

- within relevant LU Cat 1 Engineering Standards, or
- where not specifically identified within relevant LU Cat 1 Engineering Standards, the requirements identified within relevant British Standards, or
- where it is evidenced that the requirements within the aforementioned standards is not possible, meet the delivery requirements as originally installed

Only by prior agreement with the Company may the above criteria not be met.

- 6.5.2 Assets and Systems shall at all times perform their required duty without environmental impact by way of unnecessary or unintended light flicker, noise, vibration, smell, humidity, pollution or heat.
- 6.5.3 Irrespective of the performance requirements identified within paragraph 6.5.1, all faults on or impacting individual luminaires or lighting systems within public areas shall be rectified within the timescales identified in Schedule 12c (Performance Measurement) Appendix 2 (Emergency Clearance Times, Standard Clearance Times and Service Points).
- 6.5.4 Once a System or Asset falls below the performance requirements identified within paragraph 6.5.1, all faults relevant to that Asset or System shall be repaired within the timescales identified in Schedule 12c (Performance Measurement) Appendix 2 (Emergency Clearance Times, Standard Clearance Times and Service Points).
- 6.5.5 Irrespective of the performance requirements identified within paragraph 6.5.1, where the failure or sub-optimal performance of an Asset, Component or Consumable consequentially causes stress on other related or unrelated Systems, Assets, Components or Consumables, the Supplier shall rectify the failed or sub-optimal performing Asset, Component or Consumable.



## 7 SCOPE & GENERAL PROVISIONS

### 7.1 Scope of Maintenance

7.1.1 The Supplier shall deliver Planned Maintenance and Reactive Maintenance in accordance with this Specification; including the necessary replacement of Consumables, Components and Supporting Infrastructure

7.1.1

7.1.2 Equipment covered within this Specification includes but is not limited to:

- Cooling
  - Cooling Systems DX
  - Chilled Water / VRV / VRF
  - Platform Air Handling Unit (PAHU)
  - Water Chillers and Condensers.
  - Chilled Water Distribution System inc Air Blast Coolers, pumps and pressurisation sets
  - Water & Refrigerant distribution system
  - Control Systems and Panels
- Accommodation & Plant Room Ventilation
  - Supply / Extract Air Handling Units
  - Toilet Extract Ventilation
  - Machine Room/Pump Room Ventilation (incl. Fire Rated Systems)
  - Battery Extract Ventilation
  - Miscellaneous Fans (Cooker Hoods, Vent Axia's, In Line Fans / Window / Wall, Map Dampers and Indux Re-circulating Fans)
  - Ductwork distribution systems
  - Control Systems and Panels
- Tunnel & Station Ventilation
  - Tunnel & Station Ventilation including public area, stairs and lifts pressurisation fans
  - Smoke Control Fan Ventilation
  - Associated Shafts & Ductwork distribution systems
  - Control Systems and Panels
  - Blue Summer Fans
- Heating



- Industrial & Commercial Heating sources
- Heat Emitters
- Gas Services & Plant
- Piped distribution
- Control Systems and Panels
- Water
  - Mains Water Supply
  - Cold Water Tanks
  - Hot Water Storage
  - Tea Boilers and associated drinking fountains
  - Piped distribution systems
- Low Voltage Power
  - Uninterruptable Power Supplies (including batteries): not station lighting OLBI's
    - Diesel Generators
    - Change-over device operational testing: contactors, static switches
    - Lightning Protection
    - LV Switchgear & Panels
    - LV Distribution Boards
    - Cable distribution systems
    - Cable Management Systems
- Lighting
  - Lighting in Public Areas: incl. Hard Access
  - Lighting in Non-Public Areas: incl. confined spaces
  - Emergency Lighting: incl. Emergency Lighting Testing
  - Lighting Columns: Open Platform hinged and fixed, Station and Depot access roads
  - Lighting Controls (inc Andromeda)
  - Control Panels and Systems
  - Planned re-lamping & re-ballasting
- Building Management Systems
  - Control Panels
  - Cable distribution systems
- Station Public Area Signage



- Internally illuminated emergency, way finding, Underground and station naming signs
  - Non internally illuminated way finding, Underground and station naming signs
  - Miscellaneous Signage – non-public areas, all Sites
- 7.1.3 The Equipment included within this Contract is fed with either 400 Volts 3 phase AC 50 Hz or 230 Volts single phase 50 Hz.
- 7.1.4 Appendix B (Equipment Descriptions) includes a more detailed description of the various Systems covered by this Specification but is not exhaustive

## 7.2 General Provisions

7.3

7.4

- 7.2.1 Within 15 months of the Services Commencement Date, the Supplier shall in the course of the works, have visited all the Equipment covered by this Contract and produced a condition report detailing the following:
- Any discrepancies in the Equipment Register Site, asset no, asset description
  - Area served, detailed location
  - Manufacturer, model no., serial no.
  - Full technical details
  - Estimated age at time of inspection
  - Condition (physical, operational, performance)
- The report should be submitted to the Company for review and action as necessary in an electronic format to be agreed with the Company.
- 7.2.2 Specifically, for staff ventilation systems, the Supplier shall provide measurements of inlet and exhaust air flow rates taken adjacent to Ventilation System fans and grilles at the Suppliers first maintenance visit.
- 7.2.3 The Supplier shall maintain all firmware, front-end software and database software upgrades for Electrical & Mechanical Systems. The Company shall retain access to all up to date Electrical & Mechanical Systems software as related to the Sites, to be available for inspection to the Company or a third party appointed by him, at any time.
- 7.2.4 The Supplier shall make available to the Company all access and control of all firmware, front-end software and database software as related to the Electrical & Mechanical Systems at the Sites for the duration of the Contract and after the Contract has ended; this shall be irrespective of the manner in which the Contract comes to an end.
- 7.2.5 The Supplier shall provide all necessary cleaning materials and equipment.

## 7.3 Listed Buildings and Buildings of Heritage Interest



- 7.3.1 The Supplier shall be aware that many of the Company's Stations and buildings are statutorily listed, locally listed, within conservation areas or are of heritage interest. Refer to Appendix L (LU Heritage Map).
- 7.3.3 The Supplier shall repair, rather than replace original finishes, Equipment and Equipment replicas on listed buildings and buildings of heritage interest. Where necessary, Equipment replacement shall be only by prior written agreement from the Company's Representative and the replacement Equipment shall maintain the original manufacturing and design principles

#### **7.4 Methods of Working**

- 7.4.1 The Supplier shall maintain all Sites and Equipment in a clean, tidy and safe condition at all times with due regard to statutory requirements and to the satisfaction of the Company.
- 7.4.2 All low voltage electrical works must be undertaken or supervised by a Level 3 safe isolation electrician at all times. The Level 3 safe isolation process is mandatory for all low voltage electrical systems. All low voltage electrical works shall be installed and certified in accordance with and as required by BS7671.
- 7.4.3 There will be a need for fire systems isolations, and subsequent re-instatement, of equipment or apparatus in order for the Supplier to undertake Services / project works or inspections within and outside of the scope of the Contract. The Company will take responsibility for managing all such isolations and may, in the case of complex isolations request the Supplier to support this process. Where this is the case, the Supplier shall provide a priced proposal for this work in advance of undertaking the work. The following processes shall be utilised by the Supplier;
- S1088 Managing Changes to Stations Fire Precautions
  - PR0630, Fire Detection Isolation, Smoke to Heat Detector Substitution
- 7.4.4 For all works that interface with an existing "clip-in" ceiling system the Supplier shall;
- Use only suitably trained personnel to undertake the work
  - Prior to work taking place, ensure the ceiling system is examined by an experienced person who can determine if it is in a condition that will allow for tile removal and reinstallation.
  - Other than for immediate replacement, provide alternative temporary ceiling coverings during the works to minimise the number of times that ceiling tiles are removed and reinstalled.
  - Make provision for ceiling tile storage to ensure the tiles remain undamaged.
  - Ensure all works are undertaken in accordance with the Association of Interior Specialists Publication: Best Practice Guide - maintenance and access into suspended ceilings.



- Ensure that all ceiling systems and their components are only removed by experienced persons using the appropriate blade extraction tool for that ceiling tile make.
- Not reinstall any deformed or damaged ceiling tile.
- Pay particular attention to the tile return flanges, pips and stops.
- Prior to reinstallation the existing grid should be examined to ensure the jaws of the sprung T are touching.
- Do not reinstall the tile if they are not.
- Ensure that any replacement ceiling tiles, fitted into an existing grid, are from the same manufacturer.
- Record the location of any removals / reinstatements in hand back documentation.

7.4.5 Unless agreed otherwise by the Company, the Supplier shall dismantle portable access towers and scaffolding required to deliver the Services at the end of each shift or working day and remove them from the Site or take them to licensed storage if the Company's Representative agrees that this is required.

7.4.6 The use of water for cleaning of electrical Equipment is prohibited.

7.4.7 Some Equipment, in particular certain switchgear, mains SWA cabling and supply/extract ductwork, are known to contain asbestos material. The Supplier shall expect to work in close proximity to, or on Equipment containing asbestos and shall undertake all work in accordance with London Underground procedures and with reference to the London Underground Asbestos Register. The Supplier is not responsible for the removal or disposal of asbestos materials.

7.4.8 A periodic technical audit and/or inspection shall be carried out by the Company during which the Company's Representative may assess any or all of the following:

- The Supplier's compliance with the Contract;
- Adherence to the Annual Planned Maintenance Schedule;
- The effectiveness of the delivery of the Services;
- Compliance with relevant technical standards;
- Scope for improvement of service quality and value.

Full details of the scope of the audit shall be declared a minimum of 1 weeks in advance of the audit date. The Supplier shall afford access to documentation at their offices and on Site, and make available such staff as are deemed necessary by the Company's Representative. The technical audit and/or inspection shall be carried out approximately thirteen (13) times per year, or more or less often as considered necessary by the Company's Representative.

## **7.5 Requirements for every Maintenance or Repair Intervention**

7.5

7.5.1 All fixings, retainers, restraints and associated bracketry shall be inspected to ensure they are tight and show no apparent signs of



deterioration by way of corrosion, cracks or being misshapen. Any concerns shall be raised immediately with the Company for consideration and agreement of appropriate action.

- 7.5.2 All Equipment, related enclosures, housings and associated ventilation shall be free of dirt, dust and excess grease both internally and externally following each maintenance or repair intervention. The manufacturers ingress protection rating of the Equipment shall be checked and maintained at each maintenance or repair intervention.
- 7.5.3 Fan room and Switch room floors shall be vacuum cleaned in areas with fire detection or swept in areas without fire detection to ensure they are free of dirt and dust at each maintenance or repair intervention on assets or systems contained within.
- 7.5.4 Following a maintenance or repair intervention all redundant materials, dirt and excess lubricant shall be removed from within, on and local to the asset.
- 7.5.5 Immediately following a maintenance or repair intervention, a Maintenance Report shall be email copied to the Company within 48hours of completion of the intervention, which as a minimum shall identify/include;
- Fault report or work order number
  - Date and time of attendance
  - Building/Station Site
  - Asset location (SID Code),
  - Attending Supplier and Engineer's name
  - Activity undertaken
  - Confirmation of fixings/restraints inspection and confirmed acceptable
  - Identify Preventative & Corrective Maintenance, concerns, issues and/or risks required follow-up identified
  - Parts replaced
  - Asset condition assessment in line with the Company's classification
  - Date and time stamped photographs taken of an asset prior to and upon completion of the work upon it and
  - Attending engineers name and signature

("Maintenance Report ")

Failure to complete record sheets correctly will be seen as failure to complete the Reactive Maintenance or Planned Maintenance and consequently the fault may not be closed or maintenance may need to be re-scheduled.

## 7.6 Hard Access

7.6

- 7.6.1 Certain Equipment is located in difficult to access positions, reflecting the operating environment of the Company; and, as such, apparatus,



materials and associated training and certification -where necessary – shall be supplied by the Supplier in order to access such Equipment.

## **7.7 The Company's Asset Management Systems (AMS)**

7.7

- 7.7.1 The Company operates a number of Asset Management Systems (AMS) across its business units which hold the Company's asset register identifying TfL facilities assets.
- 7.7.2 The Supplier shall provide the Company with the Annual Maintenance Plan (AMP) as detailed in 7.9. This shall be uploaded into the AMS in accordance with the company requirement outlined in Appendix N. The Supplier shall track, complete and close out work orders in accordance with the company requirement outlined in Appendix N.

## **7.8 The Company' Help Desk and Fault Reporting Centres**

7.8

- 7.8.1 The Company operates a number of Helpdesks/ Fault Reporting Centres for the reporting of faults by the Company's staff. Faults reported to the Supplier will be via the AMS.
- 7.8.2 The Supplier shall provide a 24/7 call centre capability to respond to all faults reported by the Company. The Supplier's call centre facility shall be the contact point for the Company and must be operated at all times by suitably trained and competent staff. The call centre facility shall receive from and share data with the Company as required.

## **7.9 Annual Maintenance Plan (AMP)**

7.9

- 7.9.1 The Supplier shall, in conjunction with the Company, prepare the Annual Maintenance Plan and submit the first Annual Maintenance Plan to the Company by no later than two months after the Services Commencement Date.
- 7.9.2 The Supplier shall include in the Annual Maintenance Plan all:-
  - a. Outstanding Reactive Maintenance requirements
  - b. Planned Maintenance aligned to the Annual Planned Maintenance Schedule;
  - c. Proposed Equipment replacement
  - d. Preventative & Corrective Maintenance; and
  - e. Other required works which do not appear on the Annual Planned Maintenance Schedule.
- 7.9.3 The Supplier shall identify the reason for each item appearing on the Annual Maintenance Plan and prioritise each item in terms of:-
  - a. Impact on health & safety;
  - b. Impact on normal use of the Sites;
  - c. Impact on on-going costs of maintenance;
  - d. The business resilience risks to the Company; and



- e. Any other relevant criteria.

## **7.10 Reporting Timescales**

### **7.10**

- 7.10.1 The Supplier shall provide the Company a draft AMP in week 1 of Period 7 of each year. This will cover the Work Orders for the following financial year (P1 – P13). The company will review and finalise the AMP by week 4 of Period 8 and will be loaded into the AMS by week 1 of Period 9.
- 7.10.2 The Supplier shall provide a report to the Company in week 1 of each period in a template provided by the Company. A contract management meeting will be held in week 2 of each period to discuss the contents of this report and agree an action plan.
- 7.10.3 The Supplier shall close out all work orders within 2 hours of leaving Site

## **7.11 The Equipment Register**

### **7.11**

- 7.11.1 The Equipment Register shall be maintained by the Supplier such that it contains catalogued details of all Systems, Assets and Components with associated details, typically;
- Unique Asset Number
  - Asset Type/Description
  - Site
  - Bar Code Number
  - Location Type/ Room Use
  - Manufacturer Model Serial Number
  - Year of Manufacture
  - Access Hours
  - Access requirements
  - Asset Condition
  - Asset Performance
  - Specific/relevant asset details
  - Planned Maintenance Log
- 7.11.2 The Supplier shall maintain the Equipment Register up to date at all times throughout the Contract term.
- 7.11.3 The Supplier shall ensure that data held in the Equipment Register shall be in the format and hierarchy prescribed by BS 1192-2, BS 1192-3 and BIM protocol.

## **7.12 Preventative & Corrective Maintenance Delivery**

### **7.12**

- 7.12.1 During Planned Maintenance or Reactive Maintenance the Supplier may identify the need to undertake further tasks to Components,



Consumables, Supporting infrastructure (“Preventative & Corrective Maintenance”). In such cases the Supplier shall:

- Ensure the initial Planned Maintenance or Reactive Maintenance is completed on time in accordance with Schedule 12c Appendix 2.
- Identify the proposal within the Maintenance Report and include detail of the required tasks and clearance times for those tasks.

Within 1 week of the delivery of the Maintenance Report the Company will approve the proposal, reject the proposal or require changes to the tasks and/or clearance times. The Supplier shall enter the details of the approved tasks and clearance times into the Annual Maintenance Plan.

- 7.12.2 The Supplier shall identify any areas of damage or deficiencies to any Asset that the Supplier discovers during the course of the delivery of the Services, and the Supplier shall report the same to the Company in the Maintenance Report.

### **7.13 Equipment Changes**

#### **7.13**

- 7.13.1 The Supplier shall witness and document the testing and commissioning of new Equipment where the installation is undertaken by the Supplier and shall add new Equipment to the Equipment Register and Annual Planned Maintenance Schedule within 2 weeks of the Equipment being commissioned.
- 7.13.2 Where the installation of new Equipment is not undertaken by the Company the Supplier shall add new Equipment to the Equipment Register and Annual Planned Maintenance Schedule within 2 weeks of the change being accepted. If additional assets are identified, it is mandatory to complete an asset registration form (TLF 447) and submit to the Company within 48 hours of Reactive Maintenance attendance or at the Period Progress Meeting where the additional Equipment is identified from survey etc.
- 7.13.3 Upon the discovery of additional Equipment not identified in the Equipment Register, the Supplier shall provide to the Company details of the Equipment within 2 weeks of the change Equipment being discovered.
- 7.13.4 Annually 1 month before each anniversary of the Services Commencement Date, and also 6 months before the Expiry Date, the Supplier shall review and submit an updated and revised Equipment Register to the Company, taking account of any and all changes to the Sites including but not limited to changes to the Service Matrix, acquisitions and disposals of Sites, additions and disposals of the Equipment, warranties and maintenance records within the previous year.
- 7.13.5 The Supplier shall maintain all new and additional Equipment that is installed at the Sites after the Services Commencement Date, whether such installation was carried out by the Supplier or the



Company and whether it occurred pursuant to an Additional Works Notice or otherwise. The Supplier shall be entitled to request a Variation in accordance with the Contract Variation Procedure, in respect of such maintenance.

## **7.14 System or Asset Replacement**

### **7.14**

7.14.1 Except for Replace on Failure Assets identified within 7.15, the comprehensive replacement of an entire System or Asset is excluded from the scope of the Specification and may be subject to a separate instruction as Additional Works as detailed in Section 2.

The necessary replacement of specific Components, Consumables and Supporting Infrastructure to repair or maintain Systems or Assets is included in the scope of the Specification.

7.14.2 The Supplier shall identify opportunities for System and Asset replacement at any point throughout the Contract and supply appropriate information, photographs and data to the Company to evidence why it should be considered via a business case. An example of an acceptable business case template is contained in Appendix C (Flash Business Case Template).

7.14.3 System or Asset replacement may be considered by the Company where in the view of the Company a System or Asset;

- failure has increased in likelihood to a level deemed unacceptable to the Company;
- is close to being life expired and repair costs are both significant and unlikely to prove cost effective;
- repair or replacement cost of the components is greater than 70% of the asset replacement cost
- has significant costs associated with access and beneficial access is available from the replacement or maintenance of adjacent Equipment;
- has failed and it is deemed critical and replacement will prove to be significantly quicker than repair; or
- is significantly unable to meet the required performance criteria.

7.14.4 Unless instructed by the Company, the Supplier shall continue to deliver Planned Maintenance and Reactive Maintenance to all Equipment in accordance with the Contract whilst the Equipment is in place.

7.14.5 A replacement Asset shall automatically take on the obligations of its original Asset under the terms of this Contract.

7.14.6 Any Asset deemed to require replacement will be held by the Supplier for a period of four weeks in a designated quarantine location for inspection by the Company or the Company's appointed specialist. If this inspection identifies that the Asset is not life expired or beyond economical repair, the Asset will be sent back to the maintainer for refurbishment under the contract cost and kept in stock as a replacement asset.



7.14.7 Replacement of existing Assets, Consumables and Components shall be strictly on a "like for like" basis. Replacement by parts of different manufacture, manufacturer, class, type, duty rating and/or materials, shall not be carried out without prior approval of the Company. Should an Asset, Consumable or Component become no longer available, it shall be the Supplier's responsibility to advise the Company of this fact immediately and recommend an alternative. Where whole Assets require replacement the Supplier shall make efforts to standardise the Equipment in use across the network. The aim of this is to reduce the variety of assets in use across all the company maintained Sites.

Materials installed by the Supplier which do not meet these requirements shall with the approval of the Company be immediately removed and replaced with acceptable materials by the Supplier at no cost to the Company. If the Supplier is unable or unwilling to replace any unsuitable materials, the Company shall arrange for their replacement at the Supplier's cost.

## **7.15 Replace on Failure Assets**

### **7.15**

7.15.1 Certain Assets are considered either not readily maintainable or of relatively low prime cost and therefore uneconomic to repair. These are considered to be "Replace on Failure Assets".

7.15.2 Replace on Failure Assets are as follows:

- Hand Dryers
- Through the wall fans
- Cooker Hoods
- Point of use instantaneous water heaters
- Single point water heaters
- Electric Showers
- Dishwasher
- Drinks Machine
- Microwave
- Refrigerator
- Tumble Dryer
- Washing Machine
- Electric Towel Rail
- Dehumidifiers

Spouts, outlets, taps and mesh filters on Point of use instantaneous, Single point of use water heaters and showers shall be repaired or replaced as required.

7.15.3 Further Assets may be added to the above list without any change to the contract price by written agreement between the Company and the Supplier.

7.15.4 Replace on Failure Assets shall be replaced with a new product sourced from the same manufacturer with the same product number. Where this is not possible a suitable replacement product shall be



identified and used only by prior agreement between the Company and the Supplier.

- 7.15.5 Only by prior agreement between the Company and the Supplier shall individually identified Replace on Failure Assets be repaired.

## **7.16 Spares**

### **7.16**

- 7.16.1 The Supplier shall provide and hold an adequate stock supply of fully tested Asset, Component and/or Consumable Spares to support the efficient operation of the Systems and Assets and delivery of the Services.
- 7.16.2 The Supplier shall be responsible for determining and maintaining the stock levels of Spares.
- 7.16.3 The Supplier shall be responsible for the supply, delivery, offloading, storage (where no storage can be provided by the Company) and where required, testing of all Spares and Equipment including all safety equipment necessary to undertake the Services.
- 7.16.4 The Supplier shall demonstrate on a monthly basis to the Company stock levels of critical spares, a stock/Spares management system including but not limited to: proposed minimum stock/spares levels (both central store and van stock), stock/spares replenishment procedure; service level arrangements with sub-suppliers; lead times for non-stock items.
- 7.16.5 The Company shall reserve the right to instruct the Supplier to purchase certain quantities of Spares or Assets, or their alternatives, in support of the delivery of the Services.
- 7.16.6 At all times the Supplier shall be wholly responsible for any unavailability of Spares or materials.
- 7.16.7 The Supplier shall provide a monthly report on availability and delivery times of spares including an early warning of potential obsolescence of spares likely to be of use within the Contract.
- 7.16.8 The Company shall reserve the right to free issue certain Spares or Assets in support of the delivery of the Services.

## **7.18 Bespoke, No Longer Manufactured and Long Lead Spares**

### **7.17**

### **7.18**

- 7.18.1 The Supplier shall sustain at least the minimum quantity of bespoke, no longer manufactured and long lead Assets, Consumables and Components to ensure the Equipment is available at any time.
- 7.18.2 The identification of bespoke, no longer manufactured and long lead will be the responsibility of the Supplier. This will necessitate purchasing one or more in advance to ensure assets are returned to service in accordance with the Contract.



## 8 PLANNED MAINTENANCE

### 8.1 Planned Maintenance

- 8.1.1 “Planned Maintenance” comprises activities and inspections to all Equipment, inclusive of their related Supporting Infrastructure, which are (i) identified within the Service Matrix; and (ii) designed to prolong service life, reduce failures, maintain required performance and ensure safe operation; and (iii) shall comprise of Core Planned Maintenance, Statutory Planned Maintenance and General Planned Maintenance.
- 8.1.2 The Supplier shall deliver Planned Maintenance in accordance with the Annual Planned Maintenance Schedule and the Contract.
- 8.1.3 For all Planned Maintenance all parts of the Equipment across the Sites indicated by the Service Matrix shall be included in the scope of the Services – irrespective of whether or not the Equipment is specifically listed or referenced in the Equipment Register.
- 8.1.4 The Supplier shall provide any additional Planned Maintenance required as a result of changes to the Service Matrix and shall be entitled to request a Variation in accordance with the Contract Variation Procedure.
- 8.1.5 Core Planned Maintenance shall be carried out in accordance with the SFG20 Task Sheets indicated in Appendix I.
- 8.1.5.1 Equipment not identified within the Equipment Register shall be maintained in accordance with the SFG20 Task Sheets indicated within Appendix O.
- 8.1.5.2 Equipment identified within the Equipment Register shall be maintained in accordance with the SFG20 Task Sheets indicated within the Equipment Register.
- 8.1.5.3 The service timings identified within each SFG20 task sheet are automatically generated by the software and are not to be used in this Contract. Service timing assessments are the responsibility of the Supplier.
- 8.1.6 Statutory Planned Maintenance and General Planned Maintenance shall be carried out in accordance with Appendices F & G.
- 8.1.7 The Supplier shall notify the Company of any proposed changes to activities, inspections or intervals to either System or Asset groups or specific Systems or Assets. Changes to the identified activities, inspections and intervals shall only be permitted following prior agreement by the Company.
- 8.1.8 The Supplier shall notify the Company no less than 7 days in advance of any proposed changes to the dates or Sites of Planned Maintenance and shall undertake the planned maintenance on the proposed changed date only if approved in advance by the Company.
- 8.1.9 The Supplier shall adapt the Annual Planned Maintenance Schedule to allow for any Company imposed ‘maintenance freeze’ periods.
- 8.1.10 If during Planned Maintenance, the Supplier identifies faults where there is a risk of danger to persons and / or property, the Supplier



shall make safe immediately and escalate to the Company. The Supplier shall report the hazard to the Company as soon as practicable but in any case within no more than 2 hours of making safe.

- 8.1.11 The Supplier shall identify any areas of damage or deficiencies to any Equipment that the Supplier discovers during the course of the delivery of the Services, and the Supplier shall report the same in an agreed format to the Company.
- 8.1.12 The Supplier shall report the hazard to the Company as soon as practicable but in any case within no more than 2 hours of making safe.
- 8.1.13 From the Services Commencement Date the Supplier shall generate for each station/location/Site, a specific O&M manual including individual maintenance sheets, matching the format and principals of those associated with this Specification, for each System, Asset and Component located there. This shall be maintained annually and available electronically to the Company at all times.

## **8.2 Annual Planned Maintenance Schedule**

- 8.2.1 An Annual Planned Maintenance Schedule shall detail the Statutory and specified inspection & testing requirements and Planned Maintenance intervals for each System, Asset and Component inclusive of their related Supporting Infrastructure.
- 8.2.1
- 8.2.2 The Supplier shall update and issue for the Company's approval an Annual Planned Maintenance Schedule for all Sites no less than 60 calendar days prior to the actual and subsequent anniversaries of the Services Commencement Date.
- 8.2.3 The Annual Planned Maintenance Schedule shall identify programmed dates of Planned Maintenance visits to each System, Asset or Component to prolong service life, reduce failures, maintain required performance and ensure safe operation. The Schedule shall be ordered to maintain the required intervals following on from the relevant previous testing programmes.
- 8.2.4 The Company shall provide any comments or feedback on the Annual Planned Maintenance Schedule to the Supplier within 30 calendar days.
- 8.2.5 The Supplier shall make the Annual Planned Maintenance Schedule available in an electronic format to be agreed between the parties, to the Company for inspection by himself or a third party appointed by the Company at any time.
- 8.2.6 The Supplier shall provide the Company with a weekly update of the Annual Planned Maintenance Schedule in an electronic format to be agreed between the parties.

## **8.3 Electrical & Mechanical Systems Maintenance to be Undertaken by the Company or Third Party Suppliers**

8.3



- 8.3.1 The Supplier shall not undertake the daily Emergency Lighting testing. This is the responsibility of the Company's staff.



## 9 REACTIVE MAINTENANCE

### 9.1 Reactive Maintenance

9.1.1 “Reactive Maintenance” is the repairs or replacements required to Equipment identified by the Company as;

- not working
- not being in an acceptable state
- not meeting the requirements of paragraph 6.5 (Equipment Performance)

in order to return it to a safe, working and acceptable state, that meets the requirements identified within the Specification but in particular paragraph 6.5 (Equipment Performance) and the Services detailed in paragraph 9.3.

9.1.2 The Supplier shall deliver Reactive Maintenance at the Sites as indicated in the Service Matrix in accordance with the Specification; including the necessary replacement of Consumables and Components and Supporting Infrastructure

9.1.3 The Supplier shall deliver any additional Reactive Maintenance required as a result of changes to the Service Matrix and is entitled to request a Variation in accordance with the Contract Variation Procedure in respect of the same.

9.1.4 The Supplier shall deliver Reactive Maintenance to all faults within the scope of the Services as requested by the Company in line with the times detailed in Schedule 12c Appendix 2.

9.1.5 The Company shall determine the Priority Level a fault shall be treated as.

9.1.6 The Supplier shall receive instructions to carry out Reactive Maintenance from the Company’s helpdesk(s). Additionally when a defect is identified from remote monitoring at the Supplier’s control centre or from the Sites from the Supplier’s personnel, this must be reported to the Company help desk(s) immediately and logged as a fault/ Reactive Maintenance Services event, and this shall then become the instruction to attend and repair the defect.

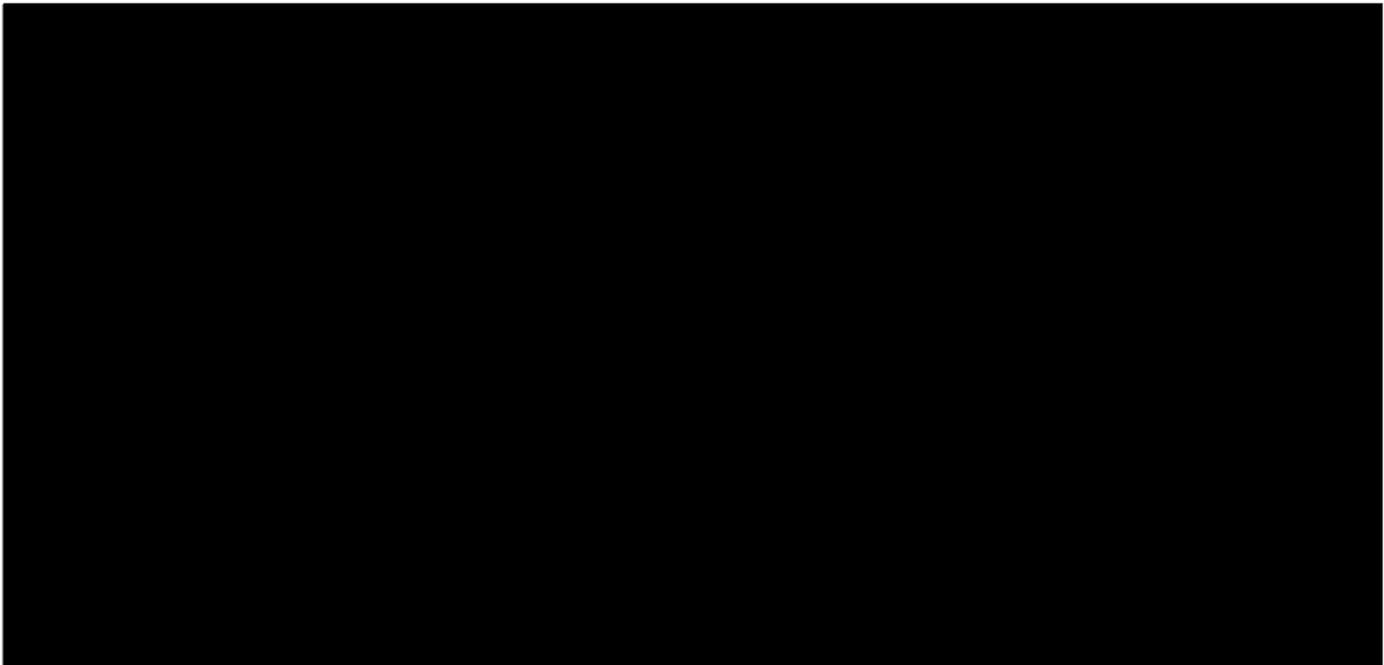
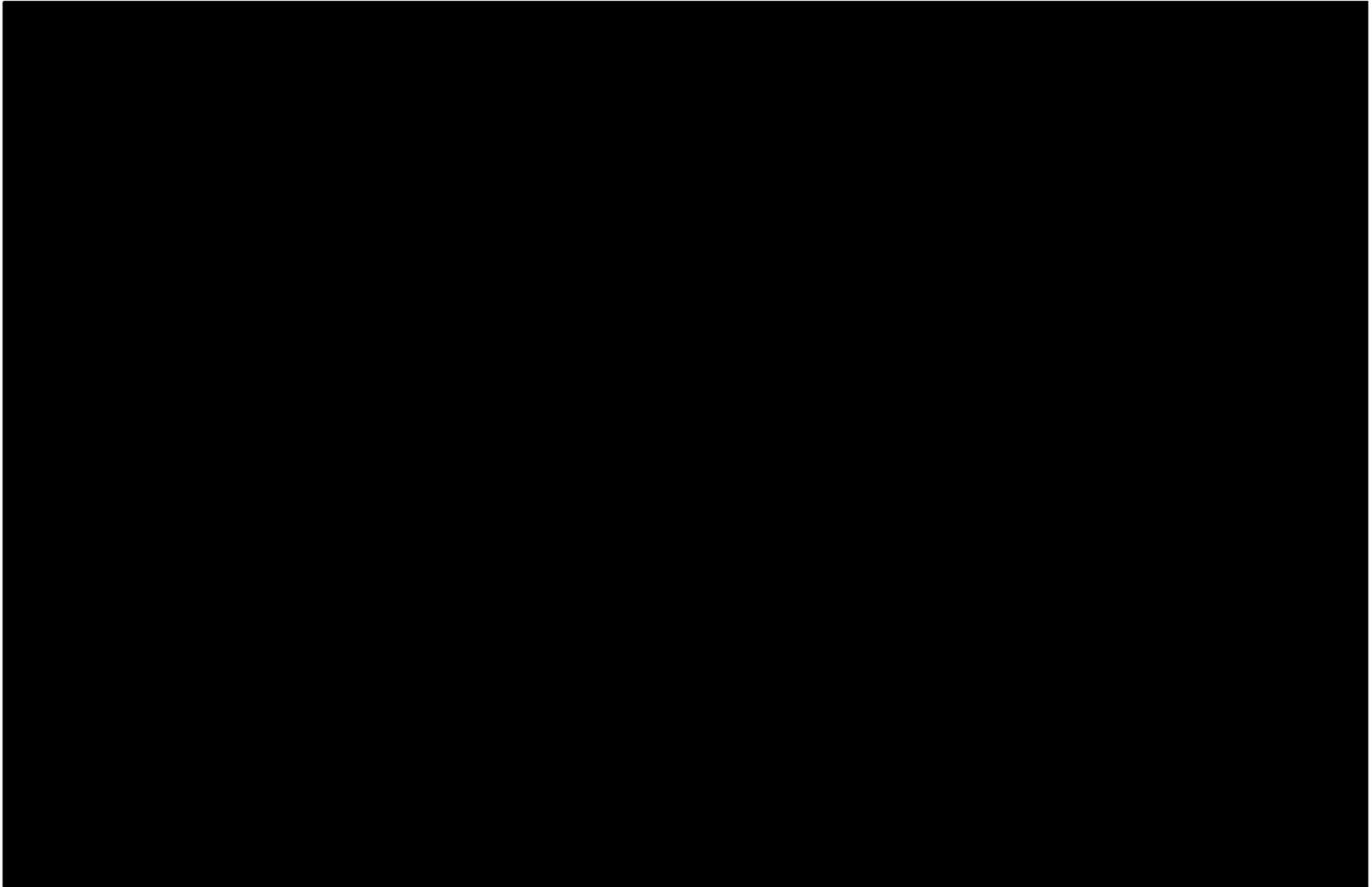
9.1.7 The Supplier shall attend the Company’s Sites and permanently rectify faults. The Supplier shall endeavour to permanently rectify each fault during a single attendance visit but if necessary the Supplier shall make more than one attendance visit to make safe or permanently rectify the fault. At the end of each and every attendance visit the fault shall be left in a safe condition even if it cannot be permanently rectified.

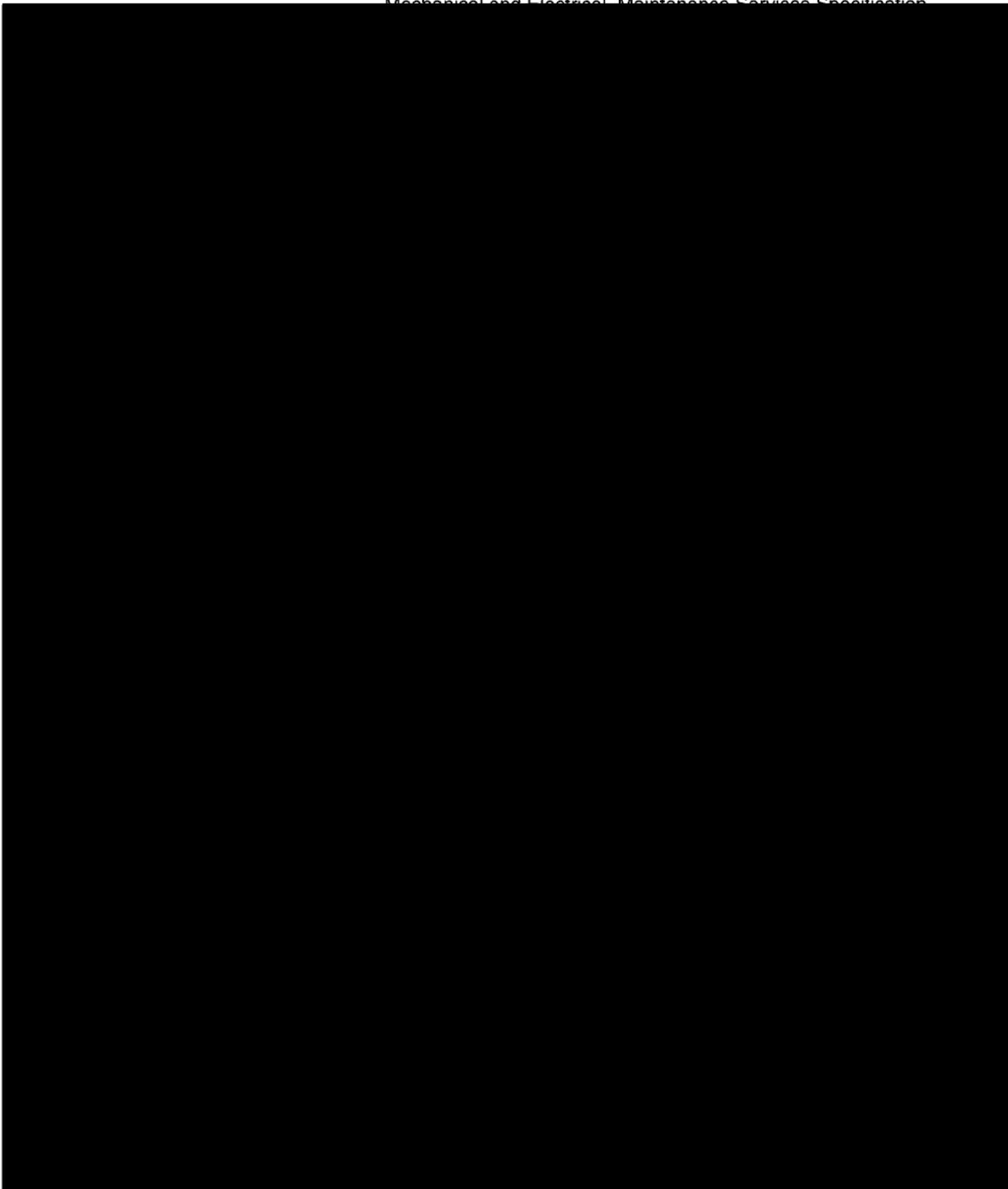
9.1.8 The Supplier shall notify the Company helpdesk when faults have been permanently rectified or made safe.

9.1.9 If the Supplier, on attending the Site traces a reported Fault or Failure to Equipment or cabling outside the scope of this Specification, the Supplier shall immediately report this to the Company helpdesk. This



does not release the Supplier from the Site unless so authorised by the Company. The Supplier shall remain on Site if required to “hand over” and/or work with other contractors to rectify the fault and provide all necessary co-operation to clear or localise the fault.





**9.3 Attendance and interfaces with the Company’s Third Party Suppliers**

9.3.1 “Attendance” is the requirement to (i) provide Site assistance and/or undertake Services in respect of Equipment that is impacted by fault attendance that relates to other equipment which is not included in the scope of this Contract or (ii) is attendance required by a Site safety issue. Each requirement to attend Site irrespective of the duration on Site, shall be deemed an Attendance.



The Supplier shall provide Attendance to each of the Delivery Units as required to deliver the Services in accordance with the Contract.

- 9.3.2 The Company shall take overall responsibility for management of interfaces between the Supplier and 3rd party Suppliers undertaking maintenance or projects. The Supplier shall proactively provide support to the Company in respect of the activities set out in paragraph 9.3.2 below and when required by the Company. The Supplier shall coordinate and resolve issues on behalf of the Company including attendance in the event of any issues surrounding interfaces until these are resolved. The Supplier shall keep the Company's local managers informed of any maintenance work that they become aware of that is likely to have an impact on assets not in the scope of this Specification. The Supplier's activities shall include, but not be limited to:-
- a. Arming/disarming life safety systems;
  - b. Bypassing infrastructure components; and
  - c. Training of Suppliers regarding risks associated with accidental service interruption.
- 9.3.3 The Supplier shall ensure that no Equipment failures, downtime or interruptions are caused by the Supplier or their sub-suppliers as a result of support activities.





## **APPENDIX B**

### **EQUIPMENT DESCRIPTIONS**



## 1. Cooling Systems.

### 1.1. Leading Particulars

The comfort cooling/air conditioning plant subject to this Specification is primarily fitted for staff comfort. However, the cooling equipment in CER's, SER's, IMR's, UPS etc is fitted to control the environmental conditions and hence maintain the reliability of the Company CER's, SER's, IMR's, UPS etc, respectively.

The following is a general description of the comfort cooling, chilled water systems and VRV/ VRF systems and typical examples of assets and components installed although variances may exist.

- General components include; Pipework, Actuators, Valves, Sensors, insulation.
- Asset: Chillers - Components include; Sensors, Filters, Compressor, Heat exchanger, Pumps, Controls, Enclosure, Valves.
- Asset: Fan Coil Units - Components include; Sensors, Filters, Heat Exchanger, Pumps, Controls, Fans (motor impellor), Enclosure.
- Asset: Condensers - Components include; Compressor, Heat exchanger, Sensors, Controls, Filters, Fan, Enclosures, Condensate Pumps.
- Asset: VRF/VRU - Components include; Sensors, Filters, Compressor, Heat exchanger, Pumps, Controls, Enclosure, Valves, BC box, Control box, Manifold.
- Asset: Package Units - Components include; Sensors, Filters, Heat Exchanger, Pumps, Controls, Fans (motor impellor), Enclosure, Compressor, Heat exchanger, Sensors, Controls, Filters, Fan, Enclosures, Condensate Pumps.

### 1.2. Split Comfort Cooling Systems (DX).

- 1.2.1. Comfort Cooling Installations since September 1995 utilise the refrigerant R417A, R407C or 410A and are labelled accordingly. Comfort Cooling Systems installed before this date operate using refrigerant R22.
- 1.2.2. The comfort cooling systems are mainly of the split type units. Dependant upon the available space the indoor evaporator units are floor, wall or ceiling mounted.
- 1.2.3. The Condenser Units are not always located in the most suitable of locations in terms of heat dissipation and maintainability, where this is the case the Supplier may forward proposals to the Company to relocate this equipment to a more suitable position.
- 1.2.4. All systems hermetically sealed and contain less than 23kg.

### 1.3. Chilled Water Systems / VRV / VRF

- 1.3.1. The chillers have been installed with the refrigerant R407C and labelled accordingly.



#### 1.4. Platform Air Handling Unit (PAHU)

The PAHU plant subject to this Specification is fitted for passenger comfort during periods of high temperatures. The cooling is either chiller system or bore hole sourced.

The following is a general description of the Platform Air Handling Unit (PAHU) systems and typical examples of assets and components installed although variances may exist.

- General components include; Pipework, Actuators, Valves, Sensors.
- Asset: Chillers - Components include; Sensors, Filters, Compressor, Heat exchanger, Pumps, Controls, Enclosure, Valves.
- Asset: Fan Coils - Components include; Sensors, Filters, Heat Exchanger, Pumps, Controls, Fans (motor impellor), Enclosure.
- Asset: Bore Hole System Pumps
- Asset: Bore Hole System Heat Exchanger - Components include; Heat exchanger, Valves, Sensors, Filters, Pressure vessels, controls.

Note: The Platform Air Handling Units (PAHU) generally operates during April to October inclusive.

Further detailed information is included within Appendix D (Oxford Circus & Green Park PAHU's O&M Manuals and Maintenance Regimes).

## 2. Accommodation & Plant Room Ventilation Systems

### 3.

#### 2.1 Leading Particulars

The accommodation and plant room ventilation systems are installed to provide air changes in staff accommodation areas and assist in temperature control in plant rooms and Sub-stations.

The following is a general description of the air handling units and components installed although variances may exist:

- General components include; Damper, Ductwork and associated access panels, Grills, In-line booster fans, Interconnecting cabling, Sensors, Local Controls, Filters and pre-filters, Noise attenuators, Anti-vibration mountings
- Asset: Air Handling Unit - Components include; Motors, Enclosure, Impellor, Heater Battery, Sensor including thermal cut-out, Controller, Filter, Bearings, Pulleys, Belt.
- Asset: Fan - Components include; Motor, Impellor, Belt, Pulleys, Bearings, Sensors, Anti-vibration mountings, Enclosures, Filters, Guards.
- Asset: Roof Mounted Smoke Vents - Components include; Blades, Actuators, Linkages, Flashing.
- Asset: In Line Fan - Components include; Motor, Impellor, Sensor including thermal cut-out, Filter, Bearing, Pulley, Belt.



- 2.1.1 The Air Handling Units installed within London Underground are mainly of the Ducted Type with Inline, Axial or Centrifugal Fans located within dedicated Plant Rooms, On Roofs or within accommodation false ceilings.
- 2.1.2 Toilet Extract Ventilation fans are generally of dual operation providing run and standby facility. The small duty units may be linked into the lighting system or a PIR controller for time overrun.
- 2.1.3 Machine and Pump Room Ventilation Fans are located within most, but not all, Escalator Machine Chambers and Pump Rooms and are installed to remove heat and contaminated air from the area. These fans operate in Extract Mode (unless otherwise specified), and can be either temperature or timer controlled.
- 2.1.4 All fans, ductwork, dampers, grilles, etc. so as to form the complete ventilation systems are included within this Specification.

## 2.2 Exclusions

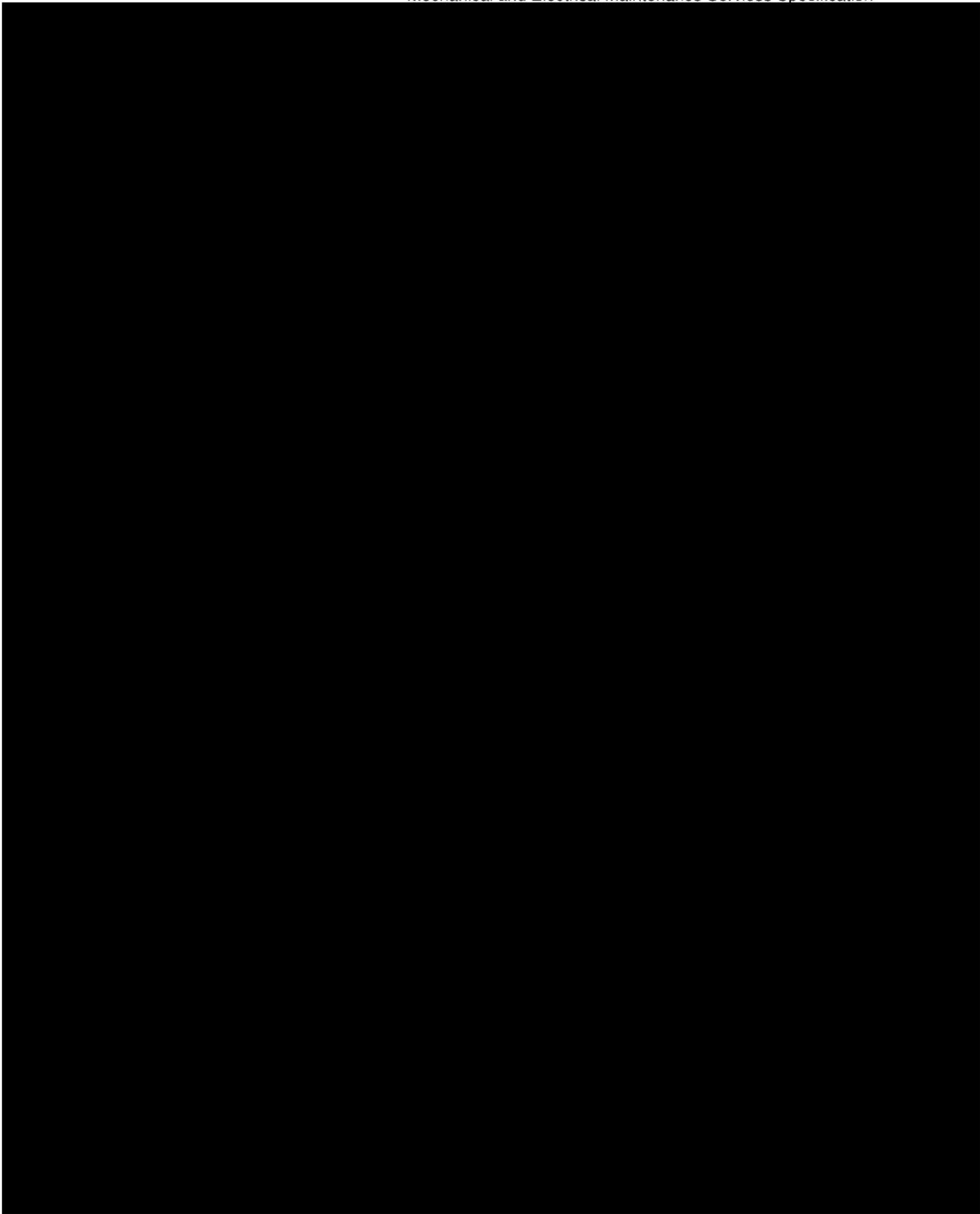
The following equipment and installations are excluded from this Contract:

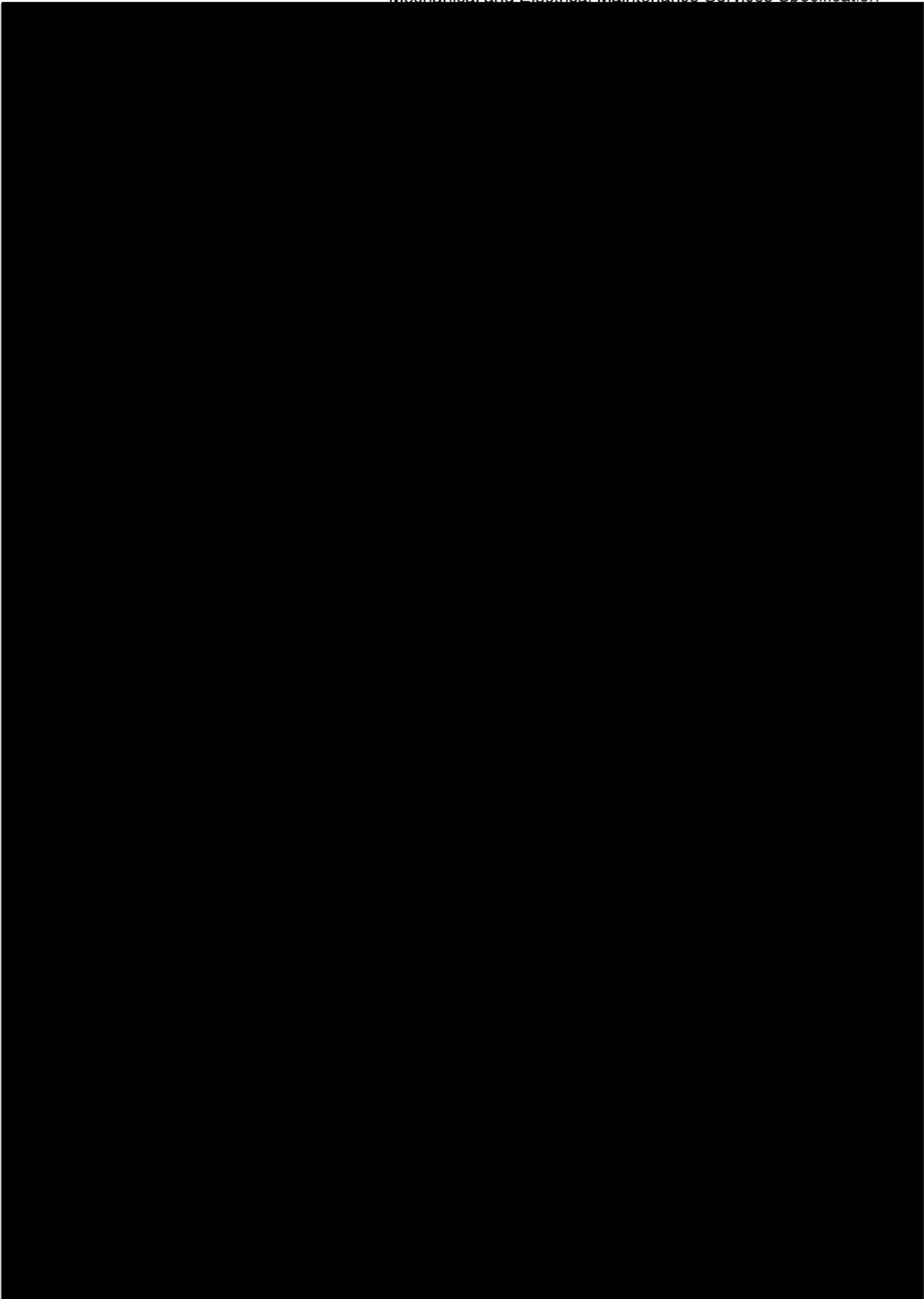
- Fire Dampers (in-line in ductwork and in-wall).

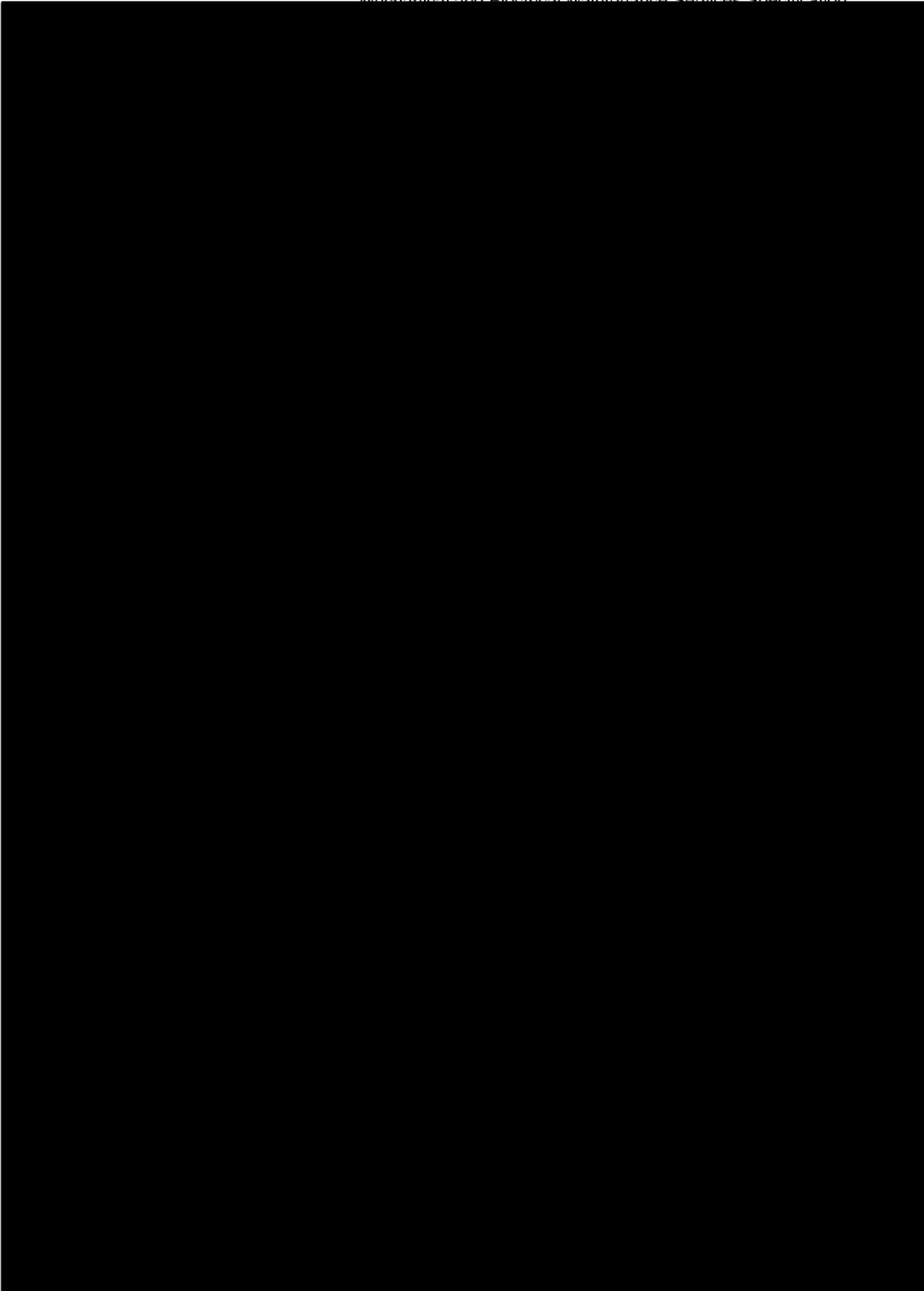
## 2.3 Machine Room / Pump Room Fans

Machine room fans shall be extract only (unless advised by the Company).









## 4. Heating, Gas, Hot & Cold Water Services

### 4.1 Leading Particulars

The following is a general description of the Heating, Gas, Hot & Cold Water Services and components installed although variances may exist:

#### **System: Space Heating Systems**

- General components include; Radiators, Pipework, Valves, Pumps, tanks, Controllers, Sensors, Interconnecting cabling
- Asset: Boilers - Components include; Valves, Fan, Heat Exchanger, Sensor, Controllers, Gas Valves,
- Asset: Electric Heaters - Components include; Heater Element, Controller, Sensor
- Asset: High Level Gas Heaters - Components include; Valves, Fan, Heat Exchanger, Sensor, Controllers, Gas Valves

4.1.1 The Services installed are provided to comply with the Workplace Regulations 1992, for (Workplace health, Safety & Welfare Regulations 1992) ACOP.

4.1.2 The Heating Services is to include all plant, equipment and pipe work from and including boiler to heat emitters related specifically to providing space heating, using Low temperature hot water (LTHW) as the heating medium.

4.1.3 The Heating systems vary from:

4.1.4 “Wet Systems”: small scale systems comprising of domestic type boiler with 1 or 2 radiators to larger scale commercial type boilers with numerous radiators, convectors, coils, etc.

4.1.5 “Direct Fired”: small-scale systems comprising individual gas fired room heaters to larger gas systems

#### System Boundaries

Inlet- Water	From the stopcock & meter, consumer side
Termination - Water	Point of Use Isolating Valve or Tap.
Inlet – Gas	Gas Supply from meter to Boiler, Burner or appliance Isolating Valve (Valve is included) buried & surfaced
Termination - Gas	Point of Use Isolating Valve.

#### **System: Water Heating Systems**

- General components include; Vented Taps, Shower heads and hoses, Pipework, Valves, Pumps, Controllers, Sensors, Interconnecting cabling
- Asset: Boiler - Components include; Valves, Fan, Heat Exchanger, Sensor, Controllers
- Asset: Storage Cylinder - Components include; Valves, Sensors, Heating Elements



- Asset: Zip and Tea Boilers - Components include; Filters, Taps, Controls, Valves, Sensor, Heat Exchanger, Heating Element
- 4.1.6 The Hot Water Services covered by this Contract is to include all piped water supply systems distributing Hot Water around Buildings/Sites and their means of generation (i.e. Calorifiers, Direct Fired Water Heaters, All Electrical water Heaters, Immersion Heaters and Point of Use Water Heaters Gas or Electric).
- 4.1.7 The Tea boilers covered by this Contract are installed at various Sites to provide boiling hot water for drinking purposes. They are normally situated in Depots, Train Crew Accommodation, Station Offices, Mess Rooms and platforms.

**System: Gas Systems**

- General components include; Pipework, Valves, Sensors, Gas Valves, Gas detection systems (Seiger)
  - Asset: Proprietary Meter Cupboards
  - Asset: Booster Pumps
- 4.1.8 The Gas Services & Appliances covered by this Contract is to include buried and surface piped gas supply systems from First Main Isolating Valve downstream of Supply Authorities Meter/Regulator to point of use and is to include Gas Cookers (NB All Heating Boilers Room Heaters and Space Heating are included within Heating Services, Gas Water Heaters within Hot Water Services).
- 4.1.9 The Supplier shall be responsible for the general housekeeping and security of gas meter housing and cupboards.
- 4.1.10 All work must be compliant with Gas Safety, Installation and Use, Regulation 1998 - HSE Approved Code of Practice L56 (latest edition).
- 4.1.11 System Boundaries

Inlet	Building Gas Supply Main Isolating Valve downstream of Supply Authorities Meter/Regulator
Termination	Point of Use.

**System: Cold Water Services Systems**

General components include; Pipework, Valves, UV Filter, Insulation, Trace Heating

Asset: Tanks - Components include; Ball valves, Tank housing, Lagging

- 4.1.12 The Cold Water Services covered by this Contract is to include the piped Cold Water systems from First Main Isolating Valve downstream of Water Supply Authorities Meter (buried or surface) to point of use



including all Cold Water Storage Tanks, Booster Sets and all other Plant and Equipment forming part of the installations.

#### 4.1.13 System Boundaries

Inlet	Building Supply Main Isolating Valve downstream of Water Supply Authorities Meter.
Termination	Point of Use, for excluded equipment the system will terminate at the adjacent isolation valve.

#### 4.1.14 Exclusions

For clarity, the following equipment and installations are excluded from this Specification:

- Catering Appliances within Kitchens run by Catering Suppliers.

## 5. Uninterruptable Power Supply (UPS) Systems

### 5.1

#### 5.1 Leading Particulars

The following is a general description of the UPS Systems and components installed although variances may exist:

- General components include; associated by-pass/transfer switch, cabling, remote monitoring systems, batteries and associated cubicle enclosures
- Non-Pedestal type UPS - components include; circuit boards, fans, filters, switches, isolators, manufacturers internal replaceable components (e.g. electronic components (e.g. capacitors), static switches, inverters, rectifiers, HCI's)
- Pedestal type UPS - components include, fans, filters

For clarity, the coincident failure and need for replacement of 1 or 2 Batteries within a string for non-pedestal type UPS systems shall be included within the Services. The coincident failure and need for replacement of more than 2 Batteries within a string for non-pedestal type UPS systems is not included within the Services.

5.1.1 The Uninterruptible Power Systems provide emergency power to a variety of assets critical to the health, safety and security of staff and customers and critical to the safe running of the Railway and its associated infrastructure.

5.1.2 The type of incoming supply to the UPS shall be either 1 or 2 three phase four wire, 415 volts, 50Hz or in some cases a single phase three wire supply 240 volts, 50Hz. This will be configured via a Maintenance "by pass" Switch.

5.1.3 The supply to the downstream distribution board shall be either three phase four wire, 415/240 volts, 50Hz or in some cases a single phase three wire supply 240 volts, 50Hz.

5.1.4 The downstream distribution board contains the necessary protective devices that supply and protect the necessary safety critical assets.



## 6. Building Management Systems (BMS) and Control Systems

### 6.1 Leading Particulars

The following is a general description of the Building Management Systems and components installed although variances may exist:

General components include; Interconnecting cabling, Field equipment (actuators/relays), HMI screens, Switches, Indicators, Sensors

Asset: Controller/PCC/PC

Asset: Display Screen

Asset: Outstation

The varied Building Management Systems support M&E Systems (incl. lighting) within Offices, Stations and Depots.

- 6.1.1 The requirement for competent BMS hardware and software resource personnel is essential to ensure the correct operation of control, process, monitoring and alarm based systems continue to operate correctly.

## 7. Generation of LV Electrical Power

### 7.1 Leading Particulars

The following is a general description of the LV Generating Systems and components installed although variances may exist:

- Asset: Solar PV Array, – Components include; Inverters, Meters, DC cables, Displays
- Asset: Diesel Generators – Components include; except for the main engine block and head and their associated internal components, all other parts associated with diesel generators are considered to be associated components

7.1.1 The Solar PV Systems are generally found at Offices and Depots and are connected directly to the incoming DNO supply system.

7.1.2 Back-up Diesel Generators are located at some Critical Sites and support the continuous operation of the services upon the failure of the incoming supplies only.

## 8. LV Electrical System

### 8.1 Leading Particulars



The following is a general description of the LV Electrical Systems and components installed although variances may exist:

- General components include; 110V transformer, Cabling, Cable management (trunking/ conduit/ tray), Lugs/glands/terminals/connectors, Labelling, Socket outlets/ spurs/ switches/ shaving point, Local isolators, Circuit Protective Devices, Mechanical & Electrical Interlocks, Surge Protection Devices, Meters & current transformers, Junction Boxes, Earth Bars, Industrial plugs & sockets, Lightning conductors, Earth rods
- Asset: Hand Dryers
- Asset: Cooker Hoods – components include; Filters, Fans, Lamps
- Asset: Cooker: Electric – components include; Heating Elements, Fans, Lamps, Thermostats Control Knobs
- Asset: Cooker: Hob – components include; Heating Elements, Fans, Lamps, Thermostats Control Knobs
- Asset: Dishwasher
- Asset: Drinks Machine
- Asset: Microwave
- Asset: Refrigerator
- Asset: Tumble Dryer
- Asset: Washing Machine
- Asset: Electric Towel Rail
- Asset: Electric Showers
- Asset: Disabled Toilet Alarms
- Asset: Switch panel – Components include; Bus bars & Insulators, Selector switches, Access doors, Door locks
- Asset: Fuse Switches – Components include; Carriage
- Asset: Bus bar Chamber – Components include; Busbars & insulators, Access covers/doors
- Asset: Distribution Boards – Components include; Access doors & covers
- Asset: Changeover Devices – Components include; Indicators, Buttons/switches, Controllers, Relays, Timers, Phase failure relays, Contactors, Access covers/doors, Motorised switches
- Asset: By Pass Switches – Components include; Mechanical and electrical interlocks, contactors, switches, indicators, isolators

8.1.1 The LV AC Electrical system distributes at 400v/230v/110v 3 & single phase throughout Stations, Depots and Offices. Main incoming sources are generally either DNO or LU or both. All below ground Fire Safety Sub-Surface Railway Regulations (Section 12) stations are dual sourced whereby Depots, offices and above ground stations tend to be a single DNO source.



System Boundaries

Intake	DNO – Main Isolator adjacent to Supply Authorities Meter. LU – Outgoing terminals of the Main Station Isolator, generally attached to the Trunk Switch Arrangement LU JLE Stations - Outgoing terminals of the Circuit Fuseswitch within the Sub-station LV Room
Termination	Point of Use via typically local isolators, socket outlets switches, fused connection units Single Pole CPD associated with the supply to Communications Equipment Double Pole CPD associated with the supply to Prestige’s Ticketing and Gateline RLV supplies Distribution boards directly supplying Signals equipment Lifts & Escalators, Main Isolator within the Plant Room prior to the Controllers and/or the Castell interlocked Isolator. Main incoming isolators within Tunnel Lighting and Tunnel Power Control Panels
Exclusions	DC Distribution System LV systems within Retail Units - station sourced supplies to Retail Units are included. Dedicated/independent DNO supplies to Retail Units Tunnel Lighting and Tunnel Power Control Panels and their downstream circuits and equipment

## 9. Lighting Systems

### 9.1 Leading Particulars

The following is a general description of the Lighting Systems and components installed although variances may exist:

- General components include; Luminaires, Lamps, Diffusers, Reflectors, Luminaire Light Controllers, Ballast, Driver, Fuses, Capacitors, LED board, Self-contained batteries, Sensors, Switches, GUI, Contactors, Test key switches, cabling
- Asset: Columns/masts – Components include; Cut-outs

9.1.1 The Lighting System throughout Stations is primarily linear fluorescent based with post mounted discharge lamps beyond the canopies on above ground stations. There is a transitional move taking place towards LED with most future new installations being LED.



## 10. Signage Systems

### 10.1 Leading Particulars

The following is a general description of the Signage Systems and components installed although variances may exist:

With the exception of CBSO advertising and UTS gate signage, all station signage, suspended signage, roundels, LU/TfL poster frames and internally illuminated signage fall under the remit of this contract.

- General components include; Enclosures, Lamps, Ballasts, Drivers, Fuses, Capacitors, LED board, Self-contained batteries, glazing, lightweight metal and vinyl stick-on signs, photo-luminescent emergency signs

Internally illuminated Way Out signs are;

- Dual supplied in Section 12 stations
- Single supplied with internal battery back-up in Non-Section 12 stations

### 10.2 Power Sites

All Power Sites have LU specific Warning Signage at each point of staff entry and statutory safety signage within. Photo-luminescent emergency escape signage is present within a high proportion of the Power Sites which requires replacement upon expiry. Internally illuminated emergency signage within Power Sites is not included within this Specification.

## 11. Lightning Protection Systems

### 11.1 Leading Particulars

The following is a general description of the Signage Systems and components installed although variances may exist:

General components include; Earth Electrodes/Rods, Surge Protection Devices, Earth Bars, Earth Pits, Clamps, Tape/Round Conductors, Brackets, Clips, Junction Clamps, Bonds, Air Terminals



## **APPENDIX C**

### **FLASH BUSINESS CASE TEMPLATE**



example FLASH  
 BUSINESS  
 CASE template

## FLASH BUSINESS CASE FOR ASSET RENEWAL AND WORKS NOT COVERED BY CONTRACT ref; XXXX

**TO EFFICIENTLY PROCESS YOUR AVC, ALL  
 BOXES MUST BE COMPLETED IN FULL**

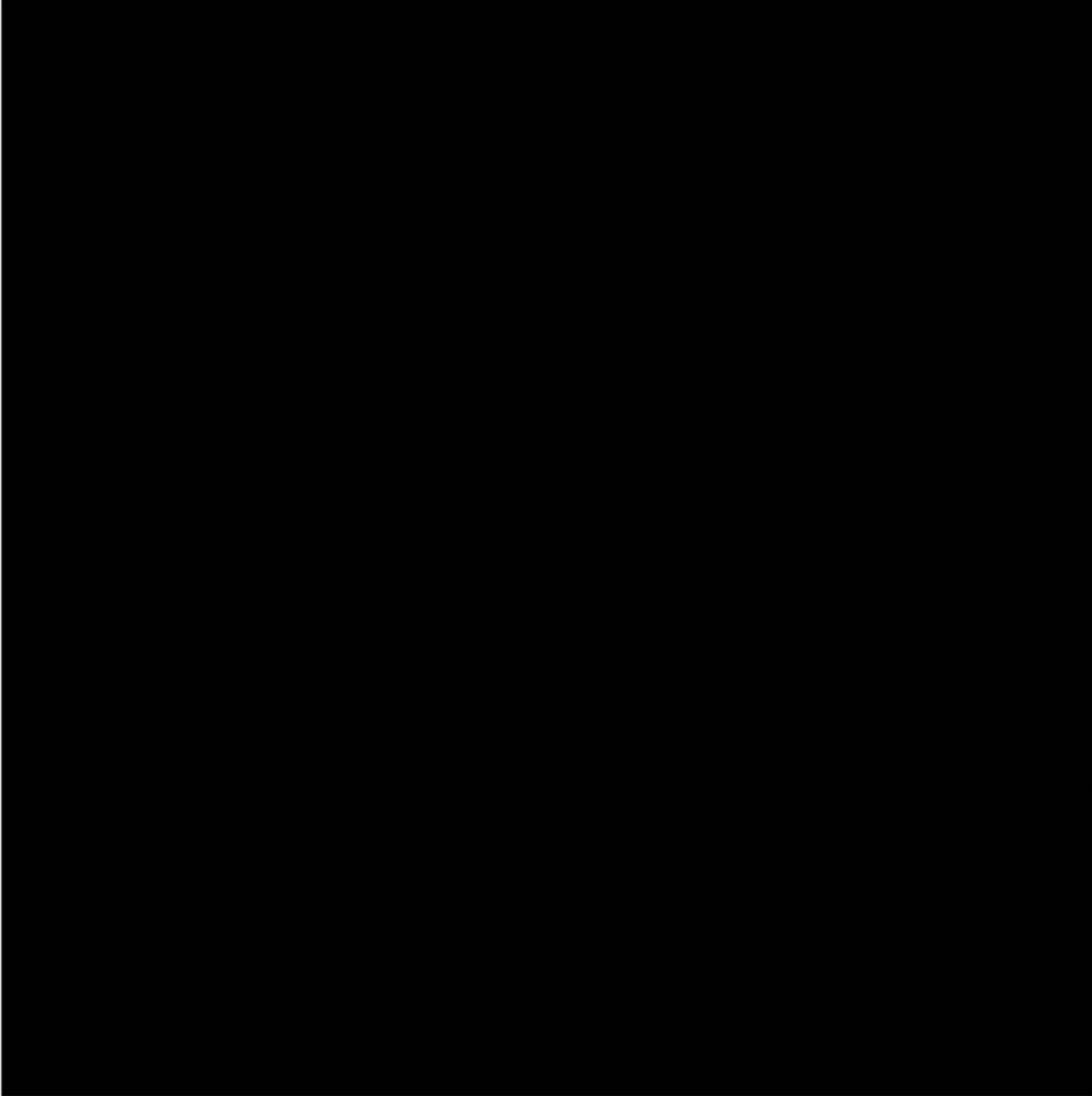
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: #cccccc;">Engineer</td><td></td></tr> <tr><td style="background-color: #cccccc;">Mob Tel</td><td></td></tr> <tr><td style="background-color: #cccccc;">Proposed Contractor</td><td></td></tr> <tr><td style="background-color: #cccccc;">Date Completed*</td><td></td></tr> <tr><td style="background-color: #cccccc;">Fault Ref (if applicable)</td><td></td></tr> </table>	Engineer		Mob Tel		Proposed Contractor		Date Completed*		Fault Ref (if applicable)		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="background-color: #cccccc;">Asset</td><td></td></tr> <tr><td style="background-color: #cccccc;">Asset Number</td><td></td></tr> <tr><td style="background-color: #cccccc;">Manufacturer/Model</td><td></td></tr> <tr><td style="background-color: #cccccc;">Critical Room/Asset Location (Site and Room)</td><td></td></tr> </table>	Asset		Asset Number		Manufacturer/Model		Critical Room/Asset Location (Site and Room)	
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Asset Number																			
Manufacturer/Model																			
Critical Room/Asset Location (Site and Room)																			

<b>RENEWAL CRITERIA</b>	Safety	Life Expired	Business Case Driven	
Statutory/Mandatory/CAT 1 Standard				Age Of Asset
				Asset Life Expectancy
				Like For Like Replacement

<b>REASON FOR ASSET RENEWAL</b>				
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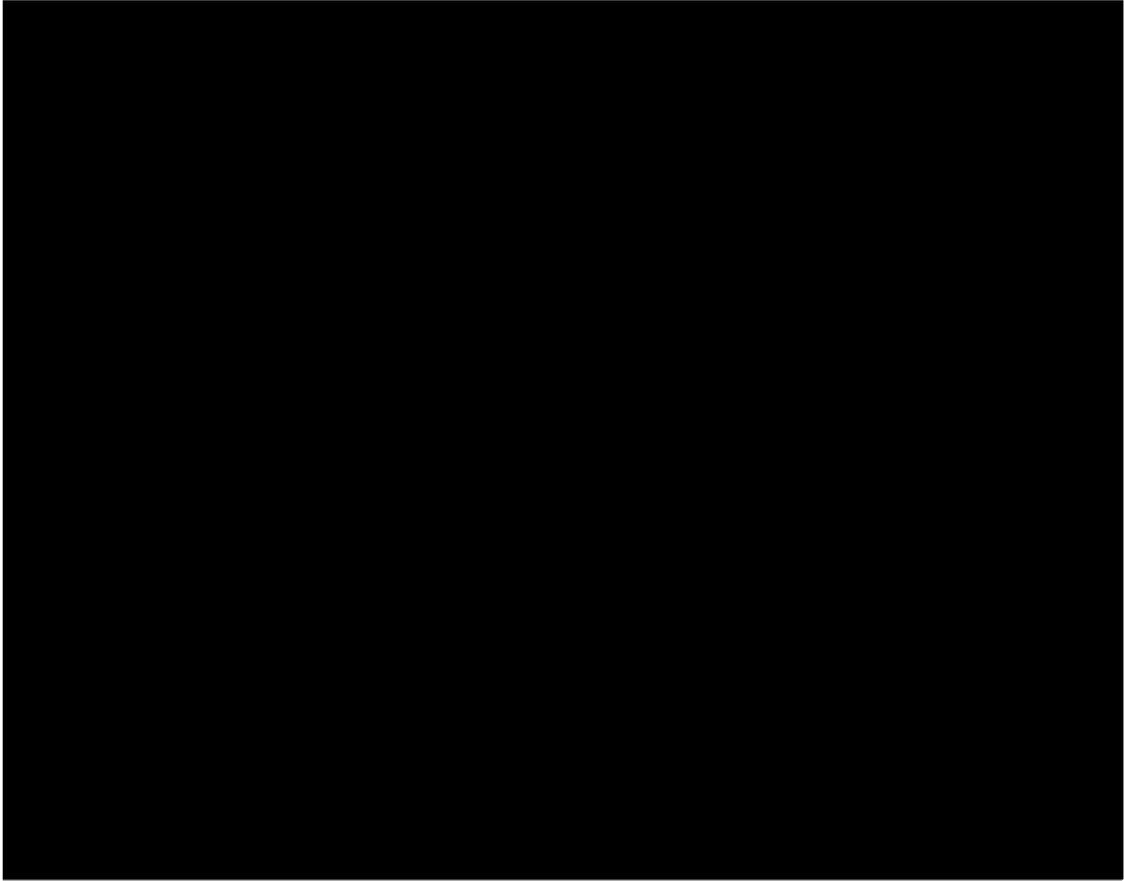
<b>CONSEQUENCES OF ACTIONS</b>		
DO NOTHING	REPAIR	REPLACE





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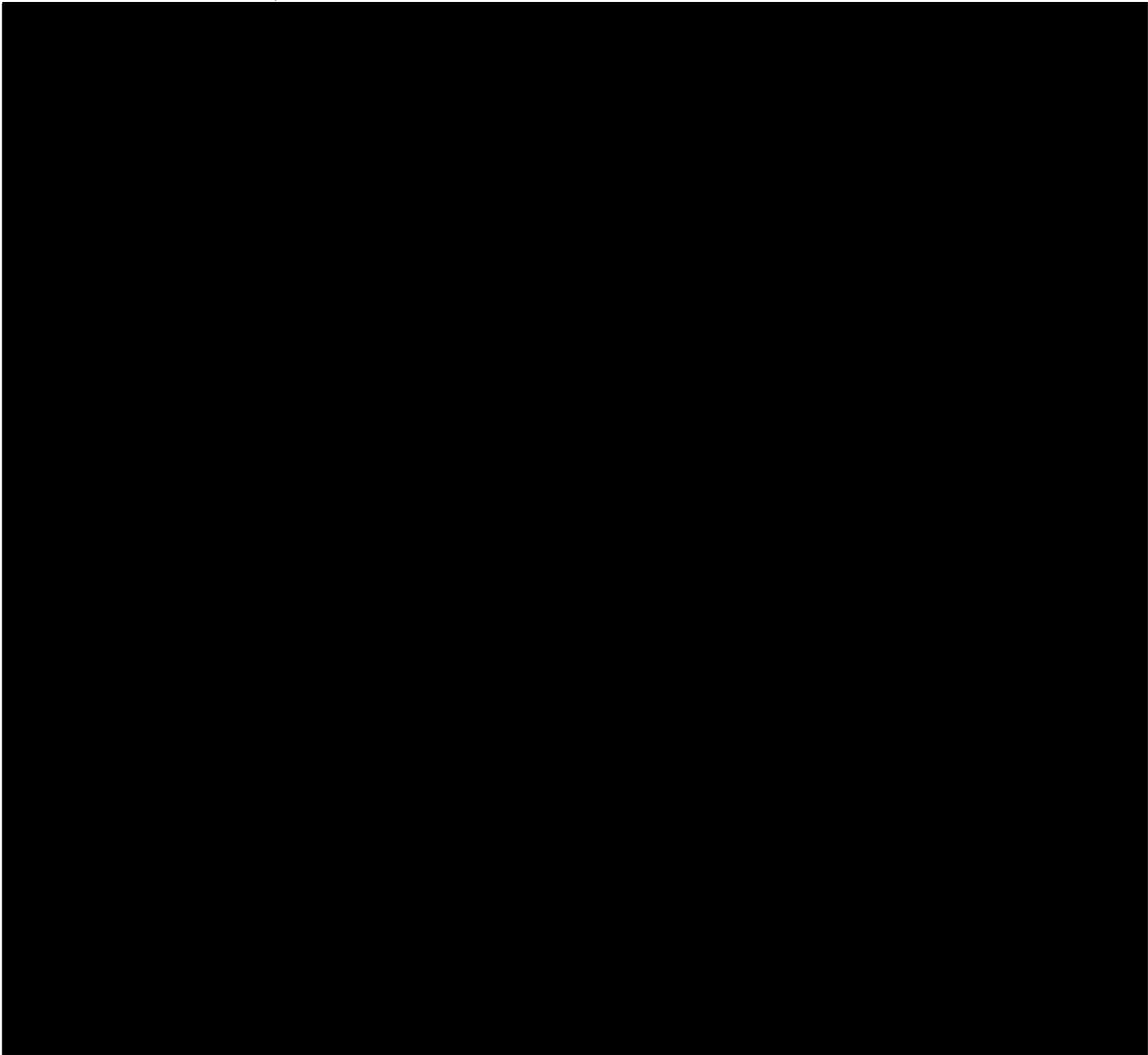
## **APPENDIX F**

### **GENERAL/OTHER PLANNED MAINTENANCE**



## 1. Summer & Winter Preparedness Maintenance

- 1.1. The Supplier shall undertake Summer & Winter Preparedness works over an agreed period and prior to a date to be determined by the Company. The Supplier shall provide daily progress updates to the Company during the programmed period.
- 1.2. The Supplier shall ensure any assets exposed to cold weather are appropriately protected and agree with the Company any identified Preventative & Corrective Maintenance requirements.
- 1.3. Where fire detection systems are present, the Supplier shall clean and undertake a managed start-up of all heater elements prior to the transition from summer to winter operation to prevent the triggering of fire detection systems and subsequent Site closures.



## 2. LU Stations Suspended Public Area Signage Planned Maintenance

### 2.1

The Supplier will be required to have staff suitably certified to work on all the electrical components of the illuminated signage.

- 2.1. As part of Reactive Maintenance the Supplier must replace defective or missing signage like for like. Vinyl stick - on signage is only acceptable as a temporary measure.
- 2.2. The Supplier will propose a 2 yearly rolling programme to the Company who shall approve or instruct changes - to inspect and renew where necessary all clevis fixings (top and bottom of the supporting arms) on station suspended signage. As part of this programme the Supplier will progress an equal percentage of stations each year
- 2.3. The Supplier must complete a report for each station and provide it to the Company detailing suspended signage and the condition of each fixing, the format of the report will be agreed with the Company's Representative.

## 3. LU stations Public Area Bulk Re-lamping/ballasting

- 3.1 The Supplier shall undertake a bulk re-lamp and clean of all Station public areas, Station Operation and Control rooms, staff toilets and mess rooms at 18month intervals. The interval may be varied, only by agreement with the Company, depending upon the quality and life expectancy of the proposed materials.
- 3.2 The Supplier shall undertake a bulk re-ballasting of all Station public areas, Station Operation and Control rooms, staff toilets and mess rooms at 90month intervals. The interval may be varied, only by agreement with the Company, depending upon the quality and life expectancy of the proposed materials.
- 3.3 The Supplier shall deliver the first re-lamping and re-ballasting at all identified Sites within 18 months of the Services Commencement Date.

## 4. UPS Performance Testing & Planned Maintenance



- 4.1 In order to maintain a monitoring regime the Supplier shall conduct a 6 monthly test on of their internal resistance of all batteries associated with UPS's (Cellcorder, equivalent or better method).
- 4.2 The Supplier shall deliver a 6-monthly report detailing the results of the tests and the residual life expectancy of the batteries associated with each UPS. Each report shall be delivered to the Company within 2-weeks of the test date.
- 4.3 The Supplier shall include within their Annual Planned Maintenance Schedule details of associated maintenance procedures and routines. These shall cover the parameters and performance criteria of each UPS system unit and the system overall. Reference shall be made to Original Equipment Manufacturer's (OEM) handbooks and engineering specifications along with other required and statutory standards that are current throughout the life of the Contract, and any extension thereof.
- 4.4 In association with the Core Planned Maintenance SFG20 task sheets for UPS, the routines and procedures shall include, but are not limited to:
- The mechanical integrity, security and cleanliness of each item and its associated cabling, connectors, terminations, indicators, switches and fixings.
  - The correctness and completeness of equipment, cabling and cable termination labelling and marking.
  - System function and performance conformance.
  - Functional correctness of dual redundancy and switch-over operation (where applicable).
  - Overall system performance.
  - System diagnostics & measurement and records, condition monitoring and assessment/record evaluation.
  - The accuracy and upkeep of as-built drawings
  - After each maintenance visit, the UPS unit must be labelled detailing what type of maintenance visit it was. The date of the visit must also be present and a date for the next visit (month & year) must also be specified along with the initials of the operative. The methodology of the labelling must be approved by the Company.
- 4.5 In association with the Core Planned Maintenance SFG20 task sheets for UPS, the following scope of planned maintenance is also to be incorporated:
- Cleaning of all Equipment, this shall include but not be limited to the exterior of cabinets and enclosures.
  - Operational, performance and functional checks
  - Mechanical installation checks on Equipment and cables, containment, fixings and structures related to the system.



- Preventative measures including replacement of items known to have a relatively short service life or items identified as being at risk of compromising the performance and availability of the system.
  - Recording, adjusting and reporting of system parameters, performance, configuration, revision and issue status, variations and trends, resulting required actions and works.
- 4.6 The Supplier shall submit a programme for pre-failure component replacement programme for the duration of the contract, validating all requirements and supported by appropriate method statements for Equipment change-out. The programme shall be based upon the life expectancy of individual system components, manufacturer's reliability data and the historical maintenance records. The Supplier shall deduce the average life expectancy of each system component based upon the data supplied and manufacturer's reliability data with the intention of undertaking component replacement just prior to the expected end of the component life.
- 4.7 If a deviation is made to a maintenance routine or procedure, the Company shall be notified as soon as possible after the procedure has taken place, if not prior. The type of deviation shall be formally submitted stating any associated risks. Additionally, the Supplier shall consult the manufacturer for their guidance and recommendations
- 4.8 For all UPS systems, the manufactures data with regards to maintenance shall be referred to. All maintenance activities shall be undertaken in accordance with the manufacturer's recommendations/specifications
- 4.9 Unless otherwise agreed in advance, the Preventative & Corrective Maintenance of Equipment shall in no manner disrupt the operation of other Equipment or facilities provided within the station or within other stations or station control rooms
- 4.10 There shall be no UPS system service downtime due to any Preventative & Corrective Maintenance task undertaken during the operational periods (e.g.: Traffic Hours) unless prior authorisation is given by the Company.
- 4.11 As part of this Contract, the Supplier is requested to document within the Equipment Register and AMS the purpose and recommended Resilience (Autonomy) of each UPS system within the first 12 months of Award. The supplier will provide the methodology they will use to test/estimate the current UPS resilience against the recommended resilience (Autonomy).

## 5. 12 Monthly Switchroom/Switchgear Inspection

- 5.1 The Supplier shall undertake a non-testing inspection of all switchrooms and switchgear to ensure :
- All blanks, lids and covers are in place



- Identify any apparent safety deficiencies, including but not limited to the following;
  - i. Water or excessive dust ingress
  - ii. Ambient temperature
  - iii. Signs of overheating
  - iv. Equipment damage
  - v. Apparent non-compliant installations
- Visual inspection and status reporting of the state of mains power supply transient overvoltage suppression devices.
- Switchroom floors shall be vacuum cleaned in areas with fire detection or swept in areas without fire detection to ensure they are free of dirt and dust.

## 6. LU Stations Tunnel and Station Public Area Ventilation Systems

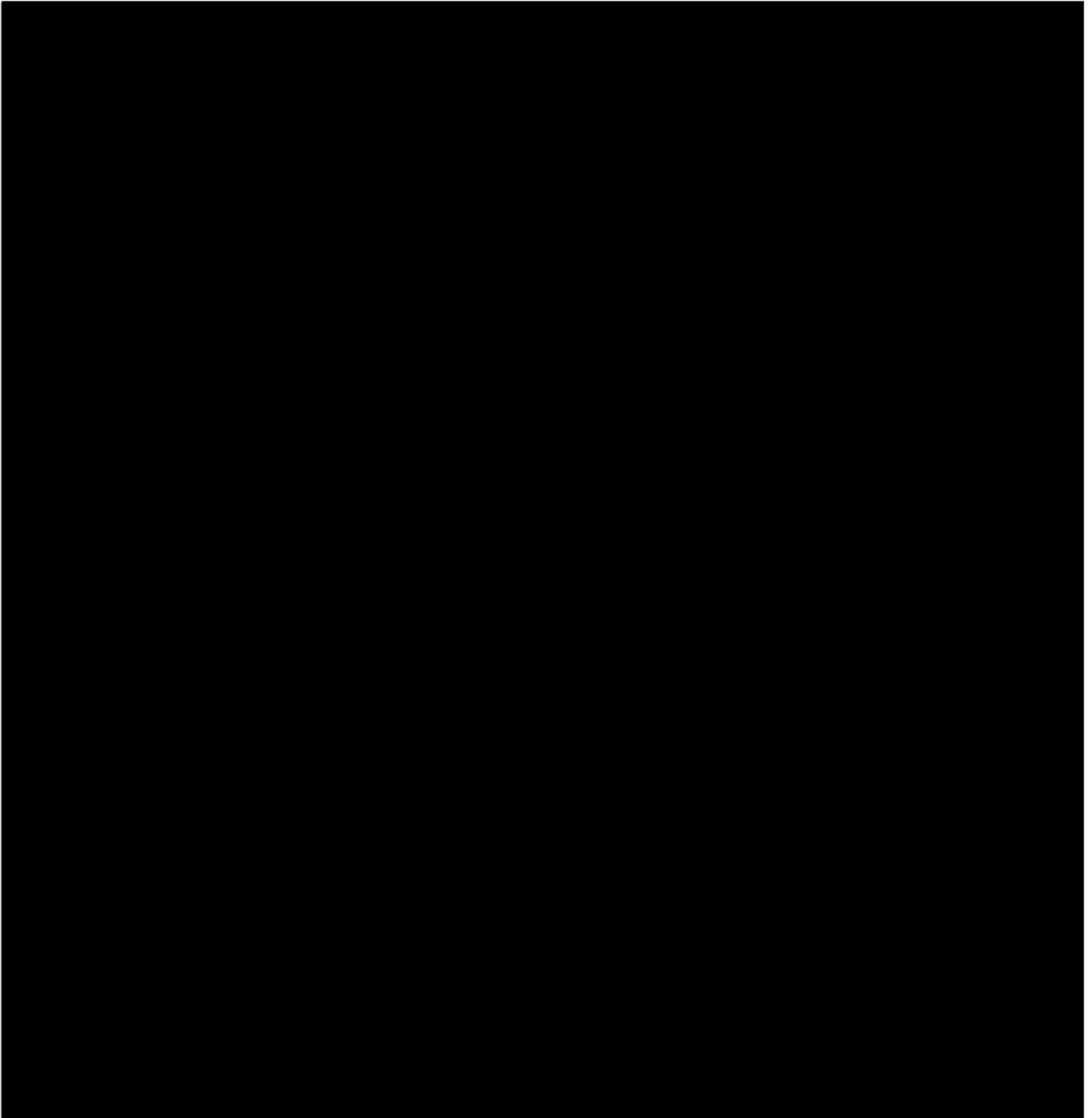
### 6.1 The Supplier will be responsible for maintaining and ensuring the following:-

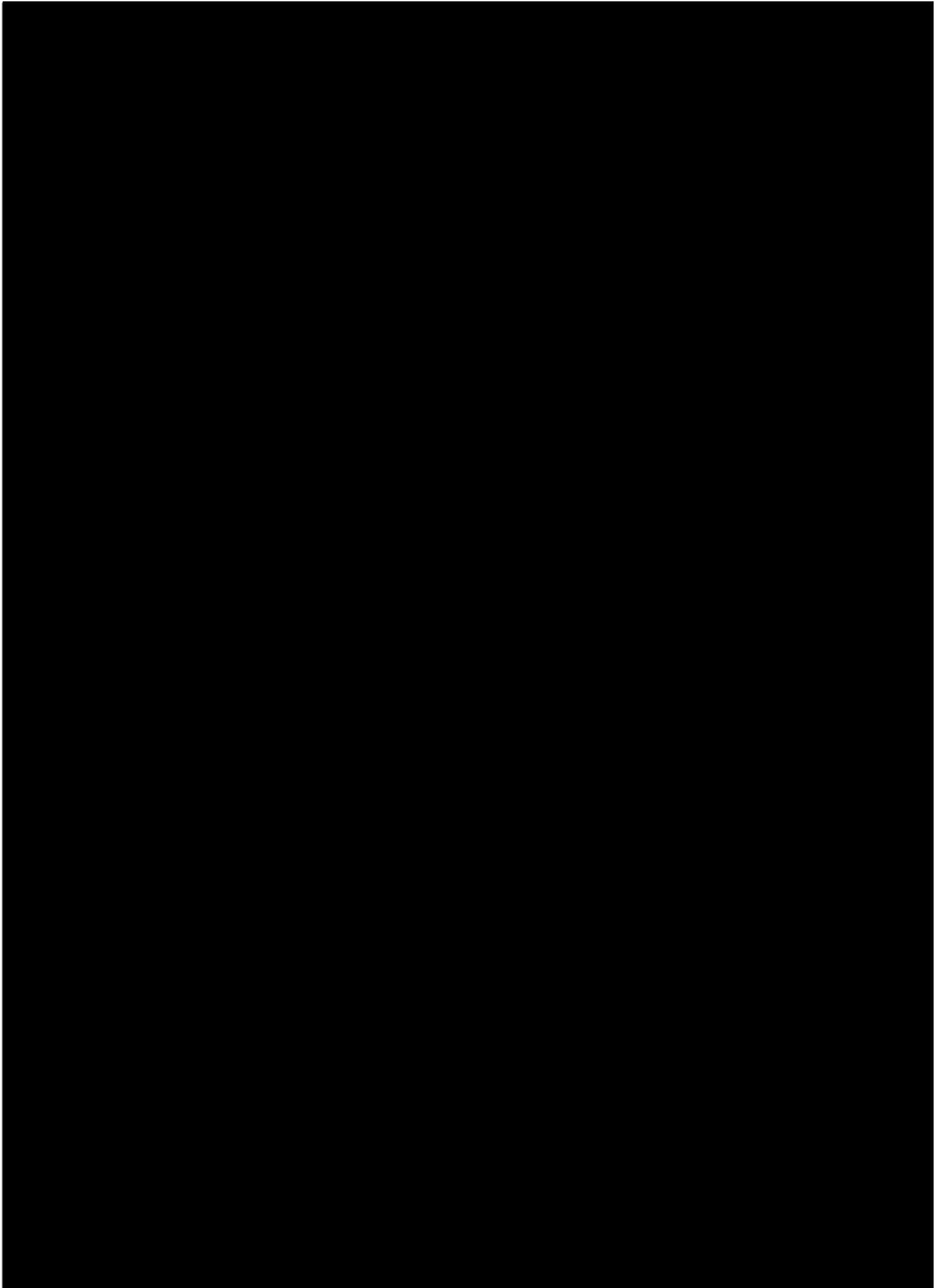
- All ventilation fans are operational at all times
- Integrity of the Fan Site, including its Cleanliness.
- The fan operates freely in the directions it was intended to operate.
- All warning and status lamps show the correct indication
- All indicator lamps within the Main and Remote Control Panels are fully operational.
- Drive Belts do not show signs of fraying and are replaced as a matched set and properly aligned with the pulleys.
- If remote dampers are installed their operation must be checked.
- The controller is free of dust and that the fan and filters of the inverter drives are cleaned and replaced at regular intervals to ensure adequate airflow in the cabinet.
- Any defects including noise, vibration, door locks, water seepage, structural damage etc. are reported
- All ductwork is maintained to prevent air leakage from the ventilation shaft (this does not include a major structure such as the ducts built as part of the structure)

### 6.2 The condition monitoring of tunnel fans should be used to determine the necessary ongoing maintenance, notwithstanding regular re-lubrication of bearings to the manufacture's specification. It should also be used to trend the performance of the asset during its life and to recommend replacements.



- 6.3 Each Mid Tunnel Ventilation Fan requires minor interventions every 4 weeks in line with 6.1 but additionally a comprehensive litter pick and clean of all floor and wall grills shall be undertaken by the Supplier.
- 6.4 With the exception of Moreton Terrace that requires 4 major interventions per year due to noise issues, each Mid Tunnel Ventilation Fan requires 2 major interventions per year, (October and May) where the required maintenance will be as per the O & M documents in Appendix M (Mid-tunnel vent fans O&M Manuals).

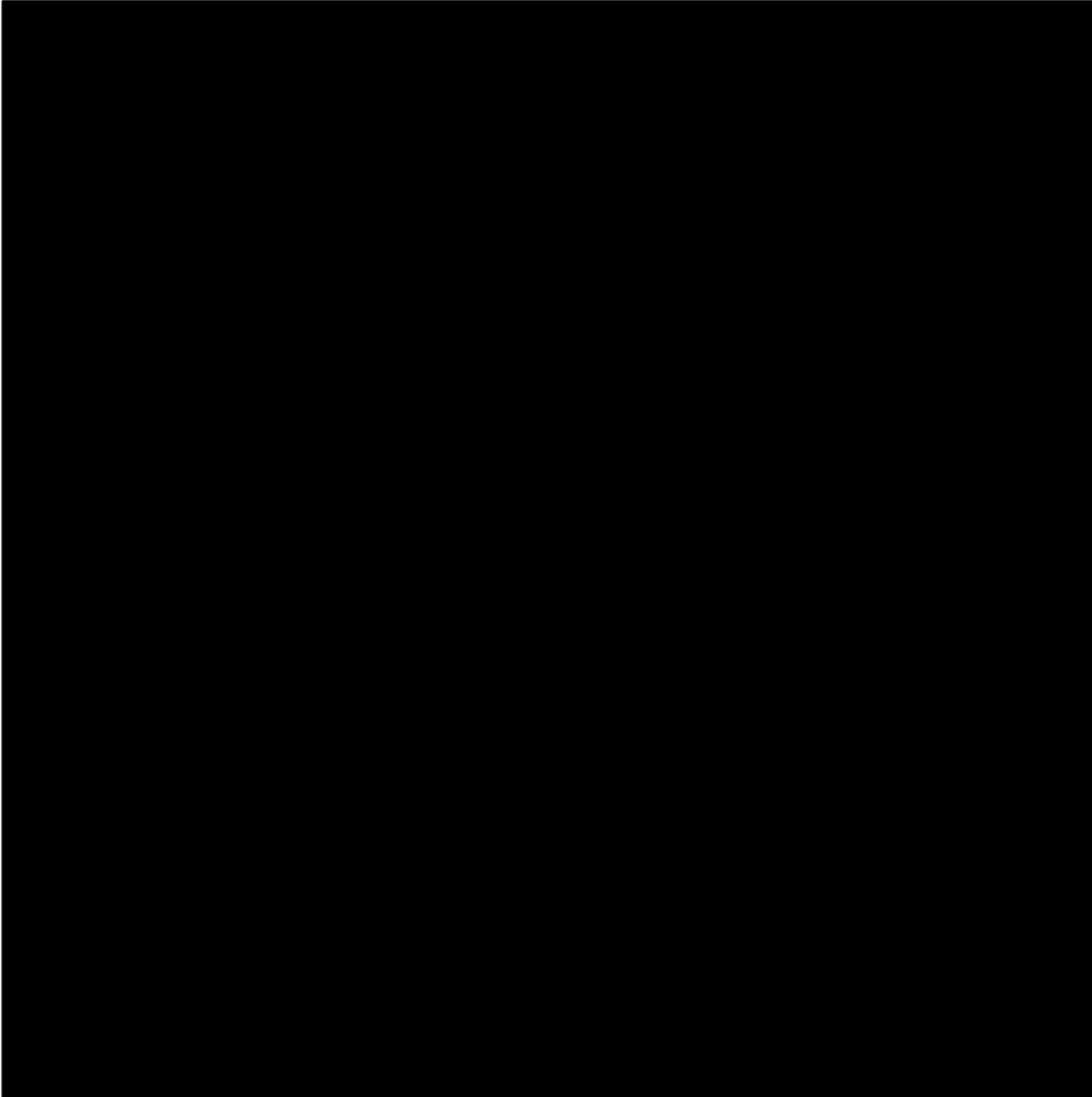






8. Smoke Fan Ventilation at Bank/Monument, serving the DLR

- 8.1 The same strategy as laid out will be undertaken but because of the critical nature of these assets a more extensive planned services regime will be required with increased frequencies.



## 10. Ventilation Ductwork Cleaning

10

- 10.1 The mechanical ventilation systems (including air conditioning systems) shall be regularly and properly tested and maintained to ensure that they are kept clean and free from anything which may contaminate the air. The Supplier shall carry out a “Vacuum Test” (V.T) at maximum intervals of 12 months in accordance with The Vacuum Test method of TR/19 – Internal Cleanliness of Ventilation Systems.
- 10.2 A system risk assessment shall be generated and maintained by the Supplier where the test results shall be recorded. Proposed changes to the system risk assessment shall be by agreement with the Company.

## 11. Building Management Systems (BMS) and Control Systems

11

- 11.1 The operation of many other Systems, Assets and Components are reliant on a correctly operating BMS or Control System. It is therefore inherently implied that the maintenance and correct operation of all other Systems, Assets and Components will often require the consequential update of an associated BMS or Control System by the Supplier.
- 11.2 To facilitate quicker re-instatement of corrupted software, the Supplier shall undertake a back-up of all Site specific control software within 12 months of the Services Commencement Date.
- 11.3 Any re-configuring of the BMS and Control Systems software shall be logged and maintained by the Supplier in line with the Quality Control System process ensuring version control is in place.
- 11.4 The Supplier shall store all versions of all back-up data in a secure, fire proof location. The Supplier shall provide a further copy of all versions of all back-up data to the Company as an alternative storage facility.





## **APPENDIX G**

### **STATUTORY PLANNED MAINTENANCE**



## 1. BS 7671 Periodic Inspection and Testing of LV Electrical Systems

The Supplier shall carry out Periodic Inspection and Testing in accordance with the requirements of BS7671 and the designated SFG20 Task Sheet specified in the Services Matrix, on a rolling programme.

The site person in charge undertaking the works shall be an Approved Electrician as defined within the JIB Grading Handbook 2016.

The Supplier shall inspect and test all internal and external Equipment supplied from the Site even if the Equipment lies outside the Site boundary.

The demarcation of the main intake is considered to be either the DNO "cut out" or the LU "trunk switch". The Supplier shall be responsible for the all Equipment beyond/downstream of these points. This shall include all circuitry emanating from the main DNO supply 'cut out' or the LU supply "trunk switch".

At Jubilee Line stations between Westminster and Stratford, the LU "trunk switch" will be the outgoing terminals of the Main LU LVAC switchgear within the sub-stations.

Station Tunnel Lighting and associated Tunnel Power assets and circuits within running tunnels are not included within this specification. The supplies to the Tunnel Lighting and Tunnel Power control Panels are.

Tests on electrical Equipment in IMR, CER, SER, Telephone Equipment, UTS Rooms, etc are to be restricted to the supply cables up to the isolators within these rooms. The Supplier shall carry out a visual inspection on the relevant electrical Equipment within these Sites, e.g. the local lighting and power circuits.

For Escalator Machine Chambers, Lift motor rooms etc. the Supplier shall undertake testing and inspection of all lighting and power circuits, except for the supply to the escalators or lifts which the Supplier shall carry out up to the main isolators within the machine chamber/ lift motor room. Lift shaft lighting is not included within this Specification.

- 1.1 A minimum of 4 weeks prior to work commencing on-site the Supplier shall generate an Isolation Plan (as defined in Appendix J) for each site identifying:
  - proposed Equipment isolations
  - isolation dates
  - tests and inspections to be undertaken
- 1.2 The Supplier shall generate, distribute and administer an Isolation Planning Form (See Appendix J (Sample Periodic Inspection & Testing Isolation Planning Form)) for all loads Communications, Signalling and 3rd Party Loads affected during planned isolations a minimum of 14 days prior to the isolation taking place.
- 1.3 Following each shift the Supplier shall generate a Report Sheet detailing works undertaken and details of any issues identified.
- 1.4 The Supplier shall be responsible for the removal, safe storage, and subsequent re-installation of all louvres, grids, ceiling panels, lids, covers, and



manhole covers etc during the Services. Any damage to the foregoing incurred by the Supplier whilst undertaking the services shall be reported to the DER and rectified at the Supplier's expense and within a timescale agreed with the DER.

- 1.5 Upon identification during Periodic Inspection and Testing, Category 1 faults shall be considered as Priority Reactive Maintenance and cleared within 4 hours. Category 2 and 3 faults that are detailed within the submitted Report and are agreed by the Company, are not included within this Specification.
- 1.6 The Supplier shall deliver the BS 7671 Periodic Inspection and Testing report within 4 weeks of the on site completion of testing and inspection works.

## 2 RCD Testing

- 2.1 The Supplier shall carry out the testing of all RCD's installed within LV Electrical Systems at all Sites, in accordance with the requirements of BS7671 and SFG20 Task Sheet 44-08, rectify any errors immediately and record the results.

## 3 Portable Appliance Testing (PAT)

- 3.1 The Supplier shall carry out annual maintenance, inspection and testing of all portable appliances as identified within the Service Matrix in accordance with the Portable Appliance Testing SFG20 Task Sheet 42-01.
- 3.2 The Supplier shall attend, inspect and test all portable appliances at Sites as identified within the Service Matrix within 12 months of the Services Commencement Date.
- 3.3 Repair or replacement of flexible leads or connections shall be undertaken wherever deemed to be cost effective. Paragraphs 7.14 and 7.15 of the Specification apply for Equipment replacement.
- 3.4 The Supplier shall carry out a risk assessment based upon the guidance contained within HSG107 "Maintaining Portable Electrical Equipment" and recommend ongoing frequencies of inspection and testing of all appliances for agreement by the Company.
- 3.5 Records of each item tested, its' use, location, test date and pass or fail state shall be recorded by the Supplier and submitted for review by the Company as and when requested.

## 4 UPS Performance Testing

- 4.1 On each UPS supporting Emergency Lighting the Supplier shall;
  - Carry out Monthly Emergency Lighting testing in accordance with the requirements of BS EN 50172:2004 (BS 5266-8:2004).
  - Carry out Annual Emergency Lighting testing in accordance with the requirements of BS EN 50172:2004 (BS 5266-8:2004).
  - BS 5266 Emergency Lighting Testing.
- 4.2 The Supplier shall;
  - Carry out Monthly Emergency Lighting testing in accordance with the requirements of BS EN 50172:2004 (BS 5266-8:2004).



- Carry out Annual Emergency Lighting testing in accordance with the requirements of BS EN 50172:2004 (BS 5266-8:2004).
  - Supply, complete and maintain local site logs based on the principles of BS5266-1 Annex H (Reactive Maintenance Performance Requirements).
  - BSEN 62305 Lightning Protection Inspection and Testing.
- 4.3 The Supplier shall carry out inspection, testing and reporting at 11 month intervals in accordance with SFG20 Task Sheet 38-01.
- 4.4 At each site, the Supplier shall identify and inspect any installation and verify the presence of a Lightning Protection System. If a Lightning Protection Systems is present it shall be inspected and tested to the required and statutory standards that are current throughout the life of the Contract, and any extension thereof.
- 4.5 A detailed report shall be submitted to the Company on the condition of the system along with the relevant test results, along with details of any corrective action required to ensure compliance.

## 5 Control, Inspection and Testing of Legionella bacteria in water systems

- 5.1 The Supplier shall at all times comply with the requirements of HSE's Approved Code of Practice, Legionnaire's Disease: the control of legionella bacteria in water systems (ACOP L8) in the control and management of legionella at all Sites listed within Appendix A.
- 5.2 During all water temperature sampling visits, all showers shall be run for approximately 2 minutes. Where anti-legionella shower heads are fitted the flow rate shall be checked and the head replaced where necessary.

## 6 Inspection of Gas installations

- 6.1 The Supplier shall carryout periodic safety inspections on all gas installations, including appliances, pipework and fittings, ventilation provisions, and flue systems, to comply with the requirements of Safety in installation and use of gas systems and appliances – 'Gas safety, installation, and use, regulation 1998 – approved code of practice 1998 (latest edition).
- 6.2 The Supplier shall ensure that:
- 6.2.1 All pipework and fittings shall be subject to a gas soundness test at least every 52 weeks.
  - 6.2.2 All pipework and fittings shall be secure and free of leaks.
  - 6.2.3 All pipework shall be identified in accordance with required and statutory standards that are current throughout the life of the Contract, and any extension thereof.
  - 6.2.4 All isolation valves, drain cocks, etc. are to be fully operational and free of leaks valve hand wheels/handles are to be fitted.
  - 6.2.5 All Equipment must be maintained to achieve the maximum operational life from the Equipment so that no untimely or lengthy loss of availability, unnecessary repair costs and premature replacements are incurred.
  - 6.2.6 All Asset Identification labels including asset number are to be securely fixed to Equipment at all times.



6.2.7 All gas meter housings shall be kept secure, identified, internally clean and suitable ventilated where required.

6.2.8 Gas cooker anti tipping devices are to be fitted and in good working order and flexible hose to be free of damage.

## 7 Energy Efficiency Air Conditioning Inspections, Report (AC-REPORT) and Certificate (AC-CERT)

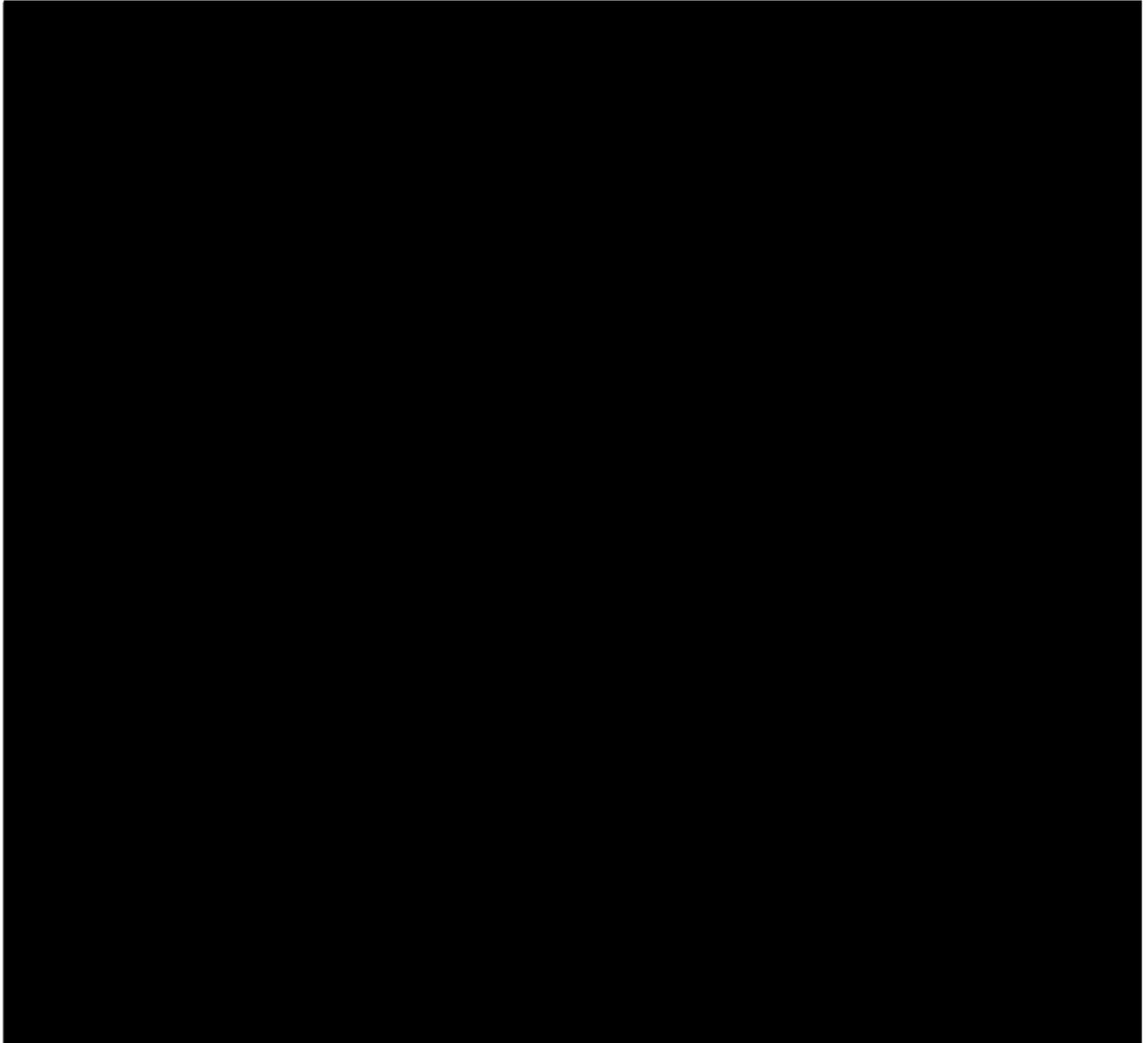
7.1 On all Air Conditioning (Comfort Cooling) Systems with an effective rate output of more than 12kw per site, not system, the Supplier shall carry out, after the first year of service, then every five years thereafter, an Energy Efficiency Inspection is to assess the site against The Energy Performance of Buildings Directive (Certificates and Inspections) (England & Wales) Regulations 2007 SI 2007/991 amended by SI 2007/1669, SI 2007/3302 and SI 200/647.

7.2 These inspections shall be carried out by an accredited Non-Domestic Energy Assessor listed on the Department for Communities and Local Government Non-Domestic Energy Performance Register.

7.3 The following information will be included in a report to be submitted within 4 weeks of the inspection :-

- The address of the Site in which the Air Conditioning (Comfort Cooling) System is installed.
- Asset Number and Details eg Manufacturer, Unit Rating, etc.
- Location of Evaporators, Fan Coil Units and Condensers or Chillers.
- Where is the system fed from Electrically.
- The name of the Energy Assessor.
- The name and address of the Energy Assessors Employer, or the name under which the Assessor Trades including his address.
- The date when the inspection was carried out.
- The name of the approved accreditation scheme that he or she is a member of.
- The final report will be in the format that can be downloaded into the Company's AMS.





## **APPENDIX I**

### **PLANNED MAINTENANCE SFG20 TASK SHEETS**

Appendix I is the document titled Lot 3.1 (M&E) - Schedule 3 - Appendix I - M&E Systems Maintenance Specification and stored on the CD-ROM at Schedule 23 (Documents on CD-ROM)



## **APPENDIX J**

### **SAMPLE PERIODIC INSPECTION & TESTING ISOLATION PLANNING FORM**





## AP JNP ELECTRICAL ISOLATION PLANNING FORM

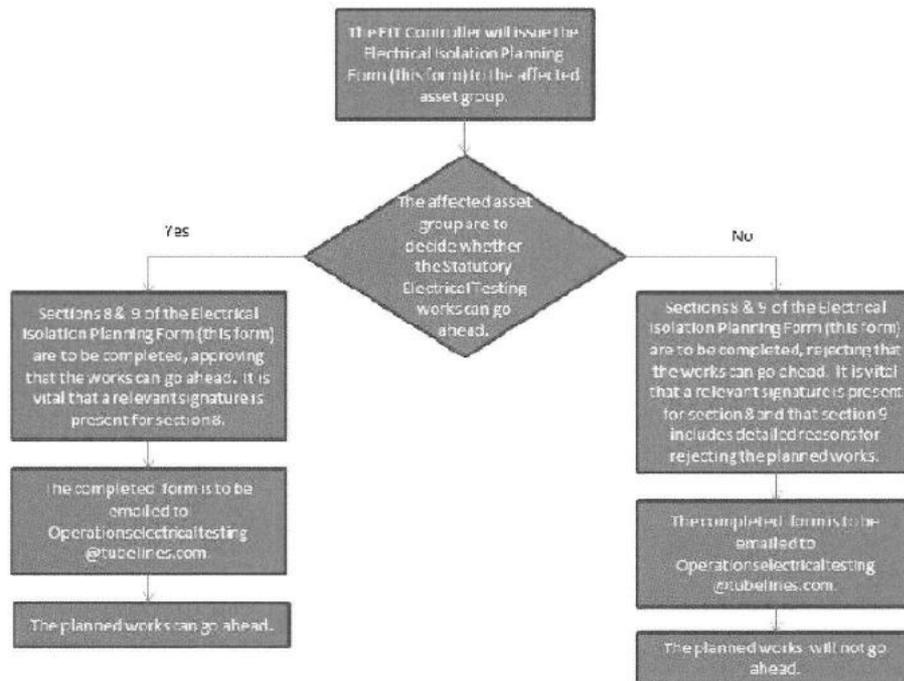
### NOTICE OF: Planned Electrical Inspection & Testing resulting in power cessations to third party systems at Stations and Non-Public Buildings

Please be advised that this is a **14 day notice** detailing Disruption or Cessation to supplies (described on the following page), due to Essential Statutory Electrical Testing work being undertaken. You **must provide confirmation** of receiving this notice immediately to the sender and **complete sections 8 & 9 of the form** on the following page **within 14 days**. If the attached form is not completed and returned within **14 days** then we will assume there is **no objection** and the **works will proceed**.

The planned Periodic Inspection & Testing takes place with a maximum duration between visits of 36 months. This is critical work necessary to demonstrate compliance with BS7671 as this is a minimum requirement to demonstrate compliance with the Electricity at Work Regulations. The Electricity at Work Regulations is a statutory Instrument and therefore compliance is mandatory, non-compliance is against the law.

As asset stewards, if you are confident that your assets and equipment can be powered down and re-energised with no complications, please state that in section 9 of this form. If you believe your assets and equipment are not resilient enough to be powered down and re-energised during our mandatory works, please arrange for an attendance to your vulnerable assets. We accept no responsibility for your assets and if you do not attend and this has an adverse effect on the station or operational railway, you will be held responsible and accountable for this. In extraordinary circumstances (Impact on the railway, possible impact on life etc.), it may be acceptable to not power down a circuit and list this as a limitation on the Condition Report. Monetary value is not an acceptable limitation. If you believe there is an extraordinary circumstance that merits a limitation, you must state this in writing including a signature and date. This will be inserted into the completed file and if necessary in the event of an incident, will be used in court to demonstrate why it was listed as a limitation. It is also worth noting that we are inspecting and testing our electrical installations. We will not fund attendances from any third parties. It is the responsibility of the specific asset stewards to ensure their equipment is available at the start of traffic hours.

#### AP JNP Electrical Isolation Planning Process:



Please return this form to [Operations.electricaltesting@tubelines.com](mailto:Operations.electricaltesting@tubelines.com)



## AP JNP ELECTRICAL ISOLATION PLANNING FORM

PLEASE COMPLETE SECTIONS 8 & 9 AND RETURN THIS FORM TO [Operationselectricaltesting@tubelines.com](mailto:Operationselectricaltesting@tubelines.com) WITHOUT DELAY.

If you have any queries regarding the proposed work, contact the sender for clarification or further information.

<b>1. Notice To:</b>	<b>Phone:</b>	<b>Email:</b>
Mark Connelly Gidion Smit		<a href="mailto:Mark.connelly@tubelines.com">Mark.connelly@tubelines.com</a> <a href="mailto:Gidion.smit@tubelines.com">Gidion.smit@tubelines.com</a>

<b>2. Notice From:</b>	<b>Phone:</b>	<b>Email:</b>
Stephen Ashton	07976199069	<a href="mailto:Steve.Ashton@tubelines.com">Steve.Ashton@tubelines.com</a>

<b>3. Date(s) of Cessation:</b>		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Wk. Comm.	Time (Off/On)							
14/3/16	01:00-04:30	D	D	D	D	D	D	D
		N	N	█	N	N	N	N
		D	D	D	D	D	D	D
		N	N	N	N	N	N	N
		D	D	D	D	D	D	D
		N	N	N	N	N	N	N

"Shade" Shift(s) Required

<b>4. Details of Work to be Undertaken:</b>	
Location: green park	Description of Work: Electrical testing and inspection of station.

<b>5. Details of Plant Affected:</b>	
Location: station supervisor office OPS	Description of Plant: 12 ways TPN DB circuit 2L1 desk power, circuit 3L1 GSF mini rack, circuit 7L2 Admin area sockets, circuit 9L1 desk power, circuit 9L2 clock station time, circuit 10L1 desk power, circuit 11L1 JLE logger box supply, circuit 12L1 desk power.

<b>6. Additional Information:</b>	<b>7. Isolation Date: 16/3/16</b>
The board and circuits will be isolated on the 16/3/16. This desk will have MICA.	

<b>8. Prepared by:</b>		
Name: Stephen Ashton	Signature:	Date sent: 3/3/16

<b>9. Approved / Confirmed / Rejected / See 9 Below (Please delete as required):</b>		
Name:	Signature:	Date:

<b>10. Restrictions, Remarks or Additional Information:</b>
Details:

Please return this form to [Operationselectricaltesting@tubelines.com](mailto:Operationselectricaltesting@tubelines.com)

**APPENDIX K**  
**ALL HOURS**



Document type : Form

Format for Case for Safety Paper

Reference Number: TFL-229-V11

From Parent Document: P-320

Review Date: 26<sup>th</sup> August 2015



## Case for Safety Paper

Implementation of Maintenance All Hours on M + E Assets.

SRCC No: TL/1516/004

Date change to be implemented: 01<sup>st</sup> Sept 2015

## **1.0 Introduction**

The detailed scope of works is attached in Appendix 2 with a summary shown in section 4.0 of this document.

This document aims to outline the impact of the risks associated with carrying out maintenance activities during All Hours working on the M + E assets. It also includes the mitigating actions to be put in place to minimise the risk as low as reasonably practicable. This analysis is included and detailed in Appendix 1.

The objective of the M + E Asset All Hours Working initiative is to explore making changes to the current maintenance practices that can increase productivity and efficiency without causing any disruption to passengers or LU Operational staff.

The main driver for moving to All Hours working is to achieve compliance to Statutory Regulations, LU Standards and legislation for the Maintenance of M + E Assets. At present there could be clashes with other works, for example in a machine room when an escalator needs to be repaired ready for service the following morning, the escalator maintainers will take priority over the M + E maintainers. In this situation, the M + E maintenance work would not be completed during this visit, this outstanding work would be completed at the weekends. With the introduction of Night Tube in September, the weekend recovery period will be lost and the work will need to be completed during the week. By moving some maintenance to Traffic Hours, there will be less pressure on staff so that jobs are not rushed and statutory obligations met. A significant driver for this proposal is therefore Night Tube which will ultimately limit hours available for Maintenance works.

## **2.0 Background**

A CoMET benchmarking study commissioned by London Underground identified that other metros with similar or higher traffic levels than London undertake more of their maintenance during traffic hours.

Due to Night Tube and pressure on scarce resources there is a need to work during All Hours (non engineering and engineering hours), this requirement has prompted a review to establish which activities can be undertaken during All Hours working as applied to London Underground.

## **3.0 Current Situation**

A number of maintenance activities are currently undertaken within Engineering hours. Most stations have close of traffic around 01:00 and open for service between 05:00 and 05:30. Taking station preparation time (30-60 minutes) into consideration this restricts productive maintenance time to between 01:00 and 04:30, about three and a half hours.

Currently we are able to maintain around 40 % of our M + E assets during traffic hours.

At present repairs are undertaken to the M + E systems within traffic hours if a failure occurs.

Non public buildings and depots are generally maintained during Traffic Hours at the request of the Operations Management. This situation is unlikely to change.

Works at Vent Shafts, Intervention Shafts & Detrainment Points at remote locations are undertaken during Traffic Hours.

#### **4.0 Proposed Change**

The following maintenance activities have been identified as suitable for undertaking during ALL Hours running (not during peak hours in customer areas). With the work activities described in Appendix 2. This list is not mandatory, with selection of particular tasks at the discretion of the asset manager. These activities have been risk assessed with the generic risks shown in Appendix 1:-

#### **MECHANICAL**

##### **4.1 Air Conditioning and Ventilation**

- 4.1.1 Evaporator system
- 4.1.2 Condenser system
- 4.1.3 Air Cooled Chillers Direct Expansion & Water Cooled Condensers
- 4.1.4 Air handling units (AHU)/ Grill & Diffusers

##### **4.2 Piped services**

- 4.2.1 BOILERS (LTHW HEATING/HWS)
- 4.2.2 BURNERS - PRESSURE JET (GAS)
- 4.2.3 BURNERS - PRESSURE JET ( OIL)
- 4.2.4 CIRCULATING PUMPS
- 4.2.5 PRESSURISATION UNITS
- 4.2.6 Cold Water Storage Tank & Cisterns
- 4.2.7 Hot Water Cylinder
- 4.2.8 Water Heaters
- 4.2.9 Trace Heating
- 4.2.10 Gas Booster Set
- 4.2.11 Showers
- 4.2.12 GAS OVERHEAD RADIANT HEATERS (CERAMIC PLAQUE TYPE - SMALL)
- 4.2.13 GAS OVERHEAD RADIANT HEATERS (CERAMIC PLAQUE TYPE - LARGE)
- 4.2.14 GAS OVERHEAD RADIANT HEATERS (BLACK TUBE TYPE)

##### **4.3 Tunnel Ventilation**

- 4.3.1 Motor
- 4.3.2 Control Panel

#### **ELECTRICAL**

##### **4.4 Lighting**

- 4.4.1 Lighting – specific to escalator lighting works.
- 4.4.2 Lighting - Corrective/Reactive Works
- 4.4.3 Lighting control systems
- 4.4.4 Building management systems
- 4.4.5 Electrical Distribution Systems
- 4.4.6 Electrical Isolation

##### **4.5 Statutory Testing**

- 4.5.1 DC circuits or equipment
- 4.5.2 Confined Space
- 4.5.3 Traction equipment
- 4.5.4 Signalling Equipment
- 4.5.5 HV switchgear or associated sub circuits
- 4.5.6 EDF Power-Link, Thames Water, British Gas infrastructure.
- 4.5.7 Network Rail Equipment

##### **4.6 Emergency Lighting Testing**

##### **4.7 Portable Appliance Testing**

##### **4.8 Lightning Protection Inspection & Testing**

## **4.9 Electrical Installation Testing**

- 4.9.1 Measurement of Lux levels.
- 4.9.2 Visual inspection of assets and referencing of Distribution Boards and Schedules
- 4.9.3 Intrusive visual inspection of 25% under floors and above ceiling
- 4.9.4 Electrical installation testing consisting of live and dead testing

## **5.0 Options considered**

### **5.1 Option 1 – Do nothing (not recommended)**

Completing maintenance on the M + E assets in Engineering Hours ( Approx 60 %) and Traffic Hours ( Approx 40%) will continue to take place.

- LU will continue to operate in the same way as historically.
- Costs will remain at current levels and may rise as asset base increases and more operatives are required to complete maintenance.
- Potential efficiencies from the work being completed by each maintenance team will not be realised.
- With the imminent introduction of Night Tube and the unavailability of Friday and Saturday nights there will be no chance to recover missed works or perform tasks whose duration cannot be completed during standard Engineering Hours.

### **5.2 Option 2 – Use an ALL Hours initiative to carry out Maintenance (recommended)**

Complete selected maintenance (as detailed in section 4 & Appendix 2) within All Hours.

- Safer working arrangements by allowing longer periods of time to complete maintenance.
- Achieving full legal compliance with British Standards and LU requirements.
- Ensure corrective works are done in time to ensure full operation of the system.
- Efficiencies maybe realised with more effective working patterns.

## **6.0 Operational Arrangements**

The Maintainer will request access to the identified sections of the M + E systems for ALL Hours. After signing in with the Landlord the M+E Maintenance Team Leader will confirm the maintenance activity being undertaken and agree any time periods where the activities may be restricted. In addition confirm any additional mitigation that will be put in place, eg. Engineer monitoring MFCP (Main Fire Control Panel). Operational issues will be different at each site and site specific risk assessment will be undertaken.

## **7.0 Scheduling and Access**

Changes to the access requirements and to the scheduling will be required once this proposal is accepted. The start date for maintenance will be amended to reflect the efficiencies and the revised programme loaded onto the mainframe management system.

## **8.0 Staff specific issues**

Regarding access to the site, M + E Maintenance teams will book on with the Landlord.

Due to maintenance teams working longer hours they may need to take their half hour break during their time on site. Under the Workplace Health, Safety and Welfare Regulations (Temporary Work Location section) the company should provide welfare facilities where practical. Agreement will be made for each site as to which and when the welfare facilities can be used on condition that they are left in a clean and tidy condition for other users. The Landlord should be briefed so there are no issues regarding welfare access. In the event that station/location welfare facilities cannot be used, the M + E Maintainer will provide welfare facilities.

## 9.0 Risks associated with the proposal

The risks associated with the proposal are detailed in Appendix A1. The main risks are summarised below:

Risk I.D.	Risk	Unmitigated risk rating (H/M/L)	Required risk controls	Mitigated risk rating (H/M/L)
1	Breach of regulations if maintenance work not done within statutory requirements	H	Extended ALL Hours enables more efficient compliance with statutory requirements and adequate time to complete all task and maintain compliance.	L
2	Isolation of circuit critical to operation of railway	H	Only lighting (in non public areas) and non critical circuits to be isolated during traffic hours. Isolation plan to be submitted to EIT Controller/ASSET MANAGER/TAM prior to works commencing. Any circuits not readily identifiable shall not isolated until an investigation during closed hours and confirmation from EIT controller is received.	L
3	Frustrated access during work	M	Effective communication through Liaison Team with LU area management/Landlord to ensure staff are briefed on works being undertaken.	L
4	Unforeseeable conditions encountered on site	M	Risk Assessed, to ascertain if works can be carried out.	L
5	Movement of Materials Impact Station Use	M	Identify large items of plant/materials in advance and only move in Engineering Hours.	L

*Summary Risk Table for M + E Maintenance ALL Hours working.*

## **10.0 Measures of Success / Failure**

The measure of success / failure of this proposal will be:-

### Success

- Maintenance completed within statutory timescales
- Greater % utilisation of scarce resources
- Number of asset failures reduced as a result of maintenance undertaken in ALL Hours

### Failure

- Increase in number of asset failure as a result of maintenance undertaken in ALL Hours
- Failure to complete maintenance tasks within statutory timescales.

## **11.0 Communication Requirements**

Upon approval of the proposal:

- The amended working arrangements will be communicated to the landlord through the AP Stations Liaison team.
- The LU AP's will liaise with all stakeholder's (the landlord, LFEPA, Stations H&S Council) to confirm the maintenance works that will be undertaken during ALL Hours.
- Communicate to all LU Stakeholders via the LU communications team