets	3 months	Condition, routine maintenance, connection checks	5 years	15 years	
DHW cylinder	6 months	Condition, control valves, safety valves and discharges	10 years	20 years	
MVHR	3 months	Check operation, fans, coils, filters, actuators, dampers, drain connection	15 years	20 years	
Local supply/extract fans	3 months	Check operation, fans, actuators dampers	10 years	15 years	

Table 2. Mechanical and public health plant and equipment maintenance frequency

Item	Frequency	Key activity	Component replacement	Major replacement/ end of life replacement	Notes
BMS panel	6 months	Condition, routine maintenance, connection checks, control checks, operation checks, refrigerant charge checks	10 years	20 years	
Transformer	12 months	Condition, routine maintenance, connection checks, control checks, operation checks, refrigerant charge checks	N/A	30 years	
LV Switchboard	6 months	Condition, control valves and sensors, safety valves and drain	10 years	20 years	
Generator	6 months	Condition, fuel storage and delivery system, switches, intake and exhaust and test run	10 years	20 years	The generator will also require regular test on monthly basis.
IT cables	3 months	Condition check	10 years	20 years	ITC switches and other IT work replacement not included and to be carried out by the museum
ATS	3 months	Condition, connection check	10 years	20 years	

Table 3. Electrical plant and equipment maintenance frequency

4.0 Plant and equipment schedule.

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
ASHP 01	SWEC Roof Phase 1	10800mm (L) x 2228mm (W) x 2538mm (H) / 11,875 kg	Packaged unit	10800mm (L) x 2228mm (W) x 2538mm (H) / 11,875 kg	Condenser coil Evaporator	7800mm (L) x 145mm (W) x 1250mm (H) / 165kg 3600mm (L) x 508mm (W) / 960kg	Element to be craned over the roof perimeter louvre via west road for replacement
ASHP 02	SWEC Roof Phase 2	12,090mm (L) x 2250mm (W) x 2520mm (H) / 9,092 kg	Packaged unit	12,090mm (L) x 2250mm (W) x 2520mm (H) / 9,092 kg	Condenser coil	4875mm (L) x 150mm (W) x 1250mm (H)/ 162kg	Element to be craned over the roof perimeter louvre via west road for replacement
WSHP 01	SWEC mechanical plant room level 03 Phase 1	4700mm (L) x 1150mm (W) x 2100mm (H) / 8,300 kg	Packaged unit	4,700mm (L) x 1150mm (W) x 2100mm (H) / 8,300 kg	Heat exchanger	2700mm (L) x 600mm (Dia) /TBC	Note that both Purethermal S1200 units are located in Phase 1, whilst only one unit will need to be commissioned for Phase 1 installation. Large element to be replaced via facade. Small element via the lift.
WSHP 02	SWEC mechanical plant room level 03 Phase 1 and Phase 2	3900mm (L) x 1000mm (W) x 2100mm (H) / 3,700kg	Packaged unit	3,900mm (L) x 1000mm (W) x 2100mm (H) / 3,700 kg	Compressor	2000mm (L) x 300mm (Dia)/ TBC	Element to be replaced via lift or facade. Large element to be replaced via facade. Small element via the lift.
Electric boiler 01	SWEC mechanical plant room level 03 Phase 2	700mm (W) x 900mm (D) x 1900mm (H) / 320kg	Packaged unit	700mm (W) x 900mm (D) x 1900mm (H) / 320kg	Heading rods	120mm (Dia) x 780mm (L) / 3kg	Replacement via lift.
Buffer tank 01	SWEC mechanical plant room level 03 Phase 1&2	2000mm (D) x 2740mm (H)/ 2,000 kg	Buffer tank	2000mm (D) x 2740mm (H) / 2,000 kg	n/a	n/a	Tanks consider to be cut in parts and taken out via lift for plant replacement. Sectional tanks consider to be installed via lift for replacement.

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
Buffer tank 02	SWEC mechanical plant room level 03 Phase 1&2	1450mm (D) x 2750mm (H) / 2,000 kg	Buffer tank	1450mm (D) x 2750mm (H) / 2,000 kg	n/a	n/a	Tanks consider to be cut in parts and taken out via lift for plant replacement. Sectional tanks consider to be installed via lift for replacement.
Buffer tank 03	SWEC mechanical plant room level 03 Phase 1&2	1830mm (D) x 2660mm (H) / 2,000 kg	Buffer tank	1830mm (D) x 2660mm (H) / 2,000 kg	n/a	n/a	Tanks consider to be cut in parts and taken out via lift for plant replacement. Sectional tanks consider to be installed via lift for replacement.
Pumpset P01	SWEC mechanical plant room level 03 Phase 1	1450mm (L) x 600mm (W) x 900mm (H)/ 581 kg	Packaged unit	1450mm (L) x 600mm (W) x 900mm (H)/ 581 kg	Pump motor	400mm (Dia) x 600mm L / 250kg	Element to be replaced via lift
Pumpset P02	SWEC mechanical plant room level 03 Phase 1	800mm (L) x 600mm (W) x 1100mm (H)/ 359kg	Packaged unit	800mm (L) x 600mm (W) x 1100mm (H)/ 359kg	Pump motor	420mm (Dia) x 550mm L / 155kg	Element to be replaced via lift
Pumpset P03	SWEC mechanical plant room level 03 Phase 2	350mm (L) x 200mm (W) x 500mm (H) / 40kg	Packaged unit	350mm (L) x 200mm (W) x 500mm (H) / 40kg	Pump motor	210mm (Dia) x 240mm L / 17kg	Element to be replaced via lift
Pumpset P04	SWEC mechanical plant room level 03 Phase 2	400mm (L) x 250mm (W) x 200mm (H) / 13kg	Packaged unit	400mm (L) x 250mm (W) x 200mm (H) / 13kg	Twin head pumpset	400mm (L) x 250mm (W) x 200mm (H) / 13kg	Element to be replaced via lift
Pumpset P05	SWEC mechanical plant room level 03 Phase 1	1300mm (L) x 420mm (W) x 650mm (H) / 341kg	Packaged unit	1300mm (L) x 420mm (W) x 650mm (H) / 341kg	Pump motor	320mm (Dia) x 550mm L / 145kg	Element to be replaced via lift
Pumpset P06	SWEC mechanical plant room level 03 Phase 1	1100mm (L) x 400mm (W) x 450mm (H) / 183kg	Packaged unit	1100mm (L) x 400mm (W) x 450mm (H) / 183kg	Pump motor	480mm (Dia) x 600mm L / 78kg	Element to be replaced via lift
Pumpset P07	SWEC mechanical plant room level 03 Phase 1	1450mm (L) x 660mm (W) x 900mm (H) / 478kg	Packaged unit	1450mm (L) x 660mm (W) x 900mm (H) / 478kg	Pump motor	400mm (Dia) x 600mm L / 205kg	Element to be replaced via lift
Pumpset P08	SWEC mechanical plant room level 03	500mm (L) x 200mm (W) x 250mm (H) / 31kg	Packaged unit	500mm (L) x 200mm (W) x 250mm (H) / 31kg	Twin head pumpset	500mm (L) x 200mm (W) x 250mm (H) / 31kg	Element to be replaced via lift

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
	Phase 2						
Pumpset P09	SWEC mechanical plant room level 03 Phase 1	1000mm (L) x 600mm (W) x 1400mm (H) / 799kg	Packaged unit	1000mm (L) x 600mm (W) x 1400mm (H) / 799kg	Pump motor	490mm (Dia) x 770mm H / 340kg	Element to be replaced via lift
Pumpset P10	SWEC mechanical plant room level 03 Phase 2	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Packaged unit	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Twin head pumpset	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Element to be replaced via lift
Pumpset P11	SWEC mechanical plant room level 03 Phase 2	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Packaged unit	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Twin head pumpset	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Element to be replaced via lift
Pumpset P12	SWEC mechanical plant room level 03 Phase 2	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Packaged unit	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Twin head pumpset	190mm (L) x 210mm (W) x 200mm (H) / 12kg	Element to be replaced via lift
Pumpset P13	SWEC mechanical plant room level 03 Phase 2	190mm (L) x 210mm (W) x 200mm (H) / 5kg	Packaged unit	190mm (L) x 210mm (W) x 200mm (H) / 5kg	Twin head pumpset	190mm (L) x 210mm (W) x 200mm (H) / 5kg	Element to be replaced via lift
PHX 36	SWEC mechanical plant room level 03 Phase 1	1470mm (L) x 770mm (W) x 2070mm (H)	Unit to be flat packed	1470mm (L) x 770mm (W) x 2070mm (H) / 2,122kg	n/a	n/a	Plates to be taken apart in situ. Replacement of the plates via lift.
PHX 37	SWEC mechanical plant room level 03 Phase 1	1470mm (L) x 770mm (W) x 2070mm (H)	Unit to be flat packed	1470mm (L) x 770mm (W) x 2070mm (H)/ 2,122kg	n/a	n/a	Plates to be taken apart in situ. Replacement of the plates via lift.
PHX 38	SWEC mechanical plant room level 03 Phase 1	2670mm (L) x 770mm (W) x 2070mm (H)	Unit to be flat packed	2670mm (L) x 770mm (W) x 2070mm (H) / 3,179kg	n/a	n/a	Plates to be taken apart in situ. Replacement of the plates via lift.
PHX 39	SWEC mechanical plant room level 03 Phase 1	2670mm (L) x 770mm (W) x 2070mm (H)	Unit to be flat packed	2670mm (L) x 770mm (W) x 2070mm (H) / 3,179kg	n/a	n/a	Plates to be taken apart in situ. Replacement of the plates via lift.
PHX 40	SWEC mechanical plant room level 03 Phase 2	480mm (L) x 330mm (W) X 1270mm (H)	Packaged unit	480mm (L) x 330mm (W) X 1270mm (H) / 257kg	n/a	n/a	Element to be replaced via lift
PHX 41	SWEC mechanical	630mm (L) x 330mm (W) x 1270mm (H)	Packaged unit	630mm (L) x 330mm (W) x	n/a	n/a	Element to be replaced via lift

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
	plant room level 03 Phase 2			1270mm (H) / 292kg			
Press_01	SWEC mechanical plant room level 03 Phase 1	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Element to be replaced via lift
Press_02	SWEC mechanical plant room level 03 Phase 1	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Element to be replaced via lift
Press_03	SWEC mechanical plant room level 03 Phase 1	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Element to be replaced via lift
Press_04	SWEC mechanical plant room level 03 Phase 1	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Element to be replaced via lift
Press_05	SWEC mechanical plant room level 03 Phase 1	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 45KG	Element to be replaced via lift
Press_06	SWEC mechanical plant room level 03 Phase 2	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Element to be replaced via lift
Press_07	SWEC mechanical plant room level 03 Phase 2	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Packaged unit	500mm (L) x 400mm (W) x 950mm (H) / 57KG	Element to be replaced via lift
EXP_01	SWEC mechanical plant room level 03 Phase 1	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Element to be replaced via lift
EXP_02	SWEC mechanical plant room level 03 Phase 1	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Element to be replaced via lift
EXP_03	SWEC mechanical plant room level 03 Phase 1	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Element to be replaced via lift

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
EXP_04	SWEC mechanical plant room level 03 Phase 1	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Element to be replaced via lift
EXP_05	SWEC mechanical plant room level 03 Phase 1	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Packaged unit	740mm (DIA.) X 1500mm (H) / 79KG	Element to be replaced via lift
EXP_06	SWEC mechanical plant room level 03 Phase 2	390mm (DIA.) X 600mm (H) / 9 kg	Packaged unit	390mm (DIA.) X 600mm (H) / 9 kg	Packaged unit	390mm (DIA.) X 600mm (H) / 9 kg	Element to be replaced via lift
EXP_07	SWEC mechanical plant room level 03 Phase 2	390mm (DIA.) X 600mm (H) / 9 kg	Packaged unit	390mm (DIA.) X 600mm (H) / 9 kg	Packaged unit	390mm (DIA.) X 600mm (H) / 9 kg	Element to be replaced via lift
DHW 01	SWEC mechanical plant room level 03 Phase 2	850mm (DIA) x 1500mm (H) / 95kg	Packaged unit	850mm (DIA) x 1500mm (H) / 95kg	850mm (DIA) x 1500mm (H) / 95kg	850mm (DIA) x 1500mm (H) / 95kg	Element to be replaced via lift
Side filtration	WEC mechanical plant room level 03 Phase 2	850mm (L) x 425mm (W) x 1060mm (H) / 140kg	Packaged unit	850mm (L) x 425mm (W) x 1060mm (H) / 140kg	Filter housing unit / 80kg	i955mm (H) x 200mm (Dia)	Element to be replaced via lift
MVHR 01	SWEC office floor level 4 &5 Phase 2	1,700mm x 1,150mm x 340mm / 235kg	Packaged unit	1,700mm x 1,150mm x 340mm / 235kg	Packaged unit	1,700mm x 1,150mm x 340mm / 235kg	Element to be replaced via lift
MVHR 02	SWEC office floor level 4 &5 Phase 2	1,600mm x 1,000m x 260mm / 187kg	Packaged unit	1,600mm x 1,000m x 260mm / 187kg	Packaged unit	1,600mm x 1,000m x 260mm / 187kg	Element to be replaced via lift
MVHR 03	SWEC office floor level 4 &5 Phase 2	1,700mm x 1,150mm x 340mm / 235kg	Packaged unit	1,700mm x 1,150mm x 340mm / 235kg	Packaged unit	1,700mm x 1,150mm x 340mm / 235kg	Element to be replaced via lift
EF 01	SWEC plant room level 2& 3 Phase 2	Dia.250mm x 280mm L / 5kg	Packaged unit	Dia.250mm x 280mm L / 5kg	Packaged unit	Dia.250mm x 280mm L / 5kg	Element to be replaced via lift
EF 02	SWEC office floor level 4 &5 Phase 2	Dia125mm x 260mm L / 2kg	Packaged unit	Dia125mm x 260mm L / 2kg	Packaged unit	Dia125mm x 260mm L / 2kg	Element to be replaced via lift
SF 01	SWEC Lift lobby riser Phase 2	Dia200mm x 300mm L / 5kg	Packaged unit	Dia200mm x 300mm L / 5kg	Packaged unit	Dia200mm x 300mm L / 5kg	Element to be replaced via lift

Reference	Area/ Installation phase	Dimension LxDxH (mm) / Wt (kg)	Installation/ end of life replacement		Maintenance		Notes
			Largest component	Dim. LxDxH (mm) / Wt (kg)	Largest component	Dim. LxDxH (mm) / Wt (kg)	
FCU 01	SWEC office floor level 4 &5 Phase 2	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Element to be replaced via lift
FCU 02	SWEC office floor level 4 &5 Phase 2	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Element to be replaced via lift
FCU 03	SWEC office floor level 4 &5 Phase 2	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Element to be replaced via lift
FCU 04	SWEC office floor level 4 &5 Phase 2	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Element to be replaced via lift
FCU 05	SWEC office floor level 4 &5 Phase 2	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Packaged unit	2003mm (L) x 900mm (W) x 235mm (D) / 86kg	Element to be replaced via lift
MCW Booster 01	SWEC mechanical plant room level 1 Phase 1	650mm (W) x 750 (D) x 1200 (H) / 84kg	Packaged unit	650mm (W) x 750 (D) x 1200 (H) / 84kg	Pumpset	600mm (W) x 300 (D) x 250 (H) / 25kg	Element to be replaced via lift
CAT 5 Break Tank 01	SWEC mechanical plant room level 1 Phase 1	600mm (W) x 600mm (D) x 750mm (H) / 43kg	Packaged unit	600mm (W) x 600mm (D) x 750mm (H) / 43kg	Pumpset	600mm (W) x 200 (D) x 250 (H) / 13kg	Element to be replaced via lift

Note all electrical plant on the level 1 shall be modular units and can be taken apart to be replaced via the lift through single door access.