NORTHWICK PARK HOSPITAL

Supply, Delivery, Installation and Commissioning of Switch Panel Maintenance

Particular Specification

22/09/2022

NORTHWICK PARK HOSPITAL

Supply, Delivery, Installation and Commissioning of Switch Panel Maintenance

22/09/2022

Consultant

Larry Gough
Lakes Join Grandly Ltd
St Julien
Colne Road
Somersham
Cambs
PE283DQ

Tel: +44 1487 208834
Email: larry@lakesjoingrandly.co.uk

www.lakesjoingrandly.co.uk

PERFORMANCE SPECIFICATION

Project Name:
**Supply, Delivery, Installation and Commissioning of
Switch Panel Maintenance**

at
Northwick Park Hospital
Harrow

Northwick Park Hospital NHS Trust
Watford Road
Harrow
HA1 3UJ

CONTENTS

PRELIMINARIES Section 1.00

1. PRELIMINARIES

1.1 THE PROJECT GENERALLY

1.2 PROJECT PARTICULARS

1.2.1 THE PROJECT:

Name: **Supply, Delivery, Installation and Commissioning of Switch Panel Maintenance**

Location: Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.2 EMPLOYER (CLIENT):

Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.3 THE PRINCIPAL CONTRACTOR:

To be Confirmed

1.2.4 CONTRACT ADMINISTRATOR:

Muhammad Syed
Capital and Estates
Northwick Park Hospital,
Watford Road
Harrow
HA1 3UJ

1.2.5 PLANNING SUPERVISOR:

TBC

1.2.6 MECHANICAL / ELECTRICAL ENGINEER:

Larry Gough
St Julien
Colne Road
Somersham
Cambs
PE283DQ
Mobile 07713863079
E-mail larry@lakesjoingrandly.co.uk

1.3 TENDER AND CONTRACT DOCUMENTS

Performance Specification
Tender with associated drawings listed in 1.3.1.

1.3.1 THE TENDER DRAWINGS: ***Drawings to follow:***

Drawing No.	Description	Scale
LJG_NPH_SPM_600	Overall Site Plan	NTS
LJG_NPH_SPM_601	H Block Panel Location	NTS
LJG_NPH_SPM_602	Substation 2 Panel Location	NTS
LJG_NPH_SPM_603	Substation 6 Panel Location	NTS
LJG_NPH_SPM_604	A&E Panel Location	NTS
LJG_NPH_SPM_605	H Block Schematic	NTS
LJG_NPH_SPM_606	Substation 2 Schematic	NTS
LJG_NPH_SPM_607	Substation 6 Schematic	NTS
LJG_NPH_SPM_608	A & E Schematic	NTS
LJG_NPH_SPM_609	H Block Panel Elevation	NTS
LJG_NPH_SPM_610	Sub 6 LVP 02 Panel Elevation	NTS
LJG_NPH_SPM_611	Sub 6 LVP 01 Panel Elevation	NTS
LJG_NPH_SPM_612	Sub 2.1 Panel Elevation	NTS
LJG_NPH_SPM_613	Sub 2.2 Panel Elevation	NTS
LJG_NPH_SPM_614	A&E Panel Elevation	NTS
LJG_NPH_SPM_615	Temporary Generator Schematic Arrangement	NTS

1.3.2 MECHANICAL AND ELECTRICAL: GENERAL REQUIREMENTS

This is detailed in the scope of works

A working knowledge of the standards cited in this specification must be incorporated within the business proposals for all electrical and mechanical engineering services.

The performance requirements for the electrical and mechanical services for each element is scheduled in Section 6.

1.3.3 THE PRE-TENDER HEALTH AND SAFETY PLAN:

To be issued separately.

1.4 THE SITE / EXISTING BUILDINGS

1.4.1 THE SITE:

The site boundaries for this Project are the workings areas as shown on the tender drawings.
Site compound area to be agreed.

1.4.2 EXISTING BUILDING:

The buildings will be in use and the working areas will be occupied with existing switchgear and will remain so for the duration of the contract.

Fire escapes from the existing surrounding buildings will need to be maintained.

1.4.3 EXISTING SERVICES

Where applicable, existing services are indicated on the tender drawings.

1.4.4 SITE VISIT:
The contractor should visit the site when preparing the tender and must make due allowance for:

- Local conditions
- Extent of operations
- Supply of and conditions affecting labour
- Storage space for materials, including all additional handling, transporting and access arrangements due to site conditions
- Position of underground services and drains,
- The nature of the ground and the execution of the contract generally.

Site visits must be by appointment. Appointments to visit site should be made with Muhammad Syed who can be contacted on 07863 846253.

1.5 DESCRIPTION OF THE WORK

1.5.1 BRIEF SCOPE OF WORK:

Electrical distribution and control systems are the heart of any Hospital, yet it is often the most under-appreciated utility and without a reliable source of electrical power, operation of the Hospital would not be possible. Despite the critical nature of electrical equipment within Hospitals, regular scheduled maintenance is not always a primary focus in some facilities despite electrical equipment failures accounting for millions of pounds in damage and lost business every year.

As our hospital electrical infrastructures continue to age, the problem will continue to worsen unless preventative maintenance is undertaken. It is estimated that more than two-thirds of electrical system failures can be prevented by undertaking routine preventive maintenance and the failure rate of equipment can be several times higher for elements that are not part of a scheduled PPM plan when compared with those that are. An effective electrical preventative maintenance program will help to avoid the disruption to the running of the Hospital and, worst-case, loss of life.

Neglecting the maintenance of electrical equipment over a long period of time will inevitably lead to costly emergency repairs and equipment failures in addition to elevated safety risks of the patient and the staff along with the property risks. In general, the HTM and other applicable standards recommends a frequency of at least once every five years for conducting regular preventive maintenance on electrical equipment, but some individual locations may require more frequent maintenance due to their surrounding environment or operational requirements of the equipment e.g. harsh environments with high moisture or dust content will require more frequent PPM’s

This specification provides basic recommended practices and frequencies that should form the basis of such a regularly scheduled electrical PPM program and by using the preventive maintenance checklists included electrical distribution systems can be kept in good working order and potentially prevent any undue risk to the Hospital and its occupants.

On average a small electrical failure could cause a minimum of 30 mins of interruption as long as all systems are maintained and working. With preventive maintenance, there is no ‘one size fits all’ approach; programs must be custom designed to fit the characteristics of the facility and vulnerability of the Hospital. Therefore, the following considerations should be taken into account to eradicate any form of services outages as far as practicable

- Areas of the Hospital affected
- Sensitivity to disruptions (patients)
- Interruption costs
- Potential loss of Life
- Age of equipment
- Changes in system loads over the years (design and expansion)
- Type of loads (increasing digital loads and demand on the Hospital)

- Sensitivity to power quality
- Geographical consideration (weather)
- Environmental conditions in which the Hospital operates (moisture, dirt, dust)

All work associated with electric systems and equipment must be performed in accordance with accepted industry safety standards and work practices and in strict accordance with the HTM Safe System of Works.

This part of the Specification relates specifically to the existing site electrical Infrastructure and essential maintenance required on major switch gear at installed at the following locations.

- Substation 1,
- Substation 2,
- Substation 3
- Substation 6
- C Block
- E, F & G Block
- H Block
- A&E department
- V, W & X

This part is to be read in conjunction with all other parts of the specification. Where detailed requirements given in this part are at variance with the general requirements of this specification, the method described in this part shall apply, but the Contractor shall bring this to the attention of the Contract Administrator.

The drawings indicate diagrammatically the requirements of the installations so far as location of various plant and items of equipment are concerned.

The Contractor shall carry out the surveys, procurement, programming, working drawings, supply, delivery to site, positioning, installation, maintenance, fixing and making all connections to all materials necessary, protection, setting to work, cleaning and the testing and commissioning of the completed electrical installation and associated works for its satisfactory operation, all in accordance with the requirements of this Specification and the accompanying drawings.

All maintenance works shall be undertaken on essential electrical services under strict Permit to Work processes in accordance with the HTM Safe Systems of Work so must include all PPE and system protection necessary to complete the required system upgrades.

The prestart works to be undertaken generally include, but may not be restricted to, the following:

1. Survey the site and the existing switch panels to understand the practicalities of achieving the task
2. Produce working drawings showing how the switchgear support systems including any necessary mobile generators will be configured, safely installed and connected into the main switch panel and on to the bars / cables of the agreed devices
3. Programme in all the works necessary to achieve the system maintenance
4. Ensure the area identified for the switch gear maintenance is clear of any equipment and materials

The maintenance arrangements will then take two alternate approaches depending on the existing switchgear arrangements.

1. Maintenance Alternate 1 –
    a. Where the switch panels have two LV incomers and a bus-coupler arrangement such as on Substation 2, Substation 6 and A&E department, the contractor shall utilise the bus-coupler to support each part of the panel whilst each of the main supply ACB maintenance is being undertaken.
    b. Whilst the ACB bus-coupler is being maintained, the two main LV supplies shall be switched to support the complete panel in two halves as long as there is a total and safe disconnection between both panel sections
2. Maintenance Alternate 2 –

a. Where the switch panels has a bus-coupler with a LV and Generator feed such as on H-Block, the contractor shall again utilise these to support each part of the panel whilst the main supply ACB maintenance is being undertaken but in this instance when the LV ACB is being maintained only the essential section of the panel will be supported due to restricted load capacity on the panel and generator.
b. Whilst the ACB bus-coupler is being maintained, the LV and generator supplies could be switched to support the complete panel as long as there is a total and safe disconnection between both panel sections

Once the main ACB's have been maintained, the contractor shall allow to undertake thermographic scans of each panel and then undertake all of the maintenance they can reasonably undertake without isolating the panel completely. In the event that the thermographic scan identifies any anomalies or problem areas, these will be investigated further and in accordance with the schedule of maintenance activities included at the rear of this document.

The below text covers the outline work requirements for each element of the electrical infrastructure

Switchgear - Thermographic Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Thermographic inspection should be performed at least once every three years on all switchgear, distribution panels, cable and bus connections, motor control centres and starters, and other critical equipment	
2	Infrared inspections are extremely beneficial in reducing electrical failures by identifying potentially dangerous conditions; such as, lose or dirty connections, overloaded or imbalanced circuits, or improperly installed equipment	
3	By measuring the heat imbalance relative to the environment and to surrounding equipment, abnormal or adverse conditions can be uncovered that if left unattended would worsen to the point of failure	
4	Thermographic surveys are very helpful in planning the work scope of an upcoming scheduled outage	
5	Prior to the planned maintenance, an IR survey should be conducted to help identify areas that need specific and immediate attention. Resources can then be allocated to address these specific problems during the de-energized period	
6	Thermographic surveys are done on energized equipment and should be conducted during peak demand periods if possible as this will reveal the most serious problems and those that would otherwise go undetected	
7	At a minimum, the loading should be at least 40% of the rated load of the equipment being inspected	

Switchgear - External Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check function of all power meters before shutdown	
2	Check function of lamps and indicators	
3	Inspect locking devices for signs damage or worn	
4	Clean thoroughly, vacuum and full visual inspection of exterior only	
5	Check electronic surge protection is intact where installed	
6	Visual inspection for signs of overheating or deterioration	
7	Inspection of all panels for paint work damage and signs of corrosion	

Switchgear - Enclosure Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Ensure that all enclosure panels, doors, and structures are well-maintained ideally in accordance with the manufacturer's specifications.	
2	During agreed maintenance, all enclosures are to be vacuum cleaned of all loose dirt and debris and any excessive dirt or other contaminates that do not come off with vacuuming should be cleaned with lint free rags using cleaning solvents but only those recommended by the switchgear manufacturer.	
3	The contractor shall note the use of compressed air is not recommended as this can cause foreign particles to become embedded in the insulation or in extreme cases damage insulators.	
4	All vents and fan grills are to be cleaned of all dust and dirt accumulations, ensuring that ventilation openings are not obstructed at the end of the cleaning process.	
5	Where seals and/or gaskets are installed, these should be examined and repaired or if necessary, replaced with new.	
6	All doors and access panels should be properly re-secured once the cleaning operations have been finished.	
7	Electrical equipment should be examined for evidence of water ingress with all enclosures examined for evidence of water since this is a common entryway that often goes undetected until a failure occurs. The source of the water should be immediately identified, and corrective measures taken to permanently correct the condition	

Switchgear - Insulators, Supports, and Connectors Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect insulators and conductor supports for signs of cracking, broken pieces, and other physical damage or deterioration.	
2	Clean all loose dirt with lint free rags. For contaminates that will not remove easily, solvents approved by the manufacturer may again be used albeit sparingly.	
3	Whilst cleaning take time to examine for evidence of moisture that may lead to tracking or flashover while in operation and examine surrounding areas for signs of tracking, arcing, or overheating.	
4	Repair or replace damaged insulators and supports as necessary but only with those approved / produced by the switchgear manufacturer.	
5	Examine all bolts and connecting devices for signs of deterioration, corrosion, or overheating, ensuring that bolts and connecting devices are tight, according to manufacturer's torque setting specifications.	
6	Be careful not to over-torque bolts and connecting devices since insulators are easy to damage and difficult to replace.	
7	In the event that copper and aluminium conductors and/or connectors have been used together, examine connections for signs of galvanic action, ensuring that the connectors are properly used and installed in accordance with manufacturer's specifications. Apply an antioxidant compound to all aluminium-to copper connections.	

Switchgear - Conductor Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Examine insulation for signs of deterioration, cracking, flaking, or overheating.	
2	Examine all connections for signs of overheating, cracked or broken connectors, and signs of tracking or arcing.	
3	Ensure that conductors are clean and dry.	
4	Examine and clean all connections, and torque to manufacturer's recommendations.	
5	Visual inspections of control wiring, relays, power supply units, timers and fuse carriers.	

Switchgear – General Intrusive Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect control wiring, relays, power supply units, timers, etc. where applicable	
2	Inspect mechanical interlock control wire, and other interlock where applicable	
3	Check electronic surge protection is intact where installed	
4	Verify control circuit fuse rating and continuity.	
5	Check and torque test bolted electrical connections as necessary to specified levels	

Switchgear – ACB Chassis / General Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Rack out ACB.	
2	Clean/ vacuum internal chassis	
3	Check operation of safety shutters closing	
4	Check shutter locking devices are intact	
5	Check operation and position of contacts	

6	Operate padlocking system	
7	Grease clusters as necessary	
8	Final visual inspection to insure all clear after work completed	
9	Check general condition of the device	
10	Check ACB locking devices	
11	Open/close manually	
12	Charge the device manually	

Switchgear – ACB Insulation Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check general condition of the device	
2	Remove and clean inter-phase barriers	
3	Clean all insulating materials with vacuum and/or clean lint free rags	
4	If it is necessary to use cleaning solvents, use only solvents recommended by the manufacturer	
5	Inspect for signs of corona, tracking, arcing, or thermal or physical damage.	
6	Ensure that insulation is left clean and dry	

Switchgear – ACB Contacts Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Ensure that all contacts are clean, smooth, and in proper alignment	
2	Ensure that spring pressures are maintained according to manufacturer’s specifications	
3	Clean with diluents Henkel 273471, vacuum ACB	
4	On silver contacts, discoloration is not usually harmful unless caused by insulating deposits. Clean silver contacts with alcohol or silver cleaner using non-abrasive cloths	

5	Manually close breaker to check for proper wipe, contact pressure, contact alignment, and to ensure that all contacts make at the same time	
6	If possible, a contact resistance test should be performed to determine the quality of the contacts	
7	Older breakers equipped with carbon contactors generally require very little maintenance. But still examine for proper pressure, deterioration, or excessive dressing which may interfere with their proper operation	
8	Draw-out contacts on the circuit breaker and the stationary contacts in the cubicle should be cleaned and inspected for overheating, alignment, and broken or weak springs	
9	Coat contact surfaces with contact lubricant to ease mating	

Switchgear – ACB Arc Interrupters Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean all ceramic materials of loose dirt and examine for signs of moisture, making sure the assemblies are clean and dry	
2	Examine for cracked or broken pieces	
3	Dirt and arcing deposits may be removed by light sanding — do not use emery cloth or wire brushes which may leave conductive residue behind	
4	Repair or replace as necessary Examine arc chutes for dirt and/or dust accumulations and clean as necessary	
5	Dielectric testing of arc shields may be recommended by the manufacturer and if so shall be undertaken	
6	Check air puffer for proper operation	

Switchgear – ACB Operating Mechanism Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect for loose, broken, worn, or missing parts (consult manufacturer’s schematics for required parts)	
2	Examine for excessive wear of moving parts	
3	Observe that operating mechanisms function properly without binding, hanging, or without delayed action	
4	Ensure any lubrication is in accordance with the manufacturer’s specifications	
5	Ensure mechanisms are clean, properly lubricated, and all bolts and screws are properly secured	

6	Repair or replace as necessary	

Switchgear – ACB Auxiliary Devices Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect operating devices for proper operation and general condition	
2	Check auxiliary wiring insulation	
3	Ensure all indicating devices are fully functional and properly set	
4	Protective relays and circuit breaker trip devices should be inspected and tested according to manufacturers' specifications and applicable industry standards such as those issued by the Institution of Engineering and Technology (IET)	
5	Secondary injection with FFT Kit, produce trip curve report	
6	Check earth fault protection/earth leakage protection	

Switchgear – Moulded Case Circuit Breakers Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Moulded Case Circuit Breakers (MCCB's) should be kept clean for proper ventilation of the breakers	
2	These types of breakers are usually tripped by a thermal element that senses an increase in temperature due to excessive current draw	
3	If dirt accumulates on the surrounding of the breaker, the heat build-up may not be permitted to dissipate properly and result in nuisance tripping. All moulded case circuit breaker panels should therefore be cleaned of all dirt, dust, and debris using a vacuum	
4	Clean the breaker housing and inspect it for cracks or signs of overheating	
5	Visual inspection all Power bar runs	
6	Check supports, Check and torque bolts and nuts	
7	Check alignment, straight runs, joint packs and directional change pieces	
8	Check panel flanges, earth continuity etc.	
9	Thermal image survey of complete runs	
10	Tighten all connections.	

11	Exercise the breaker several times to ensure the mechanism has freedom of movement and to allow contact wiping	
12	Larger duty circuit breakers (225 amps or above) should be electrically trip tested to ensure proper operation of the trip elements and trip linkages	
13	If possible, test contact resistance to ensure quality of breaker contacts	
14	Check motor operator	
15	Check under voltage release	
16	Check power supply unit	
17	Check control relays	
18	Check fuse and fuse holders if present	
19	Whilst not fully applicable under UK regulations, the latest edition of the National Electrical Manufacturer's Association (NEMA) Standard AB4, Procedures for Verifying Field Inspections and Performance Verification of Moulded-Case Circuit Breakers is a very good reference document for MCCB PPM	

Switchgear – Meters Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check voltage connections	
2	Check CT connections	
3	Check Modbus connections	
4	Check range of functions	
5	Verify load on each phase using instantaneous clamp meter test	

Switchgear – PDU Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean thoroughly exterior and interior PDU switchboards	
2	Check function of all power meters	
3	Verify control circuit fuse rating and continuity	

4	Check function of lamps and indicators	
5	Check and torque test bolted electrical connections as necessary to specified levels	
6	Check all cable connections for tightness and torque terminals	
7	Visual inspection for signs of overheating or deterioration	
8	Inspection of all panels for paint work damage and signs of corrosion	
9	Inspection to insure all clear after work completed before fitting covers	

Switchgear – Battery Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Thoroughly clean all battery surfaces of dust and/or dirt accumulations.	
2	Clean and tighten all terminal connections	
3	Remove any corrosion on battery terminals with bicarbonate of soda	
4	Clean battery studs and cable ends	
5	On stranded cable, if ends are corroded, cut off ends or separate strands and clean internally	
6	Check electrolyte levels and specific gravity. Variations of more than fifty (50) points between cells may indicate a bad cell	

Switchgear – Charger Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean all dust and/or dirt accumulations from charger	
2	Clean all vent openings and ensure that they are free from obstructions	
3	Check terminals and connections for tightness	
4	Check all relays, lights, and other indicating devices for proper operation	
5	If all cells consistently read low, check charger for proper operation	
6	If electrolyte levels are low, check charger rate settings against the manufacturer’s specifications	

7	Consistently low levels may indicate the charge rate is too fast	

Switchgear – Battery General Safety Inspection		
Item	**Works / Test Description**	**Tick when done**
1	While charging, batteries emit explosive gases	
2	Allow no open flames or sparks near charging batteries	
3	Battery rooms should be well ventilated, and smoking should not be permitted	

In regards H-Block switch panel, the works are much more involved than purely the maintenance activities described above as the existing control system is currently causing serious issues when the systems are changing over between LV and generator supplies. The existing system comprises a combination of electrical and mechanical control elements with a wall mounted Weirgrove electrical control panel and mechanical wires internally within the panel linking the LV Mains ACB, Generator ACB and Bus-Coupler.

The electrical control system is quite a complex arrangement though as the existing switchpanel installed by Austin Turner was provided with a practical Deep Sea 530 control module linking the ACB's. At some point since installation though, the DSE 530 apparently created some changeover control issues and a previous Trust manager took the decision to disable the unit rather than repair the problem and replace it with a new, overly complex Weirgrove panel complete with a Siemens Simatic display screen and even a Synchroscope, although this latter unit does not appear to be functional.

This replacement 'AMCO' control panel generally links in to the three ACB control terminals but unfortunately no detailed or updated record drawings are available as the contractor who undertook that element did not provide any record information. During the survey however, we were able to locate 3no hand annotated drawings with some various alterations and terminal markings that appear to tie up, albeit partially, with the installed systems. As part of the works the successful contractor will need to trace and prove all control wiring to enable the looms to be migrated over to the new systems.

In addition to the electrical control panel, the ACB's are also controlled through a mechanical pre-tensioned wire system which is configured to push or pull various levers connected to the ACB chassis mechanism causing the device to open or close accordingly.

The operation of the two systems is believed to be along the lines of:

1. The LV mains ACB notices a supply failure and signals through the Weirgrove panel to start the generator
2. Once the generator is up to speed it signals back through the panel causing the generator ACB to close
3. This operation causes the mechanical link to open the LV mains ACB
4. At the same time a second mechanical link from the generator ACB causes the bus-coupler to open
5. Once mains is available the operation is in reverse but this time it requires manual intervention from a member of the Trust to turn a button fully counter clockwise and hold until the breaker opens at which point the ACB's sequentially switch back to their mains healthy state.

Not only is the system far too complicated for the panel arrangement but the mechanical interlinks are causing significant operational issues whereby they regularly stick in position during routine generator testing and despite the mains being in a failed state and the generator online and up to the ACB incomer, the system fails to changeover. The cause of these issues is believed to be the mechanical control wires being at an incorrect tension or becoming seized due to lack of use or routine maintenance.

The proposal is therefore to replace the complicated Weirgrove control panel and unreliable wire links with a new electronic control system such as a Deep Sea 335 or similar unit which will be configured to open and close the various ACB's as necessary. The final design and configuration of this element will sit with the contractor as a Contractor Design Portion (CDP) element as it will be necessary to trace and prove all wiring throughout the systems.

As there is a high degree of uncertainty and risk around the system disconnection and replacement, it will be essential for the contractor to provide a temporary back-up system to support all of the connected loads. To achieve this, the contractor will arrange for a new temporary distribution panel, two new 500KVA mobile generators complete with day tank and remote fuel monitoring to be hired in, delivered to site and positioned in the Chapel generator area and configured as indicated on the tender drawings and let in a manual start mode ready to assume the full load of any identified loads be supported.

A set of temporary feed cables will then be installed from this mobile generator arrangement up to a temporary external switch panel arrangement located between H-block and Substation 2 from which

multiple load cables will be routed through in to H-block LV switch room and connected in to the switch panel in the outline method indicated below.

Outline installation steps - **potential for an extended period of vulnerability to <u>each</u> load**

a. The works will start with the least impactful of all the loads to be supported
b. At an agreed time for each identified load to be supported, the existing load shall be switched off, the door opened, and the fuse carrier removed from the panel.
c. Once removed, the fuses shall be disconnected from the carrier and set aside for reuse when the works have been completed
d. One of the temporary load cables from the external switch panel will then be connected on to the load side of fuse carrier which will then be reinserted into the panel
e. A temporary Perspex screen will then be fitted over the door opening allowing the cables to pass out freely but enabling the safety interlock to latch
f. Once all connections have been made on to the identified loads, the main LV and generator ACB's will be switched off, opened and locked off to isolate the panel fully.
g. The temporary generators will be started and the contractor will ensure the supply is present up to the external temporary switch panel. All load devices in the temporary panel will remain switched off at this point
h. The handle on the most important load will then be operated and the fuse carrier closed on to the panel bars and checked to ensure it is functionally sound
i. The output device on mobile generator connection panel will then be switched on and the load tested to ensure it is fully operational and all systems are back online.
j. All loads will then be connected and switched on in the same manner until all systems are fully operational and running on the mobile generator system

Once all existing loads have been migrated over to the temporary arrangement, the LV main ACB, generator ACB and bus-coupler ACB shall be racked out fully so that the existing systems are fully isolated and the panel can be confirmed dead. The control cable linking systems shall then be completely removed from within the panel and all control modifications undertaken.

At the end of the works and the new control systems have been installed, the main ACB's shall racked back in to enable the systems to be robustly tested offline to ensure they operate correctly and simulate mains failures to ensure the ACB's open and close in sequence.

Once the robust testing has been completed, each of the supported loads will be isolated and disconnected from the temporary arrangement. The fuses will then be refitted into the carrier and the system connected back into an operational state in the panel

After all systems have been reinstated, the panel shall be switched back on and all loads tested to ensure they are fully re-supported by the main systems. It is also strongly recommended that the panel is then tested several times to ensure the systems change over and perform correctly so that each time the mains fails and the generator starts the LV ACB and bus-coupler open and the generator ACB closes to restore the panel and all connected loads.

We would suggest this is approximately 1-weeks' worth of work but some elements such as surveying the switchgear to be supported, capturing all of the systems to be transferred, completing the design of the temporary systems, preparing working drawings and then arranging for delivery to site and positioning of systems in an agreed position can all be done in advance. Additionally, arranging all of the paperwork and draughting permits can also be done in advance to reduce this time where possible. This shall then be followed by all necessary isolations and migrations, but the successful contractor must confirm full timescales at tender return though

The Contractor's programme for carrying out the above works shall be agreed with the Contract Administrator in liaison with the Client. The Contractor shall make allowance for working and co-ordination with other trades and working within an occupied building and on live switch panels.

It should be noted that there will be a requirement to work out of hours and NO shutdowns of critical areas, i.e. Critical Care will be permitted, unless by prior arrangement. All works must be completed with zero impact to the Trust unless meticulously planned.

1.5.2 THE PLANS

Modifications can be made but proposal showing any variation to the methodology must be submitted at tender return.

1.5.3 PROGRAMME

A fully detailed program shall be presented with the tender that indicates the time from date of order to completion. A guidance programme of anticipated key deliverables and time frames has been included within this specification.

A fully detailed program shall be presented with the tender that indicates the time from date of order to completion.

1.5.4 BUILDING REGULATIONS

Where necessary it is the contractor's responsibility to obtain current Building Regulation consent (all fees paid by main contractor).

Works must comply with the NHS Estates Health Technical Memorandums.

Health Technical Memorandum 06-01 - Electrical services supply and distribution
Health Technical Memorandum 06-02 - Electrical safety guidance for low voltage systems

The above recommendations are without prejudice to any requirements which may be required by the local building regulation authority or Local London Fire & Rescue Services.

Planning – The employer will be applying for Full Planning Approval if necessary, under 'Designated Powers'.

1.5.5 WORKING ARRANGEMENTS

The contractor will be entirely responsible for the accurate and efficient installation and performance of the works and such responsibility cannot be transferred in whole or in part to any other party.

The Contractor will be deemed to have examined the site of the work, Form of contract, Specification and General Conditions, with such schedules, drawings, plans and related documents as are annexed thereto or referred to therein.

If all information required cannot be obtained from this examination, application for information shall be made to the Contract Administrator prior to submission of the tender.

Claims made by the Contractor arising from any lack of knowledge in this respect will not be considered.

THE CONTRACT Section 2.00

2. THE CONTRACT

2.1 DB 2016 Design and Build Contract (DB) 2016

The contractor's attention is drawn to JCT guidance issued in 2012 for implementation of DB 2016

The contractor's attention to the Public Contract Regulations 2015 is essential

2.2 SUB - CONTRACTS

Ensure that all sub-contractors, suppliers and others responsible to the Contractor or who may affect or be affected by the works are fully aware of the contract conditions and any amendments thereto.

2.3 DOMESTIC SUB-CONTRACTOR APPOINTMENTS

Domestic Sub-contractors will be subject to appointment in accordance with section 3 clause 3.3 of the Main Contract Conditions.

THE CONDITIONS:

Section 1 Definitions and Interpretation

1.1 **Definitions**

Interpretation

1.2 Reference to clauses
1.3 Agreement etc. to be read as a whole
1.4 Headings, references to persons, legislation etc.
1.5 Reckoning periods of days
1.6 Contracts (Rights of Third Parties) Act 1999
1.7 Notices and Other Communications
1.8 Effect of Final Statement
1.9 Effect of Payments other than payment of Final Statement
1.10 Consents and Approvals
1.11 Applicable Law

Section 2 Carrying out the Works

Contractor's obligations

2.1 General obligations
2.2 Materials, goods and workmanship

Possession

2.3 Date of Possession - Progress
2.4 Deferment of Possession
2.5 Early use by Employer
2.6 Work not forming part of the Contract

Supply of Documents, Setting Out etc.

2.7 Contract Documents
2.8 Construction information
2.9 Site Boundaries

Discrepancies and Divergences

EMPLOYERS REQUIREMENTS Section 3.00

3.00 EMPLOYER'S REQUIREMENTS

(This section gives the Employer's requirements for all works carried out on the NPH site, therefore contractors should be mindful that there may be clauses below which are not applicable to the Job in hand, if in doubt concerns to be raise and brought to the attention of the NPH Project Manager).

3.1 TENDERING/SUBLETTING/SUPPLY

MAIN CONTRACT TENDERING

3.1.1 SCOPE

These conditions are supplementary to those stated in the invitation to tender and the Form of Tender.

3.1.2 TENDERING PROCEDURE

Will be in accordance with the principles of the 'Code of Procedure for Single Tendering' 1996

3.1.3 ACCEPTANCE OF TENDER

The Employer and his representatives:

- Offer no guarantee that the lowest or any tender will be recommended for acceptance or accepted.
- Will not be responsible for any cost incurred in the preparation of any tender

3.1.4 PERIOD OF VALIDITY

Tenders must remain open for consideration (unless previously withdrawn) for not less than period of 3 calendar month/s from date fixed for the submission or lodgment of tenders.

PRICING /SUBMISSION OF DOCUMENTS

3.1.5 PRELIMINARIES IN THE SPECIFICATION

The Preliminaries /General Conditions sections (1.10-5.60 inclusive) must not be relied on as complying with SMM7.

3.1.6 SPECIFICATION WITHOUT QUANTITIES

Where and to the extent that quantities are not included in the specification, tenders must include for all work shown or described in the tender documents as a whole or clearly apparent as being necessary for the complete and proper execution of the works.

3.1.7 PRICING OF SPECIFICATION

Alterations and qualifications to the specification must not be made without consent of the CA. Tenders containing unauthorised alterations or qualifications may be rejected. Costs relating to items in the specification, which are not priced will be deemed to have been included elsewhere in the tender.

3.1.8 THE CONTRACT SUM ANALYSIS

Must be submitted with the tender.

3.1.9 ERRORS IN THE PRICED SPECIFICATION/CONTRACT SUM ANALYSIS

Will be dealt with in accordance with the Code of Procedure for single stage selective tendering 1996 alternative 1 (the word 'specification ' or the words 'contract sum analysis ' being substituted for 'bills of

quantities')

3.1.10 TENDER SUBMISSION

The tender submission shall comprise:

- **Form of Tender**
- **Tender Certificate**
- **Tender Summary**
- **Building Works Tender Summary**
- **Preliminaries and provisional sums**
- **Electrical Services Tender Summary**
- **Mechanical Services Tender Summary**
- **Detailed Construction Programme**

3.1.11 PROGRAMME

The contractors proposed programme as specified in section 1.53 showing the sequence and timing of the principal parts of the works, periods for (planning and design and itemising any work which is excluded must be submitted with the tender).

3.1.12 SUBLETTING

Without the written consent of the Contract Administrator, the Contractor shall not assign this contract.

3.1.13 TENDER AWARD PROCESS

As part of the tender award process, the Trust will shortlist several contractors and ask them to attend a tender interview. At said interview, a 1-hour time slot will be provided where the contractor will be expected to give a formal presentation on their company, its structure, support network and capabilities. The presentation should then extend to how they will undertake the works and assure the Trust of 'business as usual' at all times and adhere to the Trusts safe systems of work which will be enforced at all times.

The interview timeline will be:

No	Item	Time Limit
1	Introductions & Client Overview	5 mins
2	Contractor Presentation	15 mins
3	Q&A Session	30 mins
4	Client Summary & Close-out	10 mins

Following on from the contractor's presentation, the Trust interviewing panel will then pose a number of scripted but not pre-advised technical, practical or managerial type questions to the contractor and will score their responses accordingly.

The scoring matrix that will be used in this instance will be

Score	Description
0	No confidence in supplier's ability to provide service
1	Lower confidence in supplier's ability to provide service
2	Confident that supplier will be able to provide service, but with some minor reservations.
3	Full confidence in supplier's ability to provide service – supplier knowledgeable and able to fully reply to questions.
4	Exceptional Response – Exceeds requirements, providing additional benefit/value/ experienced above that specified

The scores from the tender interview will then be aggregated with the price and quality scores from the initial tender return and used as a mechanism to support any award decision the Trust decides to make.

3.2 PROVISION, CONTENT AND USE OF DOCUMENTS

DEFINITIONS AND INTERPRETATIONS

3.2.1

CA means the person nominated in the Contract as the Contract Administrator or his authorised representative.

3.2.2 IN WRITING

When required to advise, notify, inform, instruct, agree, confirm, obtain information, obtain acceptance or obtain instructions do so in writing.

3.2.3 ACCEPTANCE

(and words derived there from) means the acceptance in writing of the CA unless specified otherwise.

3.2.4 A PRODUCT

Means materials (including naturally occurring material and goods (including components, equipment and accessories) intended for permanent incorporation in the works.

3.2.5 EQUIVALENT PRODUCTS

Where the specification permits substitution of a product of different manufacture to that specified and such substitution is desired, before ordering the product notify the employer and when requested, submit for verification documentary evidence that the alternative product is equivalent in respect of material, safety, reliability, function, compatibility with adjacent construction, availability of compatibly accessories and, where relevant, appearance. Submit certified English translations of any foreign language documents.

Any proposal for use of an alternative product must also include proposals for substitution of compatible accessory products and variation of details as necessary, with evidence of equivalent durability, function and appearance of the construction as a while. If such substitution is sanctioned, and before ordering products, provide revised drawings, specification and manufacturer's guarantees as required by the CA.

3.2.6 EQUIVALENT PRODUCTS

Whenever products are specified by proprietary name and the phrase 'or equivalent 'is not included, it is deemed included.

3.2.7 BRITISH STANDARD PRODUCTS

Where any product is specified to comply with a British Standard for which there is no equivalent European Standard it may be substituted by a product complying with a grade or category within a national standard of another Member State of the European Community or an International standard recognised in the UK specifying equivalent requirements and assurances in respect of material, safety, reliability, functioning compatibility with adjacent construction, availability of accessories and where relevant, appearance. In advance of ordering notify the CA of all suck substitutions and, when requested, submit for verification documentary evidence confirming that the products comply with the specified requirements.

3.2.8 REFERENCES TO BSI DOCUMENTS

Are to the versions and amendments listed in the British Standards Catalogue and in subsequent issues of BSI Update - Standards up to and including that for one month before the date of the submission of tenders.

3.2.9 FIX ONLY

Means all labour in unloading, handling, storing and fixing in position, including use of all plant.

3.2.1 SUPPLY AND FIX

Unless stated otherwise all items given in the schedule of work and/or on the drawings are to be supplied and fixed complete.

DOCUMENTS PROVIDED ON BEHALF OF THE EMPLOYER

3.2.11 ADDITIONAL COPIES OF DRAWINGS

All information will be issued in electronic format (PDF). Contractors are to copy/print all information.

3.2.12 ADDITIONAL COPIES OF EMPLOYERS REQUIREMENTS

Not used.

3.2.13 TENDER DRAWINGS

Show schematic layout only, any significant variations to these drawings must be included in the tender return. It is the responsibility of the Contractor to complete the design, make due allowance for all materials necessary to complete the work and to achieve a full co-ordination of all services and equipment.

The Contractor will receive electronic copies of the drawings and specifications and shall ensure his site staff have two paper copies of all drawings and two copies of the specification and subsequent revision thereto. Additional electronic copies of the drawings and specification can be obtained as necessary.

The Drawings accompanying the documents show the general arrangement and extent of the Works but may not cover every detail and are generally diagrammatic in content.

Notwithstanding the provision of the drawings the Contractor shall be held responsible for the work embodied therein and shall take his own particulars and dimensions from site and provide at his own expense all necessary working drawings, copies of which shall be submitted to the Contract Administrator for comments before the work is executed.

3.2.14 DIMENSIONS

The accuracy of dimensions scaled from the drawings is not guaranteed. Obtain from the employer any dimensions required but not given in figures on the drawings nor calculable from figures on the drawings.

DOCUMENTS PROVIDED BY CONTRACTOR / SUB-CONTRACTORS

3.2.15 CONTRACTORS DESIGN: DESIGN AND PRODUCTION INFORMATION

When preparing the master programme make reasonable allowance for completing design / production information, including submission to the Planning Supervisor for comment, inspection by the CA, and any subsequent amendment(s), resubmission(s) and re-inspection(s).

During the Contract submit to the employer the required number of copies of design / production information. The employer will note his comments on one copy, then return to the contractor.

Ensure that any necessary amendments are made with no delay. Unless and until the employer confirm that resubmission is not required submit copies of amended drawings etc. to employer, and ensure incorporation of necessary amendments all as before.

If submitted design / production information differs from the Employers Requirements, each such

difference must be the subject of a request for substitution or Change, supported by all relevant information.

Should any amendment required by the Employer be considered to involve a Change which has not already been acknowledged as a Change by the Employer, notify the Employer without delay and in any case within 7 days, and do not proceed with ordering, fabrication, erection or installation until subsequently instructed. Claims for the extra cost of such work, if made after if has been carried out, may not be allowed.

Complete final version of all design / production information and submit to the Employer the number of copies required by him.

3.2.16 PRODUCTION INFORMATION for the Contractor's designed work must include:

The design / production information shall be submitted within 2 working weeks of the date of acceptance of the tender by, or on behalf of, the Employer.

Drawings shall be to scale 1:50 for departmental plans.

3.2.17 PRODUCTION DRAWINGS

Prepare production drawings of the Contractors proposal including Building work, Mechanical and Electrical services.

For services engineering information, submit two copies to the Employer and two further copies to the Mechanical and Electrical Engineer. Allow, from receipt from the Employer / Engineer, 5 working days for their inspection / comments of the first issue of each item of information and 5 working days for subsequent resubmissions.

For substructure information, submit two copies to the Employer and two further copies to the Structural Engineer. Allow, from receipt from the Employer / Engineer, 5 working days for their inspection / comments of the first issue of each item of information and 5 working days for subsequent resubmissions.

For superstructure information, submit two copies of such information to the Employer. Allow, from receipt by the Employer, 5 working days for his inspection / comments.

The employers agent inspection will not relieve the Contractor of his responsibility to check dimensions and quantities, nor, the Contractor's / Sub-Contractor's design responsibility where such design is specified in, or by performance requirements is derived from, this Specification.

Where plant and equipment is to be installed inside or close to existing buildings or structures, the Contractor shall take his own dimensions of the buildings or structures for the purpose of installing any plant and materials to be supplied and fixed under this Contract and shall be responsible for the accuracy of such dimensions.

In the preparation of installation / production drawings and in the erection of the Contract Works, the Contractor shall ensure that adequate provision is made for access to, operation and maintenance of the various valves, dampers, components, plant and equipment.

Provision shall be made so that apparatus that needs regular removal for maintenance may be removed with the minimum of disconnections and without interference to other adjacent installations.

In each case where the Contractor considers that available access may be inadequate, it shall be referred to the Contract Administrator.

Should any portion of the Works which reasonably and obviously would be inferred as necessary for complete, safe and satisfactory operation of the Works as a whole, be not specified or expressly described in the Specification and/or drawings the Contractor not withstanding such omission shall provide and execute such work as part of the contract and shall not be entitled to any extra payment on that account.

The Contractor shall prior to ordering submit to the Contract Administrator drawings showing the construction details and dimensions of all plant, equipment and machinery included in the Works.

The Contractor shall submit Drawings of control panels and specially prepared comprehensive wiring diagrams of all internal and external wiring required for permanent power and control circuits associated with the plant and equipment included in the Works. Manufacturers' standard leaflets applying to typical installation or to individual components will not be accepted as supplementary information.

3.2.18 AS BUILT DRAWINGS

Shall be maintained on site as a fully detailed record of all changes from the Production drawings. These shall be kept available at all times for inspection by the Employer.

3.2.19 AS BUILT DRAWINGS AND INFORMATION

Must be provided to the Employer not less than 2 weeks before the date for Completion as follows.

3.2.20 MAINTENANCE INSTRUCTIONS AND GUARANTEES

Retain copies delivered with components and equipment (failing which, obtain), register with manufacturer as necessary and hand over to Employer on or before Practical Completion. Notify Employer of telephone numbers for emergency services by Subcontractors after Practical Completion.

3.3 MANAGEMENT OF THE WORKS

GENERALLY

3.3.1 BUILDING REGULATIONS: Submit for and obtain Full Building Regulations approval.

3.3.2 SUPERVISION

Accept responsibility for co-ordination, supervision and administration of the Works, including all subcontracts. Arrange and monitor a programme with each subcontractor, supplier, local authority and statutory undertaker, and obtain and supply information as necessary for co-ordination of the work.

3.3.3 INSURANCES

Before starting work on site submit documentary evidence and/or policies and receipts for the insurances required by the Conditions of Contract.

3.3.4 CLIMATIC CONDITIONS

Keep an accurate record of:
- Daily maximum and minimum air temperatures.
- Delays due to adverse weather, including description of the weather, types(s) of work affected and number of hours lost.

3.3.5 OWNERSHIP

Materials arising from the alteration work are to become the property of the Contractor except where otherwise stated. Remove from site as work proceeds.

3.3.6 HARDCORE

Brick rubble or other hard materials arising from the work may not be reused as hardcore.

3.3.7 EMERGENCY CONTACTS

When required by the Employer provide him with details of two alternative emergency 'out of hours' telephone numbers for the Principal, Mechanical, Electrical contractors and such other contractors specified by the Employer.

3.3.8 PROGRAMME

As soon as possible and before starting work on site prepare in an approved format a master programme for the works, which must make allowance for all:

* Design and production information provided by the Contractor / Sub-Contractors / Suppliers, including inspection and checking.
* Planning and mobilisation by the Contractor
* Running in, adjustment, commissioning, testing and validation of all engineering services and installations.
* Work resulting from instructions issued in regard to the expenditure of provisional sums.
* Work by or on behalf of the employer

The nature of the scope of which, the relationship with preceding and following work and any relevant limitations are suitably defined in the contract documents.

Where and to the extent that the programme implications for work which is not so defined are impossible to assess the Contractor should exclude it from his programme and confirm this when submitting the programme.

* Submit 4 copies to Employer.

3.3.9 MONITORING

Record progress on a copy of the programme kept on site. If any circumstances arise which may affect the progress of the Works put forward proposals or take other action as appropriate to minimise any delay and to recover any lost time.

3.3.10 PROJECT MEETING

Prior to the commencement of the works the Employer will call a meeting to review the project. The Employer will chair, take and distribute minutes.

3.3.11 CONTRACTORS SITE MEETINGS

The contractor shall hold regular site meetings to review progress and other matters arising from the administration of the Contract. Meetings will be held at least bi monthly.

Invite Employer to each meeting.

The Trust will ensure the availability of accommodation at the time of such meetings.

Attend all meetings and inform subcontractors and suppliers when their presence is required.

The Contractor shall chair the meetings and take and distribute minutes.

3.3.12 NOTICE OF COMPLETION

3.3.14 EXTENSIONS OF TIME

When a notice of the cause of any delay or likely delay in the progress of the Works is given, written notice must also be given of all other causes which apply concurrently. The Contractor shall, as soon as possible, submit to the Employer:

Relevant particulars of the expected effects if appropriate related to the concurrent causes.

An estimate of the extent, if any, of the expected delay in the completion of the Works beyond the Date for Completion, and all other relevant information required by the Employer.

CONTROL OF COST

3.3.15 EXISTING WORK

The extent and location of renewal of existing work must be agreed, at least on a provisional basis, with the Employer before the work is started. Remove existing work in ways to reasonably minimise the amount of removal and renewal.

3.3.16 EMPLOYER INSTRUCTIONS

If requested by the Employer prepare costs of issued instructions within 10 days.

3.3.17 PROPOSED INSTRUCTIONS

If the Employer issues details of a proposed instruction with a request for an estimate of cost, submit such an estimate without delay and in any case within 7 days. The estimate must include:

A detailed breakdown of the cost including any allowance for direct loss and expense.
Details of any additional resources, which may be required.
Details of any adjustments, which may have to be made to the programme for the works.
Any other information as is reasonably necessary for the Employer to fully assess the implications of issuing such an instruction.

Inform the Employer immediately if it is not possible to comply with any of the above requirements.

3.3.18 BUILDERS WORK IN ASSOCIATION WITH ENGINEERING WORKS

The Contractor shall take full responsibility for all associated builders work for all trades. The Contractor shall be held responsible for the accuracy of all builder's work details.

All builders work in respect of the installation of engineering services will be carried out by the Contractor.

All bases, holes through structures, positions for brackets, chases etc., shall be detailed by the Contractor either on drawings, submitted in accordance with dates agreed with the Contractor, or by marking out on site in advance by the Contractor. Where the formation of holes, cutting away, etc., might adversely affect the building structure, drawings detailing those requirements shall be prepared by the Contractor and submitted to the Contract Administrator for Comment.

The Contractor shall plug all structures for his fittings and shall provide all necessary fixing devices.

The Contractor shall proceed in sufficient time to avoid delays to the Contract, provide sufficiently detailed drawings or templates for all items requiring foundation bolts or other fixtures and for all plant required to be built into or otherwise affecting the structure.

The Contractor shall ensure that foundation levels for plant, bedding and grouting of plant on foundations and bases, and grouting in of other fixings are adequately and properly performed.

The Contractor will excavate backfill and reinstate all trenches including the installation of service marker posts.

The Contractor will supply and lay any sand or other building materials necessary for initial coverage of buried services.

3.4 QUALITY STANDARDS / CONTROL

MATERIALS AND WORK GENERALLY

3.4.1 GOOD PRACTICE

Where and to the extent that materials, products and workmanship are not fully detailed or specified they are to be:

Of a standard appropriate to the Works and suitable for the functions stated in or reasonably to be inferred from the project documents, and

In accordance with good building and services installation practice.

3.4.2 GENERAL QUALITY OF PRODUCTS / MATERIALS

Products to be new unless otherwise specified.

For products specified to a British or European Standard obtain certificates of compliance from manufacturers when requested by Employer.

When a choice of manufacturer or source of supply is allowed for any particular product or material, the whole quantity required to complete the work must be of the same type, manufacture and/or source unless otherwise approved. Produce written evidence of sources of supply when requested by Employer.

Ensure that the whole quantity of each product and material required to complete the work be of consistent kind, sized, quality and overall appearance.

Where consistency of appearance is desirable ensure consistency of supply from the same source. Unless otherwise approved do not use different colour batches where they can be seen together.

If products are prone to deterioration or have a limited shelf life, order in suitable quantities to a programme and use in appropriate sequence.

3.4.3 PROPRIETARY PRODUCTS

Handle, store, prepare and use or fix each product in accordance with its manufacturers current printed or written recommendations/instructions. Inform Employer if these conflict with any other specified requirement. Submit copies to Employer when requested.

The tender will be deemed to be based on the products as specified and recommendations as described in the manufacturers' literature current at one month before tender return date.

Obtain confirmation from manufacturers that the products specified and recommendations on their use have not been changed since that time. Where such change has occurred inform Employer and do not place orders for or use the affected products without further instructions.
Where British Board of Agreement certified products are used, comply with the limitations, recommendations and requirements of the relevant valid certificates.

3.4.4 PROTECTION OF PRODUCTS

Prevent over-stressing, distortion and any other type of physical damage.
Keep clean and free from contamination, prevent staining, chipping, scratching or other disfigurement, particularly of products exposed to view I the finished work.
Keep dry and a suitably low humidity atmosphere to prevent premature setting, moisture movement and similar defects. Where appropriate store off the ground and allow free air movement around and between stored products.
Prevent excessively high or low temperatures and rapid changes of temperature of the products.
Protect adequately from rain, damp, frost, sun and other elements as appropriate. Ensure that products are

at a suitable temperature and moisture content at time of use.
Ensure that sheds and covers are of ample size, in good weatherproof condition and well secured.
Keep different types and grades of products separately and adequately identified.
So far as possible keep products in their original wrappings, packing or containers, until immediately before they are used.
Wherever possible retain protective wrappings after fixing and until shortly before Practical Completion.
Ensure that protective measures are fully compatible with and not prejudicial to the products / materials.

3.4.5 SUITABILITY OF PREVIOUS WORK AND CONDITIONS

Before starting each new type or section of work, ensure that:

Previous, related work is appropriately complete, in accordance with the project documents, to a suitable standard and in suitable condition to receive the new work.

All necessary preparatory work has been carried out, including provision for services, damp proofing, priming and sealing.

The environmental conditions are suitable, particularly that the building is suitably weather-tight when internal components, services and finishes are installed.

3.4.6 GENERAL QUALITY OF WORKMANSHIP

Operatives to hold a construction skills certificate scheme (CSCS card)must be appropriately skilled and experienced for the type and quality of work.

Take all necessary precautions to prevent damage to the work from frost, rain and other hazards.

Inspect components/materials carefully before fixing or using and reject any, which are defective.

Fix or lay securely, accurately and in alignment.

Where not specified otherwise, select fixing and jointing methods and types, sizes and spacing of fastenings in compliance with section Z20, fastenings to comply with relevant British Standard.

Provide suitable, tight packing at screwed and bolted fixings to take up tolerances and prevent distortion. Do not over tighten fixings.

Adjust location and fixing of components so that joints, which are to be finished with mortar or sealant or otherwise left open to view are even and regular. Ensure that all moving parts operate properly and freely.

Do not cut, grind or plane pre-finished components to remedy binding or poor fit without approval.

3.4.7 BS 8000: BASIC WORKMANSHIP

Where compliance with BS 8000 is specified, this is only to the extent that the recommendations therein define the quality of the finished work.

Where BS 8000 gives recommendations on particular working methods or other matters which are properly within the province and responsibility of the Contractor, compliance therewith will be deemed to be a matter of general industry good practice and not a specific requirement of the Employer under the Contract.

If there is any conflict of discrepancy between the recommendations of BS 8000 on the one hand and the project documents on the other, the latter will prevail.

ACCURACY / SETTING OUT GENERALLY

3.4.8 SETTING OUT

Check levels and dimensions of the site against those shown on the drawings and record the results on a copy of the drawings. Notify the Employer in writing of any discrepancies and obtain instructions before proceeding.

3.4.9 APPEARANCE AND FIT

Arrange the setting out, erection, juxtaposition of components and applications of finishes (working within the practical limits of the design and the specification) to ensure that there is satisfactory fit at junctions, that there are no practically or visually unacceptable changes in plane, line or level and that the finished work has a true and regular appearance.

Wherever satisfactory accuracy, fit and/or appearance of the work are likely to be critical or difficult to achieve obtain approval of proposals or of the appearance of the relevant aspects of the partially finished work as early as possible.

Without prejudice to the above and unless specified otherwise, tolerances will (where applicable) be not greater than those given in BS5606, Tables 1 and 2.

SERVICES GENERALLY

3.4.10 SERVICE RUNS

Make adequate provision for services, including unobstructed routes and fixings. Wherever possible ducts chases and holes are to be formed during construction rather than cut.

3.4.11 MECHANICAL AND ELECTRICAL SERVICES

Must have final tests and commissioning carried out so that they are in full working order at practical completion.

3.4.12 TESTING GENERALLY

Testing is the process of inspection, which is necessary to determine whether plant, equipment and installations meet the specified requirements.

3.4.13 TESTING MATERIALS ETC

The contractor shall provide such labour, materials, stores, apparatus and instruments as may be required for the tests.

3.4.14 TEST RESULTS

On completion of the testing, one copy of the results shall be supplied to the Employer, duly signed on behalf of the contractor and authorised by the Employer or his site representative. It is the responsibility of the contractor to bring to the specific attention of the Employer any failure in his attempts to meet the test requirements.

Where failure is demonstrably due to a fault in the installation attributable to the contractor or his workmen the whole of the cost of the correction of such work including all water, fuel and electricity used shall be borne by the contractor

PRACTICAL COMPLETION

3.4.15 COMMISSIONING GENERALLY

Commissioning is the advancement of engineering plant, equipment and installations from the stage of static completion to full working order to specified requirements and includes the setting-to-work and

performance testing of all plant, equipment and installations and the documentation of results.

Commissioning will include the energising of electrical installations, setting plant and equipment into motion, verifying the operation of controls, safety devises and alarms; the regulating of flow quantities and the setting of controls within limits specified in the specification.

3.4.16 COMMISSIONING MATERIALS

The contractor shall provide all labour, materials, instruments all other items necessary for commissioning.

The contractor shall provide evidence of the state of calibration of the instruments he proposes to use and when requested to do so, shall verify their accuracy to the satisfaction of the Employer.

The type of instruments used and their application shall also be subject to the Employer's approval.

3.4.17 VALIDATION

Once the testing and commissioning described above and in volumes 2 and 3 has been completed and agreed by the Employer/ Engineer, demonstrate compliance to the requirements to the Employer's validation officer.

SUPERVISION/INSPECTION/DEFECTIVE WORK

3.4.18 SUPERVISION

In addition to the constant management and supervision of the works provided by the Contractor's person in charge, all significant types of work must be under close control of competent trade supervisors to ensure maintenance of satisfactory quality and progress.

3.4.19 ACCESS FOR EMPLOYER

Provide at all reasonable times access to the Works and to other places of the contractor or Subcontractors where work is being prepared for the Contract.

3.4.20 DEFECTS IN EXISTING CONSTRUCTION

To be reported to Employer without delay. Obtain instructions before proceeding with work, which may:

Cover up or otherwise hinder access to the defective construction, or

Be rendered abortive by the carrying out of remedial work.

3.4.21 ACCESS FOR INSPECTION

Give Employer not less than 5 working days’ notice before removing scaffolding or other facilities for access.

3.4.22 PROPOSAL FOR RECTIFICATION OF DEFECTIVE WORK/PRODUCTS

As soon as possible after any part(s) of the work or any products are known to be not in accordance with the Contract, or appear that they may not be in accordance, submit proposals to CA for opening up, inspection, testing, making good, adjustment of the Contract Sum, or removal and re-execution.

Such proposals may be unacceptable by the Employer, and may issue contrary instructions.

WORK AT OR AFTER COMPLETION

3.4.23 GENERALLY

Make good all damage consequent to the work.

Remove all temporary markings, coverings and protective wrapping unless otherwise instructed. Clean the works thoroughly inside and out including all accessible ducts and voids, remove all splashes, deposits, efflorescence, rubbish and surplus materials consequent upon the execution of the work.

Cleaning materials and methods to be as recommended by manufacturers of products being cleaned, and to be such that there is no damage or disfigurement to other materials or construction.

Obtain COSHH dated data sheets for all materials used for cleaning and ensure they are used only as recommended by their manufacturers.

Touch up minor faults in newly painted/repainted work, carefully matching colour, and brushing out edges. Repaint badly marked areas back to suitable breaks or junctions.

Adjust, ease and lubricate moving parts of new work as necessary to ensure easy and efficient operation including doors, windows, drawers, ironmongery, appliances, valves and controls.

3.4.24 INSPECTIONS

At an agreed date, and when the works are substantially complete, all services tested and commissioned, the works will be inspected by the Employer. Any outstanding work arising from this inspection shall be completed prior to the date agreed for Practical Completion.

3.4.25 CLEANING

In addition to the generality of clause 3.40.23, the building shall be cleaned to the standards required for operational use as a clinical ward.

3.4.26 SECURITY AT COMPLETION

Leave the works secure with all accesses locked. Account for and adequately label all keys and handover to Employer with itemised schedule, retaining duplicate schedule signed by Employer as receipt.

3.4.27 MAKING GOOD DEFECTS

Make arrangements with the Employer and give reasonable notice of the precise dates for access to various parts of the Works for purposes of making good defects. Inform Employer when remedial works to the various parts are completed.

3.5 SECURITY / SAFETY / PROTECTION

3.5.1 THE PRE-TENDER HEALTH AND SAFETY PLAN

To be prepared with assistance from the planning supervisor.

3.5.2 NOISE

Comply generally with the recommended BS 5228: Part 1, clause 9.3 for minimising noise levels during the excavation of the Works.

Fit all compressors, percussion tools and vehicles with effective silencers of a type recommended by manufacturers of the compressors, tools or vehicles.

Do not use pneumatic drills and other noisy appliances at any time without consent of the Employer.

Do not use or permit employees to use radios or other audio equipment in ways or at times, which may cause nuisance.

3.5.3 POLLUTION

Take all reasonable precautions to prevent pollution of the site, the Works and the general environment including streams and waterways. If pollution occurs, inform the appropriate Authorities and the Employer with no delay and provide them with relevant information.

3.5.4 NUISANCE

Take all necessary precautions to prevent nuisance from smoke, dust, rubbish, vermin and other causes. Ensure all contractors personnel adhere to the Trust alcohol policy whilst working on site.

3.5.5 FIRE PREVENTION

Take all necessary precautions to prevent personal injury, death and damage to the Works or other property from fire. Comply with joint Code of Practice 'Fire Precaution on Construction Sites' published by the Building Employers Confederation and the Loss Prevention Council.

3.5.6 FIRE PRECAUTIONS

Allow for taking adequate precautions against fire and prior to work commencing obtain the approval of the CA to the precautions and the procedures to be adopted in the case of fire. Arrangements shall cover means of escape, provision of fire-fighting equipment, raising alarm, removal of accumulated rubbish, smoking restrictions, flammable materials and access through external working area of fire appliances.

3.5.7 FIRE POLICY

Smoking will not be permitted on the site.

3.5.8 BURNING ON SITE

Of materials arising from the work will not be permitted.

3.5.9 WATER

Prevent damage from storm and surface water. (Items for keeping the site and excavations free of water are given elsewhere).

3.5.10 MOISTURE

Prevent the work from becoming wet or damp where this may cause damage. Dry out the Works thoroughly.

Control the drying out and humidity of the Works and the application of heat to prevent:

Blistering and failure of adhesions, Damage due to trapped moisture, excessive movement.

3.5.11 WASTE

Remove rubbish, debris surplus material, spoil regularly, and keep the Site and Works clean and tidy.

Remove all rubbish, dirt and residue from voids and cavities in the construction before closing in.

Ensure that non-hazardous material is disposed of at a tip approved by a Waste Regulation Authority.

Remove all surplus hazardous material and their containers regularly for disposal off site in a safe and competent manner as approved by a Waste Regulation Authority and in accordance with the relevant regulations

Retain waste transfer documentation in site.

3.5.12 MILLENNIUM COMPLIANCE

Certify that equipment complies with PD 2000-1A: 'A definition of Year 2000 conformity requirements' published by BSI.

PROTECT THE FOLLOWING

3.5.13 WORK IN ALL SECTIONS

Adequately protect all types of work and all parts of the Works, including carried out by others, throughout the Contract. Whenever work is of an especially vulnerable nature or is exposed to abnormal risks, provide special protection to ensure that damage does not occur.

3.5.14 EXISTING SERVICES

Notify all service authorities and/or adjacent owners of proposed works not less than one week before commencing site operations.

Notify the client FOUR-WEEKS before any proposed shutdowns or disruption to services. As there will be potential for shutdowns for this project over the contract period, all shutdowns will need to be mapped out and indicated on the main programme of works

Before starting work, check positions of existing mains/services. Where positions are not shown on drawings, obtain relevant details from service authorities or other owners.

Observe service authority's recommendations for work adjacent to existing services.

Adequately protect, and prevent damage to all services. Do not interfere with their operation consent of the service authorities or their owners.

If any damage to services results from the execution of the Works, notify Employer and appropriate service authority without delay. Make arrangements for the works to be made good with out delay to the satisfaction of the service authority or other owners as appropriate. Any measures taken by the Employer to deal with an emergency will not affect the extent of the contractor's liability.

Replace any marker tapes or protective covers disturbed during site operations to the service authority's recommendations.

3.5.15 ROADS AND FOOTPATHS

Adequately maintain roads and footpaths within and adjacent to the site and keep clear of mud and debris. Any damage to roads and footpaths caused by site traffic or otherwise consequent upon the Works must be made good to the satisfaction of the Local Authority or other owner. Bear any costs arising.

3.5.16 TREES/HEDGES/SHRUBS/GRASSED AREAS

Adequately protect and preserve, except those which are to be removed. Replace to approval or treat as instructed any species or areas damaged or removed without approval.

3.5.17 EXISTING FEATURES

Prevent damage to existing buildings, fences, gates, walls, roads, paved areas and other site features which are to remain in position during the execution of the Works.

3.5.18 EXISTING FITTINGS

Protect existing fittings and furniture in occupied buildings.

3.5.19 EXISTING WORK

Prevent damage to existing property undergoing alteration or extension and make good to match existing, any defects so caused. Remove existing work the minimum necessary and with care to reduce the amount of making good to a minimum.

3.5.20 BUILDING INTERIORS

Protect building interiors exposed to weather during the course of alteration work with temporary enclosures of sufficient size to permit execution of the work and which will remain weather tight even in severe weather.

3.5.21 EXISTING STRUCTURES

Provide and maintain during the execution of the Works all incidental shoring, strutting, needling and other supports as may be necessary to preserve the stability of existing structures on the site or adjoining, that may be endangered or affected by the Works.

Support existing structure as necessary during cutting of new openings or replacement of structural parts.

Do not remove supports until new work is strong enough to support the existing structure. Prevent over stressing of completed work when removing supports.

3.5.22 CRIMINAL RECORDS BUREAU CHECK (CRB)

It is a requirement of The London North West University Healthcare NHS Trust that all contractors and/or sub contractors who work on site in clinical areas or in the vicinity of vulnerable people must hold a CRB check and must not appear on the Vulnerable Adults List or Barred Children's list.

3.6 SPECIFIC LIMITATIONS ON METHODS / SEQUENCE / TIMING.

3.6.1 SCOPE

The limitations described in this section are supplementary to limitations described or implicit in information given in other sections or on the drawing.

3.6.2 SCAFFOLDING

Ensure that standing scaffolding is erected early enough and/or dismantled late enough to suit the programmes of all subcontractors.

3.6.3 COMPLETION IN SECTIONS OR PARTS

Where the employer is to take possession of any Section or Part of the Works and such Section or Part will, after it's practical completion, depend for it's adequate functioning on work located elsewhere on the site, complete such other work in time to permit such possession to take place.

During execution of the remainder of the Works, ensure that completed sections or Parts of the Works have continuous and adequate provision of services, fire precautions, means of escape and safe access.

3.7 FACILITIES/TEMPORARY WORKS/SERVICES

3.7.1 LOCATIONS

Inform Employer of the intended siting of all spoil heaps, temporary works and services.

3.7.2 MAINTAIN

Alter adapt and move temporary works and services as necessary. Clear away when no longer required and make good.

3.7.3 LIGHTING AND POWER

The permanent electrical installation may be used by the contractor, but the Employer does not undertake that it will be available.

Electricity for the Works will be supplied free of cost to the Contractor.

3.7.4 WATER

For the works will be supplied free of cost to the Contractor.

3.7.5 MOBILE TELEPHONES

Are not permitted in the Client's premises.

3.7.6 TEMPERATURE AND HUMIDITY

The permanent heating installation may be used for drying out the Works and controlling temperature and humidity levels but: The employer does not undertake that it will be available.

The contractor must take responsibility for operation, maintenance and remedial work, and arrange supervision by and indemnification of the appropriate Subcontractors and pay costs arising.

3.8 OPERATIONS/MAINTENANCE OF THE FINISHED BUILDING

3.8.1 THE BUILDING MANUAL

The building manual (incorporating the Health and Safety File and subtitled accordingly) is to be a comprehensive information source and guide for the Employer and end users providing a complete understanding of the building and it's systems and enabling it to be operated and maintained efficiently and safely. The Planning Supervisor is required to obtain or prepare all the information to be included in the Manual, produce the required number of copies of the Manual and submit them to the Employer for checking by the Planning Supervisor and for delivery to the Employer.

The Manual is to consist of the following three parts sectioned as appropriate:

Part 1: GENERAL: content as clause 3.80.2, the information being provided to the Planning Supervisor by the employers agent.

Part 2: BUILDING FABRIC: Content as clause 3.80.3, plus certain as-built drawings and other information provided to the Contractor by the employers agent.

Part 3: BUILDING SERVICES: Content as clause 3.80.4

The presentation of this manual to be as clause 3.80.5

A complete draft of the manual must be submitted not less 2 weeks before the date of submissions of the final copies of the manual. Amend the draft manual in the light of any comments and resubmit to the employer. Do not proceed with production of the final copies of the maul until authorised to do so by the employer.

Final copies of the manual: provide the Employer with 3 copies at practical completion.

As built drawings: provide 3 copies on paper folded to A4, and on computer disk in AutoCAD 2007 (dwg

format).

3.8.2 THE BUILDING MANUAL PART 1 GENERAL INFORMATION must include:

A description of the building.

Details of ownership and all consultants and designer.
Details of all authorities plus copies of all consents and approvals obtained.
Names, addresses, telephone and fax numbers of all contractors, subcontractors, suppliers and manufacturers. (Contractors to provide data).
Any operational requirements and constraints of a general nature which are not relevant to other parts of the building manual.
The fire safety strategy for the buildings (s) including drawings showing emergency escape routes, locations (this clause is given purely for the contractor's information)

3.8.3 THE BUILDING MANUAL PART 2: BUILDING FABRIC INFORMATION:

Provide such information as is reasonably required by the planning supervisor including:

Details of construction methods and materials which may present significant residual hazards with respect to cleaning maintenance or demolition for all contractor designed work performance specified work.
As - built drawing recording details of construction for all contractor designed work and performance specified work.
Copies of manufacturers current literature for all products for which the particular proprietary brand has been chosen by the contractor, including COSHH dated data sheets and manufacturers recommendations for cleaning and maintenance.

Copies of all guarantees, warranties and maintenance agreements offered by sub contractors and manufacturers.

Copies of all test certificates and reports required in the specification.

To enable the Employer to prepare 'as built' drawings submit to him marked up print at least 2 weeks before Practical completion identifying amendments to issued main constructional including sub structure and drainage, drawings.

3.8.4 THE BUILDING MANUAL PART 3: BUILDING SERVICES information must include:

A full description of each of the systems installed including services capacity and restrictions.
Diagrammatic drawings of each system indicating principal items of plant, equipment valves, service runs etc.

Legend for all colour-coded services.
Electrical circuit references and distribution boards charts. (to be shown on as - built drawings)

Schedules (system by system) of plant, equipment, valves etc., stating their locations, duties and performance figures. Each item must have a unique number cross referenced to the record and diagrammatic drawings and schedule.

The name, address and telephone number of the manufacture of every item of plant and equipment together with catalogue list numbers.

Manufacturer' technical literature for all items of plant and equipment, assembled specifically for the project, excluding irrelevant matter and including drawings, electrical circuit details an operating and maintenance instructions.

A copy of all test certificates (including but not limited to electrical circuit tests, corrosion tests, type tests, works tests, start and commissioning tests) for installations and plant, equipment, valves etc.

Used in the installations

A copy of all manufacturers' guarantees. Warranties and maintenance agreements offered by sub-contractors and manufacturers.

Starting up, operating and shutting down instructions for all equipment and systems installed. Schedules of all fixed and variable equipment settings established during commissioning.

Procedures for seasonal changeovers.

Recommendations as to the preventative maintenance frequency and procedures to be adopted to ensure the most efficient operation of the systems.

Lubrication schedules for all lubricated items.

A list of normal consumable items.

A list of recommended spares to be kept in stock by the Employer, being those items subject or wear or deterioration and which may involve the employer in extended deliveries when replacements are required at some future date.

Procedures for fault finding.

Emergency procedures, including telephone numbers for emergency services.

3.8.5 PRESENTATION OF BUILDING MANUAL:

The part of the Manual that is the Contractor's responsibility is to be contained in a series of A4, plastic covered, loose-leaf binders with hard covers, each indexed divided and appropriately cover titled. Selected drawings needed to illustrate or locate items mentioned in the Manual, where larger than A4, are to be folded and accommodated in the binders so that they may be unfolded without being detached from the rings. The main set(s) of as- built drawings may form an annex(s) to the manual. The Contractor must include electronic versions of this document in Word, Excel and Autocad 2010 format on CD’s.

3.8.6 TRAINING OF EMPLOYER'S STAFF:

Before Practical Completions the contractor is to explain and demonstrate to the Employer's staff the purpose, functions and operation of the installations including all items and procedures listed in the Building Manual. Include for not less than 1.0 operating days for this purpose.

3.9 CONTRACTORS HEALTH AND SAFETY REQUIREMENTS

The primary legal responsibility for the Health and Safety of their workforce and any people who may be affected by their work activities lies with the Contractor. However, without relieving the Contractor of any of his legal and contractual responsibilities this **Health and Safety Resume** has been produced to assist the Contractor in ensuring that safe working practises and measures are adopted whilst working at the Trust’s sites.

The purpose of this document is to foster co-operation and form a partnership between the Trust and the Contractors to promote Health and Safety at Work. It is **not** the intention for it to be used as an excuse for **inactivity** by the Contractor but sets out both the Trust’s general requirements when working on their plant and systems, and **some** detailed requirements to avoid danger from significant specific hazards.

The information given in this resume is **not** intended to be exhaustive, but to illustrate the **nature** of the Trust’s operations by referring to any hazards that are frequently met and/or are common sources of accidents.

3.9.1 CONTRACTOR’S OVERVIEW

In addition to their statutory responsibilities Contractors, Sub-Contractors and their employees and agents **shall** abide by the Trust's operational/administrative rules and procedures, including those for:

- Fire
- Evacuation
- First Aid
- Reporting of Serious Accidents/Incidents
- Permit-to-Work Systems etc.
- Special procedures for working in infectious areas and with biologically contaminated equipment.

Any of which that are relevant to the safe and smooth enactment of the contract.

In pursuance of the above the Contractor shall:

a) Attend a Pre-Site Contract Meeting with a primary and functional aim of discussing the Health and Safety issues associated with the contract and agreeing a Health and Safety plan and implementation strategy.
b) Nominate a safety representative to be directly responsible for the management of the day-to-day safety requirements of the contract, and as such, shall be the point of contact for the Project Manager on any issues pertaining to Health and Safety.
c) Work within his company's general Health and Safety Policy requirements and the resultant Health and Safety management plan as agreed at the pre-site meeting.
d) Describe and explain what actions are to be taken to implement and effectively comply with the Plan's Health and Safety requirements.
e) Comply with all Orders, Regulations and By-Laws made by a competent authority that are applicable to the works, in such matters that may affect the Health and Safety of persons on or adjacent to the sites.

3.9.2 PROJECT ENGINEER LEAD MANAGER - CAPITAL AND ESTATES

The Project Lead shall nominate a **Project Manager**, whose responsibilities shall include liaising with the Contractor on Health and Safety aspects such that any operations by **any** party that affect any other with regards to Health and Safety can be made known and acted upon. **Such appointment will not relieve the Contractor from his own responsibilities for Health and Safety**. The Project Engineer shall be the Contractor's focal point for Health and Safety Issues. The Project Manager shall conduct a pre-site meeting to ensure that **before** the work is started the following significant Health and Safety issues shall be discussed and agreed:

- The Project manager shall make the Contractor aware of any potential hazards and their associated precautionary/control procedures established on site.
- The Contractor shall propose their Nominated Site Supervisor(s) and Competent Person(s). Before work is started they shall have undergone sufficient instruction and training to ensure that they are fully conversant with the Trust's Permitry Procedures and certified as such in accordance with the Trust's documentation procedures.
- Site Emergency Procedures, including Emergency Evacuation.
- The Contractor's nominated Safety Representatives.
- Waste disposal procedure/environmental legislation compliance.
- Hazardous Substance Control.
- Possible impact of the Contractor's work activities on other people's activities.
- An effective communication system.
- The Project Managers limits of power and authority - such that he can stop work if in his opinion people's Health and Safety is being significantly compromised. The Contractors right to refer the matter to the Estates Manager in exceptional circumstances where the problems cannot be resolved at the working level.
- The Contractor's obligation to provide the Project Manager with any appropriate approved certification of competence/testing etc. i.e. fork lift trucks, lifting tackle inspections, crane use, scaffold erectors etc.
- The Project Managers and the Contractor's safety representative shall agree any activities that are considered to be **outside** the existing control measures and the **Contractor** shall produce a written **Method Statement** of how the job is to be undertaken safely. The Project Manager shall, in due course,

assess the Method Statements by whatever means he considers appropriate (specialist services etc.), and agree to their implementation **prior** to the contractor imposing them on the work.
- Minutes of the meeting shall be taken by the Project Manager and circulated to the Contractors (and any Sub-Contractors) to authorise them as a true record of the meeting.

3.9.3 THE CONTRACTOR

All the Contractor's employees, including Sub-Contractors, shall be given appropriate induction training **specific** to the location and nature of the work. Induction shall include:

- The general site safety requirements, including permit systems
- Site emergency procedures
- Potential hazards
- Hazard control measures
- Precautionary measures
- Infection control procedures

All contract staff must be under proper supervision at **all** times when on the Trust's sites. Where Contractors are to work unsupervised (i.e. lone working) the circumstances and method of work shall be agreed with the Project Manager.

The Contractors, having been shown safe access to and egress from the work place, shall use it!

The Contractors shall only use fit for purpose tools and equipment, which must be in good repair. ***Under no circumstances should tools and equipment, including keys, be loaned to contractors from the Capital and Estates Department unless supervised by Estates personnel***. Where necessary equipment shall be erected to the suppliers/ manufacturer's instructions.

Where Personal Protective Equipment is required for the work, it shall be provided by the Contractor. Failure by an employee to take proper care of the PPE or refusal to wear it shall normally result in dismissal from site following an initial verbal warning (confirmed in writing).

Whilst working the Contractors shall keep the work area as clean and tidy as practicable, and free from loose debris or any other obstructions. All floors and walkways must be kept clear of materials, tripping and slipping hazards (especially any wet work).

The Contractor shall exercise proper control over waste management and shall ensure that the water systems (including drains) are not polluted (i.e. water jetting, chemical cleaning etc.), and the air is not polluted (i.e. dust, combustion products etc).

The Contractor shall record attendance at site of all his employees, including Sub-Contractors, so that their numbers can be readily accounted for in times of Fire or other emergency.

3.9.4 THE TRUST'S SAFETY PROCEDURE

General Safety:

In addition to the need to apply formal **Permit-to-Work** Systems to secure the Health and Safety of persons at work or those affected by the work, there is also need to assure and maintain the **General Safety to** and **from** the place of work **and** at the **vicinity** of the place of work. Hence, before work is started, it is the personal responsibility of the Contractor's Supervisor to satisfy himself that appropriate Health and Safety precautions are taken to establish **General Safety** at and in the **vicinity** of the workplace, and that the access/egress route(s) shown to him by the Project Manager are used as instructed and kept safe.

Once the work has started the Contractor's Competent Person in charge of the work shall **continue** to maintain conditions which ensure **General Safety**. He shall also ensure that his work activities do not adversely affect other work areas.

The Safety Rules Procedures:

Whenever work on the Trust's contract is subject to the Trust's **Safety Rules** the Contractor **shall** comply with them.

The Contractor shall nominate Supervisor(s) and Tradesmen to undergo the appropriate induction training and assessment to enable them to be certified as Competent under the Trust's Safety Rules to receive and clearly specified safety documents.

The induction training shall comprise an awareness of the philosophy and basic principles behind the Safety Rules and detail the procedures associated with the issue, operation and clearance of specified Safety Documents. This shall include Permit Locks, Key Safes, **Danger** and **Caution Notices**, Safe Retention of the Safety Document etc. The Contractor's Competent Person(s) shall be assessed by an Authorised person for competency (within the context of the Safety Rules) and be certified in writing to that effect.

The Project Manager may, for whatever reason he considers appropriate, refuse to accept a person nominated by the Contractor. The Contractor shall have redress through the Authorised Person.

The Contractor shall be made fully aware of the requirement for a **controlled release** of plant/apparatus. Due to the possible operational implications, which at a hospital site may well be dire in terms of patient safety and well-being, arranging for system shut downs will need careful planning. As such these shall be given due consideration as part of the Permit System Process, including proper and timely notification for the requirement for a Safety Document, through the proper procedures and request pro-forma.

As much notice as practicable of the requirement for equipment isolations and their attendant Safety Documents shall be given by the Contractor's Supervisor. Plant/apparatus shall be returned to the agreed programme, delays can be costly in more ways than simply money.

3.10 SITE RULES FOR CONTRACTORS

3.10.1 LOCATION OF SITE ACCESS AND EGRESS (INTERNAL)

Access routes within buildings on Trust Sites will be specified in the tender documentation as agreed at the preliminary site meeting with the Project Manager prior to commencing works. Trust staff, patients and visitors may also use these routes. It is the contractor's responsibility to ensure all access routes are kept clean and clear of debris at all times and checked regularly, i.e. at least once a day by a designated site operative.

3.10.2 LOCATION OF SITE ACCESS AND EGRESS (EXTERNAL)

Access routes into Trust sites will either be specified (with a site plan) in the Tender Documents or agreed at the preliminary site meeting with the Project Manager prior to works commencing. It is the contractor's responsibility to ensure that accumulations of mud and debris are cleared immediately they appear and that all access roads into site areas are maintained in a safe manner at all times for general site traffic.

3.10.3 LOCATION OF TEMPORARY SITE ACCOMMODATION

If sufficient reason exists, the Trust may agree to the siting of temporary accommodation for the contract period in a suitable location. This will either be specified in the tender documentation or agreed with the Project Manager at the preliminary site meeting. It will be the contractor's responsibility to install, maintain and remove on completion any temporary services to temporary accommodation. All with the agreement of the Project Manager.

3.10.4 SERVICES TO BE PROVIDED TO THE CONTRACTOR

Water and electricity will be provided from the nearest convenient take off point if agreed during the Tender stage or before work commences with the Project Manager. It will be the contractor's responsibility to install, maintain and remove on completion temporary supplies as necessary to enable the works and to

reinstate services and finishes, all in accordance with legislation current at that time. Welfare facilities for the Contractor's site staff may be available on a project specific basis. When not available, the Contractor will provide these facilities on a basis agreed with the Project Manager.

3.10.5 LOCATION OF LOADING AND STORAGE AREAS

Unloading areas may be allocated at specific times in certain locations by agreement with the Project Manager. Storage areas will be allocated in a similar way to temporary accommodation. Special requests for short-term storage should be made to the Project Manager. Generally, no internal storage within existing buildings will be provided unless designated within tender documentation.

3.10.6 CONTRACTOR PARKING

Because of the lack of parking spaces available for contractors on the site, a limited number of designated spaces may be made available, with the agreement with the Project Manager. All other contractors parking will abide by the Trust's visitors parking permit scheme. The permit must be clearly displayed in the vehicle at all times. Failure to park in the designated parking area or failure to display a valid parking permit could lead to the Contractor being fined. The contractor will be held responsible for paying such fines for its vehicles.

3.10.7 DELIVERY OF MATERIALS

Unless otherwise stated in the contract documentation, delivery of materials to the contractor's site should normally occur between 6.00am and 8.30am, to minimise disruption to Trust staff and patients. Deliveries outside of these allocated times and at weekends may be agreed with the Project Manager. All deliveries likely to cause an obstruction must be discussed with the Project Manager, so that suitable traffic control arrangements may be agreed. Waiting areas for delivery vehicles etc will also have to be agreed with the Project Manager.

3.10.8 CONTRACTOR'S RESPONSIBILITY FOR TRAFFIC CONTROL

Contractors involved in works resulting in the restriction of access on Trust roads should provide traffic control equipment, they should also be aware that emergency vehicles will have priority over any traffic signals in use and are not to be obstructed at any time.

3.10.9 IDENTITY BADGES

All Contractors that move about within the NPH site will be issued with the Trust's 'Estates Contractor' identity badge, which is to be worn whenever on Trust premises. Individuals not wearing badges will be asked to leave site. Contractors working for the Tender company within the building site the Tender company must ensure that their staff and contractors have been DBS (Disclosure Burring Service) checked.

3.10.10 DISABLED ACCESS/EGRESS

Disabled access routes must not be obstructed under any circumstances unless they form part of the site area and alternative arrangements have been agreed.

3.10.11 PEDESTRIAN ROUTES

In addition to the movement of vehicles on site access roads, patients on trolleys and beds will also be moved through some of these areas. Contractors must ensure full access for trolleys, beds and equipment is maintained at all times.

3.10.12 THE 'PERMIT TO WORK' SYSTEM

Permits to work will be required from the Operational Estates manager, before starting any work regarding the following: -

- **Low Voltage Systems**
- **Sanction for Testing**
- **High Voltage Systems**
- Medical Gas Systems
- Theatre Clean/Vent Systems
- Magnetic Resonance Imaging Controlled Area
- Fume Cupboards
- Areas of Controlled Radioactivity. Radioactive Waste Drains
- Hot Works on Fire Risk Activities. Pressure Vessels
- Confined Spaces
- **Isolation of Electrical Systems**
- Isolation of Water Services
- Natural Gas Installations
- Excavation
- Drainage runs

Once issued the conditions of the permit must be strictly adhered to at all times.

3.10.13 FIRE AND FIRE RISK ACTIVITIES

All Contractors involved in fire risk activities should ensure that they take measures to minimise risk wherever possible by removing any combustible materials and providing adequate firefighting equipment. When undertaking any fire risk activity all such work should cease at least half an hour prior to the end of the working day. An employee must be designated to check the site prior to leaving.

Existing fire detectors sited within contractors working area shall be temporary isolated and protected with dust covers. This shall be in agreement with the Operational Estates Manager, and Project Manager. In the event of a fire break out, the procedure on the Northwick Park Site is described in section 3.10.14.

3.10.14 FIRE PROCEDURE: WITHIN HOSPITAL BUILDINGS

All contractors should make themselves aware of the local fire safety plan for the ward/department in which they are working so as to establish the predetermined location for assembly within the ward/department.

An intermittent sounding of the fire alarm sounders means there may be a fire in an adjacent ward/department.

A continuous sounding fire alarm is an instruction to evacuate the ward/department /building.

On detecting a fire
1. Remove persons from immediate danger.
2. Sound alarm by breaking glass of fire alarm call point.
3. Shut doors and windows adjacent to the fire.
4. Do not call switchboard.
5. Attack fire only if this can be done without jeopardising personal safety.

On hearing an intermittent fire alarm
6. Prepare for evacuation by clearing escape routes for patients and staff.
7. Go to ward/department predetermined location.
8. Await further instruction from Hospital staff

On hearing a continuous fire alarm
9. Prepare for evacuation by clearing escape routes for patients and staff.
10. Leave the ward/department/building by the nearest available exit. Close fire doors as you go.
11. **Do not use lifts**.
12. **Do not** re-enter the ward/department/building until instructed to do so by the Hospital Fire Response Team, or Fire Service.

Should evacuation of an area be necessary, this will be co-ordinated at the scene of the fire by the Hospital Fire Response Team, or Fire Service.

3.10.15. SPECIFIC SITE HAZARDS

The Trust will inform the Contractor of any known specific site hazards prior to commencement of work.

3.10.16 NOISE AND VIBRATION LEVELS

Contractors should ensure that noise and vibration levels created within their site are kept to a minimum at all times. Equipment that generates high levels of noise or excessive vibration should be substituted for less noisy or disruptive equipment where possible or adequately damped, silenced and soundproofed. Engine driven plant should only be operated during agreed hours or as specified within the project specify details of the tender documents.

Radios or other audio equipment are prohibited on all Trust premises (including contractor's designated site areas and compounds). These devices may cause considerable disturbance to patients and staff, disrupting clinical treatment and as a result must not be used.

3.10.17 CONTROL OF DUST, FUMES AND DEBRIS

All operations that produce dust (e.g. disc cutting, chasing, high-speed sawing etc) in excess of 10 milligrams of dust per cubic metre of air (10 mgjm3) averaged out over eight hours, or any respirable dust in excess of 5 mgjm3 averaged over eight hours is deemed to be a substantial concentration of dust and therefore within the definition of substance hazardous to health (COSHH).

Dust producing equipment is to be controlled at source with local exhaust ventilation or dust suppression tools to the satisfaction of the Project Manager. All work areas are to be suitably sealed against dust breakout to other areas, and where required to control dust breakout measures such as double doors or air locks are to be supplied.

All temporary screens to be constructed out of fire-retardant materials, of a suitable nature to fully contain any expected hazards. Approval of method statement to control dusts to be gained prior to starting work from the Project Manager.

Working areas to be cleaned as required by means that do not promote dust transfer. When requested by the Project Manager, air and environmental monitoring of the building works and adjacent areas will be required.

3.10.18 REGULATIONS AND CODES OF PRACTICE

a) Latest relevant BS Standards and Codes of Practice

b) Health and Safety at Work Act and Work Place Regulations current edition

c) Building Regulations current edition

d) Local Authority Regulations and Bye-Laws current edition

e) Local Authority Fire Officer

f) Electricity Supply Regulations current edition

g) CIBSE Code for Interior Lighting current edition

h) HVCA Ductwork Specification current edition

i) CIBSE Guides and Commissioning Codes current edition

j) BS 7671 Requirements for electrical installations. (IEE Regulations 17th Edition) including all amendments

k) Gas Regulations current edition

l) Local Water Authority Bye-Laws current edition

m) Environmental and Public Health Approval current edition

n) COSHH Regulations current edition

o) Clean Air Act current edition

p) The Electricity (Factories Act) Special Regulation current edition

q) Electricity at Work Regulations current edition

r) Any additional requirements covered in the drawings and contract documentation

s) CDM regulations

t) Insurance company inspection requirements

u) Loss Prevention Council (Formally FOC)

v) Electromagnetic Compatibility Regulations SI No 2172, 89/336/EEC current edition

w) Electrical Equipment (Safety) Regulations SI No. 3260, 73/23/EEC current edition

x) UK Construction Products Regulations SI No. 3051, 89/103/EEC current edition

y) Site Waste Management Plans Regulations current edition

z) The Control of Asbestos Regulations current edition

aa) Manual Handling Operation Regulations current edition

bb) The Regulatory Reform (Fire Safety) Order current edition

cc) The Working at Height Regulation current edition

dd) HSG (95) 10 Hospital Infection Control

ee) The Health and Safety at Work Act 1974

ff) The Control of Pollution Act 1974

gg) The Management of Health and Safety at Work Regulations 1999

hh) The Construction (Health, Safety and Welfare) Regulations 1996

ii) Debris should be disposed of in accordance with the Trust's Waste Disposal Policy.

3.10.18 CONTRACTORS WORKING HOURS

Normal working hours on Trust sites will be between 7.30am and 6pm Monday to Friday. Weekend and out of hours working will be agreed with the Project Manager.

3.10.19 ACCIDENTS/INCIDENTS

Any dangerous occurrences/incidents as defined in RIDDOR should be immediately reported to the HSE and the Project Manager. Accidents/incidents which fall outside the scope of the RIDDOR should be recorded in the normal way and copies of the reports handed to the Project Manager at the next scheduled Site Meeting or on the completion of works, whichever is sooner.

3.10.20 ELECTRICAL TOOLS

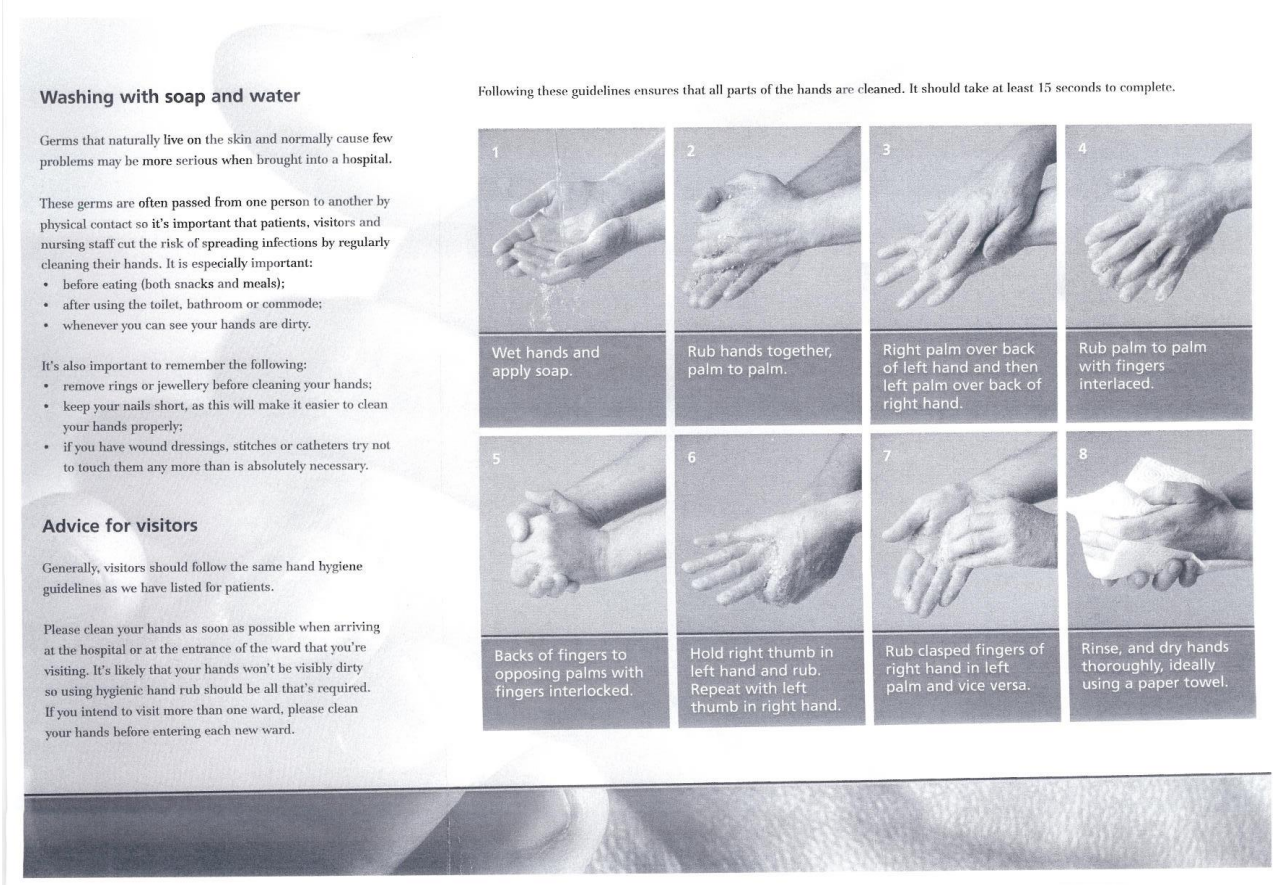
All electrical tools used by contractors must be either 110 vac or 240 vac and RCD protected and with an up-to-date test certificate available for inspection.

3.10.21 SMOKING

The Trust has a no smoking policy in all buildings including areas temporarily forming contractors working areas.

3.10.22 INFECTION CONTROL

The London North West University Healthcare NHS Trust requires that all contractors follow Trust guidance and infection control policy with regard to hand washing requirements for preventing spread of infection. Hand hygiene advice for patients and visitors is noted below:



Washing with soap and water

Germs that naturally live on the skin and normally cause few problems may be more serious when brought into a hospital.

These germs are often passed from one person to another by physical contact so it's important that patients, visitors and nursing staff cut the risk of spreading infections by regularly cleaning their hands. It is especially important:

- before eating (both snacks and meals);
- after using the toilet, bathroom or commode;
- whenever you can see your hands are dirty.

It's also important to remember the following:

- remove rings or jewellery before cleaning your hands;
- keep your nails short, as this will make it easier to clean your hands properly;
- if you have wound dressings, stitches or catheters try not to touch them any more than is absolutely necessary.

Advice for visitors

Generally, visitors should follow the same hand hygiene guidelines as we have listed for patients.

Please clean your hands as soon as possible when arriving at the hospital or at the entrance of the ward that you're visiting. It's likely that your hands won't be visibly dirty so using hygienic hand rub should be all that's required. If you intend to visit more than one ward, please clean your hands before entering each new ward.

Following these guidelines ensures that all parts of the hands are cleaned. It should take at least 15 seconds to complete.

3.10.23 FITNESS FOR WORK

The London North West University Healthcare NHS Trust requires that all contractors working on the Trust's site are, at all times, fit for work. The Trust retains the right to request that individuals leave the site if they are unfit for work for reasons of alcoholism, drug taking, injury, tiredness or any other reason that may affect the standard of workmanship or the health and safety of members of the public or hospital staff within the area.

3.10.24 STANDARDS OF DRESS

All contractors will report to work in suitable clean clothing. the following items of clothing are examples of unacceptable clothing, either on the grounds of health and safety or for the Trust's public image: Denim jeans or skirts, track suits, casual sports t-shirts, leisure shorts, combat trousers, sweat-shirts, baseball caps/hats, overly tight or revealing clothes, clothing bearing inappropriate slogans, the wearing of shorts is not acceptable, neither are bare chests. Dirty clothes or overalls will not be worn in public or patient areas. Clothing must be suitable for the task being carried out. Personal protective equipment will be worn wherever applicable. Footwear must be safe, sensible, in good order, smart and clean and have regard to Health and Safety considerations. Visible tattoos are to be discouraged and where present should not be offensive to others. Where they are deemed to be offensive they should be appropriately covered. Jewellery should be discreet and appropriate and not cause offence or be a health and safety hazard. Facial/body piercing are not permitted and must be removed before coming on site, piercings for religious or cultural reasons must be covered. Hair should be neat and tidy at all times. Headwear worn for religious purposes are permitted. All contractors must display a high standard of personal hygiene.

3.10.25 HOSPITAL EQUIPMENT

The use and borrowing of Hospital equipment or tools is not acceptable and contractors should ensure that they have sufficient equipment to carry out the work specified.

3.10.26 TWO-WAY RADIOS AND CELL PHONES

There is a risk to patients from radio frequency transmissions interfering with electro-medical equipment. As a result, the use **of two-way radios by contractors is prohibited but to facilitate the shutdown works, Trust owned radios will be issued to all operatives attending the works**.

There is a risk that when cell-phones are turned on they transmit signals back to their cell-net base regardless of whether they are monitoring, receiving or transmitting calls. Cell phones must be turned off to be safe. The risks will be controlled by a total ban on the use of cell-phones within all areas of the hospital and up to 10 metres from those buildings, this includes corridors and circulation areas. This means that cell phones may only be turned on outside, 10 metres away from any buildings.

3.10.27 ASBESTOS

The Trust maintains a register of all known locations of Asbestos existing on the Trusts premises. This register must be checked before any work starts on any construction site on any part of the Trust's site.

No work shall be carried out on any suspected asbestos bearing materials by any person who is not suitably trained. No testing or analysing shall be carried out by any person or laboratory that has not gained N.A.M.A.S. or similar accreditation. No work shall be carried out on any asbestos material without written instructions from the Trust's representative, this can be given in the form of a specification Site Instruction.

Any Contractor finding what he believes to be an Asbestos bearing material on any of the Trust's premises should stop work immediately and bring it to the attention of the Trust's Project Manager or representative who will, if deemed necessary, suspend all further work until the affected areas are made safe.

3.10.28 ASBESTOS LABELLING

The Trust has adopted the H.S.E. suggested working for the Asbestos warning labels.

3.10.29 THE MENTAL HEALTH ACT

Contractors need to be aware that certain works undertaken on the Trust's premises will bring contractors into contact with patients admitted under the Mental Health Act. These patients may be uninhibited or disruptive and contractors may need to put in place additional measures on site that would minimise the risk to this group of patients.

CONTRACTORS GENERAL COST ITEMS Section 4.00

4	CONTRACTOR'S GENERAL COST ITEMS	£
4.1	**MANAGEMENT AND STAFF**	
4.2	**SITE ACCOMMODATION**	
4.3	**SERVICES AND FACILITIES**	
4.3.1	POWER	WILL BE SUPPLIED
4.3.2	LIGHTING	
4.3.3	FUELS (excluding fuels for testing and commissioning)	
4.3.4	WATER	WILL BE SUPPLIED
4.3.5	TELEPHONE AND ADMINISTRATION	
4.3.6	SAFETY, HEALTH AND WELFARE	
4.3.7	STORAGE OF MATERIALS	
4.3.8	RUBBISH DISPOSAL	
4.3.9	CLEANING	
4.3.10	DRYING OUT	
4.3.11	PROTECTION OF WORK IN ALL SECTIONS	
4.3.12	SECURITY	
4.3.13	MAINTAIN PUBLIC AND PRIVATE ROADS	n/a
4.3.14	SMALL PLANT AND TOOLS	
4.3.15	GENERAL ATTENDANCE ON NAMED / NOMINATED SUBCONTRACTORS	
4.4	**MECHANICAL PLANT**	
4.4.1	CRANES	
4.4.2	HOISTS	
4.4.4	TRANSPORT	
4.4.8	PAVING AND SURFACING PLANT	n/a
4.5	**TEMPORARY WORKS**	
4.5.1	TEMPORARY ROADS	n/a
4.5.3	ACCESS SCAFFOLDING	
4.5.4	SUPPORT SCAFFOLDING AND PROPPING	
4.5.5	HOARDINGS, FANS, FENCING ETC	
4.5.6	TEMPORARY SCREENS	
4.5.7	HARDSTANDING	
4.6	**WORK BY OTHERS**	
4.7	**BY EMPLOYER**	
4.8	**PROVISIONAL SUMS**	
	Additional Costs to be added to overall Tender Cost	

FORM OF TENDER Section 5.00

5.1 FORM OF TENDER

TO: **NORTHWICK PARK HOSPITAL NHS TRUST**
FOR: **DESIGN, SUPPLY, DELIVERY, INSTALLATION AND COMMISSIONING OF SWITCH PANEL MAINTENANCE**
AT: **NORTHWICK PARK HOSPITAL - LONDON**
JOB NO: **……..**
TENDER NO:

I/We hereby undertake to enter into a contract to execute and complete the whole of the works described, implied or referred to in the documents inviting a tender.

for the sum of £……

(sum in words) .....

....

Exclusive of Value Added Tax which will be added at the appropriate rate.

I/we agree that should obvious errors in pricing or errors in arithmetic be discovered before acceptance of this offer in the priced bill and Specifications submitted by me/us these errors will be dealt with in accordance with Alternative 1 contained in section 6 of the N.J.C.C. Code of Procedure for Single Stage Selective Tendering 1996.

We agree that this tender remains open for acceptance for a period of 4 months from the date of tender.

The submission of this tender is deemed to imply that the tender is bona fide (please sign separate form) and that I/we have not divulged the tender price and further that I/we have taken all necessary steps to ensure that it will not be divulged to any person or body before 28 days after the day that tenders are to be submitted to Northwick Park Hospital NHS Trust.

Signature: .....

Printed: .....

Status: .....

Name of Contractor: .....
Address: .....

.....

Date: .....

Signature of witness to Signatory: .....

5.2 TENDER CERTIFICATE

TO:	**NORTHWICK PARK HOSPITAL NHS TRUST**
TENDER FOR:	**DESIGN, SUPPLY, DELIVEY, INSTALLATION AND COMMISSIONING OF SWITCH PANEL MAINTENANCE**
AT:	**NORTHWICK PARK HOSPITAL - LONDON**
RETURNABLE BY:	**2022 @ 12:00 noon**

The essence of selective tendering is that the client shall receive bona fide competitive tenders from all those tendering. In recognition of this principle, we certify that this is a bona fide tender, intended to be competitive, and that we have not fixed or adjusted the amount of the tender by or under or in accordance with any agreement or arrangement with any other person. We also certify that we have not done and we undertake that we will not do at any time up to 28 days after the date specified for the return of this tender any of the following acts:-

a) Communicating to a person other than the person calling for those tenders the amount or approximate amount of the proposed tender, except where the disclosure, in confidence, of the approximate amount of the tender was necessary to obtain insurance premium quotations required for the preparation of the tender;

b) Entering into any agreement or arrangement with any other person that he shall refrain from tendering or as to the amount of any tender to be submitted;

c) Offering or paying or giving or agreeing to pay or give any sum of money or valuable consideration directly or indirectly to any person for doing or having done or causing or having caused to be done in relation to any other tender or proposed tender for the said work any act or thing of the sort described above.

In this certificate, the word “person” included any persons, anybody or association, corporate or un-incorporate; and “any agreement or arrangement” includes any such transaction, formal or informal, and whether legally binding or not.

Signed .....

(To be signed by a Director, Company Secretary, Partner or Sole Principal)

Print Name .....

Position .....

On behalf of .....

Date .....

5.3 TENDER SUMMARY – BUILDING WORKS

Item Ref	Description	Price (£)
B1	Design	£
B2	Builderswork	£
B3	Demolition	£
B4	Ceiling / Walls / Partitions Adaptations for Access	£
B5	Floor Adaptations for Access	£
B6	Fabric Penetration Making Good / Fire Stopping	£
B7	System Integrity Testing	£
B8	Scaffolding / Hoists	£
B9	Other items (please specify)	£
B10	Phasing Requirements Other items (please specify)	£
B11	Contingency	£
Total Building Works Price		£

5.4 BREAKDOWN OF TENDER – ELECTRICAL SERVICES

This breakdown constitutes the Contract Sum Analysis. Please complete and return with your Tender.

ITEM	DESCRIPTION	SUM
1.	Preliminaries	£
2.	Survey works	£
3.	Safe System of Works Requirements	£
4.	Electrical Switch Panel Maintenance	£
5.	Protective Device Maintenance	£
6.	Control Cable System Repairs	£
7.	Replacement Electronic Control System	£
8.	Mobile Generator Hire Cost	£
9.	Mobile Generator Fuel Cost	£
10.	Temporary Back Feed Supply Cables	£
11.	Load Cable Migrations	£
12.	Extra over for out of hours working	£
13.	Testing and Commissioning	£
14.	Any other item not included above (give details)	£
15.	FIXED PRICE TENDER – TO FORM OF CONTRACT	£
16.	Provisional sum for contingency (10% of Fixed Tender Price)	£

(IN WORDS) .....

Signed.....

For and on behalf of.....

.....

5.5 ALTERNATIVE EQUIPMENT

List below those commodities which have been described as from a specified Manufacturers for which approval is sought to change from the specified Manufacturer. The Tender will be deemed always to include for commodities to be manufactured by the firm specified.

Commodity	**Specified Manufacturer**	**Proposed Manufacturer**	**Tender Cost Return**

Signed.....

For and on Behalf of.....

Date.....

5.6 UNSPECIFIED MANUFACTURERS

List below those commodities for which a Manufacturer has not been specified in the Tender Documentation and state the Proposed Manufacturer. Failure to list all the proposed Manufacturers below will not prevent consideration by the Contract Administrator of proposals at any other time, but the Tender will be deemed always to include for commodities which comply with the Descriptions contained in the Tender Documentation and which are of manufacture which the Contract Administrator will approve.

Commodity	**Name of Proposed Product**	**Name and Address of Proposed Manufacturer**

Signed .....

For and on Behalf of .....

Date.....

5.7 PROPOSED SUB-LET WORK

List below those parts of the works which will be sub-let and state the proposed firm. Failure to list all parts of the works to be sub-let will not prevent consideration by the Contract Administrator of proposals at any other time, but apart from the works listed below, the Tender will be deemed always to include for the work being undertaken by the Contractor.

Part of the Works	**Name of the Proposed Firm**	**Address of the Proposed Firm**

Signed .....

For and on Behalf of .....

Date.....

5.8 FORM OF DECLARATION

We declare that we are not parties to any scheme or arrangement under which

a) we communicate the amount of our Tender to any other person or body before the Contract is let

b) any other party for the works, which are the subject of our Tender, is reimbursed any part of his tender cost

c) our Tender prices are adjusted by reference directly or indirectly to the prices of any other Tenders for the works.

We also agree that:

No Tender shall be deemed to have been accepted by the Client unless such acceptance shall be notified to the Tenderer in writing under the hand of the Client. The invitation to submit a tender implies no obligation to accept the lowest, or any, tender and no responsibility for any expense or loss which may be incurred in the preparation thereof.

As witnessed by hand this.....day of.....

Signature.....

Contractor's Name in Full.....

Address.....

.....

SCOPE OF WORKS SECTION 6.00

Introduction

Lakes Join Grandly Ltd were commissioned in September 2022 to undertake an assessment of existing LV electrical systems on site at Northwick Park, London in order to determine where any maintenance was required and how to correct an operational issue on one of the main switch panels on site.

This contract is a full Turnkey package and requires the successful contractor to take on full Design and Build responsibility, including all temporary enabling works, Mechanical and Electrical installation including full liaison with the switch panel supplier to fully understand the maintenance requirements within the switch rooms. It is assumed all tenderers will have the relevant insurances in place, including Professional Indemnity.

A brief overview of the existing infrastructure is that there are 2 no rec incomers and 6 no Trust owned transformer sub stations fed from the DNO's local 11kV network with designations sub 1, 2, 3, 4, 5 & 6. Each transformer feeds separate LV intake panels at each of these locations as shown on the existing site schematic diagram.

The transformers individually supply their own LV intake panels but they cannot be coupled and operate in parallel. Outgoing from each section of the main LV intake panels are supplies feeding a number of individual LV switchboards within the hospital as well as other direct fed loads (MRI, Power Factor Correction etc).

The hospital site is currently supported by 4 no. standby generators rated at 2200kVA, 1000kVA, 1000kVA & 675kVA to provide back-up 'essential' power to the various substation main LV switchboards to cover total site power failure from the REC and local failure between the main HV intake and main LV switchboard.

These will remain in operation throughout the works and all standby generators must be maintained fully operational at all times during the contract to provide emergency power support to essential Trust services.

It is Essential that the tendering Contractor visit site to carry out a full survey and familiarise themselves of the task in hand and of the existing building and surroundings.

All necessary survey, detailed design and construction should be allowed for as it will be the Contractors responsibility for the design and build of these as part of this package and take in to account the risk of system continuity.

The switchgear at each block will be maintained to provide greater reliability to existing services. Some modification to H Block LV switch board / switchgear controls will be necessary to enable all works to be undertaken.

It should be noted there is no cable void beneath the LV switch panel at any location and the majority of SWA cables enter the LV Panel from above and are terminated to the top of the panels and will need to be protected throughout the works.

Any existing monitoring and protection systems will need to be maintained as necessary and should be included in the contractor's tender price along with testing and commissioning of the plant together with full training of operation and maintenance staff prior to handover.

The Contractor will be responsible for all design, engineering, collection, delivery, offloading, handling, positioning and installation requirements of new equipment and materials as well as removal of redundant existing plant. Deliveries and movements will require close coordination between the Trust and the contractor as access is very restricted.

All work associated with electric systems and equipment must be performed in accordance with accepted industry safety standards and work practices and in strict accordance with the HTM Safe System of Works.

As previously advised in the earlier section, this part of the Specification relates specifically to the existing

'H' Block, Substation 2, Substation 6 and A&E department site electrical Infrastructure and essential maintenance required on major switch gear at Northwick Park Hospital, London.

This part is to be read in conjunction with all other parts of the specification. Where detailed requirements given in this part are at variance with the general requirements of this specification, the method described in this part shall apply, but the Contractor shall bring this to the attention of the Contract Administrator.

The drawings indicate diagrammatically the requirements of the installations so far as location of various plant and items of equipment are concerned.

The Contractor shall carry out the surveys, procurement, programming, working drawings, supply, delivery to site, positioning, installation, maintenance, fixing and making all connections to all materials necessary, protection, setting to work, cleaning and the testing and commissioning of the completed electrical installation and associated works for its satisfactory operation, all in accordance with the requirements of this Specification and the accompanying drawings.

All maintenance works shall be undertaken on essential electrical services under strict Permit to Work processes in accordance with the HTM Safe Systems of Work so must include all PPE and system protection necessary to complete the required system upgrades.

The prestart works to be undertaken generally include, but may not be restricted to, the following:

1. Survey the site and the existing switch panels to understand the practicalities of achieving the task
2. Produce working drawings showing how the switchgear support systems including any necessary mobile generators will be configured, safely installed and connected into the main switch panel and on to the bars / cables of the agreed devices
3. Programme in all the works necessary to achieve the system maintenance
4. Ensure the area identified for the switch gear maintenance is clear of any equipment and materials

The maintenance arrangements will then take two alternate approaches depending on the existing switchgear arrangements.

1. Maintenance Alternate 1 –
    a. Where the switch panels have two LV incomers and a bus-coupler arrangement such as on Substation 2, Substation 6 and A&E department, the contractor shall utilise the bus-coupler to support each part of the panel whilst each of the main supply ACB maintenance is being undertaken.
    b. Whilst the ACB bus-coupler is being maintained, the two main LV supplies shall be switched to support the complete panel in two halves as long as there is a total and safe disconnection between both panel sections
2. Maintenance Alternate 2 –
    a. Where the switch panels has a bus-coupler with a LV and Generator feed such as on H-Block, the contractor shall again utilise these to support each part of the panel whilst the main supply ACB maintenance is being undertaken but in this instance when the LV ACB is being maintained only the essential section of the panel will be supported due to restricted load capacity on the panel and generator.
    b. Whilst the ACB bus-coupler is being maintained, the LV and generator supplies could be switched to support the complete panel as long as there is a total and safe disconnection between both panel sections

Once the main ACB's have been maintained, the contractor shall allow to undertake thermographic scans of each panel and then undertake all of the maintenance they can reasonably undertake without isolating the panel completely. In the event that the thermographic scan identifies any anomalies or problem areas, these will be investigated further and in accordance with the schedule of maintenance activities included at the back of this document.

In regards H-Block switch panel, the works are much more involved than purely the maintenance activities described above as the existing control system is currently causing serious issues when the systems are changing over between LV and generator supplies. The existing system comprises a combination of

electrical and mechanical control elements with a wall mounted Weirgrove electrical control panel and mechanical wires internally within the panel linking the LV Mains ACB, Generator ACB and Bus-Coupler.

The electrical control system is quite a complex arrangement though as the existing switchpanel installed by Austin Turner was provided with a practical Deep Sea 530 control module linking the ACB's. At some point since installation though, the DSE 530 apparently created some changeover control issues and a previous Trust manager took the decision to disable the unit rather than repair the problem and replace it with a new, overly complex Weirgrove panel complete with a Siemens Simatic display screen and even a Synchroscope, although this latter unit does not appear to be functional.

This replacement 'AMCO' control panel generally links in to the three ACB control terminals but unfortunately no detailed or updated record drawings are available as the contractor who undertook that element did not provide any record information. During the survey however, we were able to locate 3no hand annotated drawings with some various alterations and terminal markings that appear to tie up, albeit partially, with the installed systems. As part of the works the successful contractor will need to trace and prove all control wiring to enable the looms to be migrated over to the new systems.

In addition to the electrical control panel, the ACB's are also controlled through a mechanical pre-tensioned wire system which is configured to push or pull various levers connected to the ACB chassis mechanism causing the device to open or close accordingly.

The operation of the two systems is believed to be along the lines of:

1. The LV mains ACB notices a supply failure and signals through the Weirgrove panel to start the generator
2. Once the generator is up to speed it signals back through the panel causing the generator ACB to close
3. This operation causes the mechanical link to open the LV mains ACB
4. At the same time a second mechanical link from the generator ACB causes the bus-coupler to open
5. Once mains is available the operation is in reverse but this time it requires manual intervention from a member of the Trust to turn a button fully counter clockwise and hold until the breaker opens at which point the ACB's sequentially switch back to their mains healthy state.

Not only is the system far too complicated for the panel arrangement but the mechanical interlinks are causing significant operational issues whereby they regularly stick in position during routine generator testing and despite the mains being in a failed state and the generator online and up to the ACB incomer, the system fails to changeover. The cause of these issues is believed to be the mechanical control wires being at an incorrect tension or becoming seized due to lack of use or routine maintenance.

The proposal is therefore to replace the complicated Weirgrove control panel and unreliable wire links with a new electronic control system such as a Deep Sea 335 or similar unit which will be configured to open and close the various ACB's as necessary. The final design and configuration of this element will sit with the contractor as a Contractor Design Portion (CDP) element as it will be necessary to trace and prove all wiring throughout the systems.

As there is a high degree of uncertainty and risk around the system disconnection and replacement, it will be essential for the contractor to provide a temporary back-up system to support all of the connected loads. To achieve this, the contractor will arrange for a new temporary distribution panel, two new 500KVA mobile generators complete with day tank and remote fuel monitoring to be hired in, delivered to site and positioned in the Chapel generator area and configured as indicated on the tender drawings and let in a manual start mode ready to assume the full load of any identified loads be supported.

A set of temporary feed cables will then be installed from this mobile generator arrangement up to a temporary external switch panel arrangement located between H-block and Substation 2 from which multiple load cables will be routed through in to H-block LV switch room and connected in to the switch panel in the outline method indicated below.

Outline installation steps - **potential for an extended period of vulnerability to <u>each</u> load**

a. The works will start with the least impactful of all the loads to be supported
b. At an agreed time for each identified load to be supported, the existing load shall be switched off, the door opened, and the fuse carrier removed from the panel.
c. Once removed, the fuses shall be disconnected from the carrier and set aside for reuse when the works have been completed
d. One of the temporary load cables from the external switch panel will then be connected on to the load side of fuse carrier which will then be reinserted into the panel
e. A temporary Perspex screen will then be fitted over the door opening allowing the cables to pass out freely but enabling the safety interlock to latch
f. Once all connections have been made on to the identified loads, the main LV and generator ACB's will be switched off, opened and locked off to isolate the panel fully.
g. The temporary generators will be started and the contractor will ensure the supply is present up to the external temporary switch panel. All load devices in the temporary panel will remain switched off at this point
h. The handle on the most important load will then be operated and the fuse carrier closed on to the panel bars and checked to ensure it is functionally sound
i. The output device on mobile generator connection panel will then be switched on and the load tested to ensure it is fully operational and all systems are back online.
j. All loads will then be connected and switched on in the same manner until all systems are fully operational and running on the mobile generator system

Once all existing loads have been migrated over to the temporary arrangement, the LV main ACB, generator ACB and bus-coupler ACB shall be racked out fully so that the existing systems are fully isolated and the panel can be confirmed dead. The control cable linking systems shall then be completely removed from within the panel and all control modifications undertaken.

At the end of the works and the new control systems have been installed, the main ACB's shall racked back in to enable the systems to be robustly tested offline to ensure they operate correctly and simulate mains failures to ensure the ACB's open and close in sequence.

Once the robust testing has been completed, each of the supported loads will be isolated and disconnected from the temporary arrangement. The fuses will then be refitted into the carrier and the system connected back into an operational state in the panel

After all systems have been reinstated, the panel shall be switched back on and all loads tested to ensure they are fully re-supported by the main systems. It is also strongly recommended that the panel is then tested several times to ensure the systems change over and perform correctly so that each time the mains fails and the generator starts the LV ACB and bus-coupler open and the generator ACB closes to restore the panel and all connected loads.

We would suggest this is approximately 1-weeks' worth of work but some elements such as surveying the switchgear to be supported, capturing all of the systems to be transferred, completing the design of the temporary systems, preparing working drawings and then arranging for delivery to site and positioning of systems in an agreed position can all be done in advance. Additionally, arranging all of the paperwork and draughting permits can also be done in advance to reduce this time where possible. This shall then be followed by all necessary isolations and migrations, but the successful contractor must confirm full timescales at tender return though

The Contractor's programme for carrying out the above works shall be agreed with the Contract Administrator in liaison with the Client. The Contractor shall make allowance for working and co-ordination with other trades and working within an occupied building and on live switch panels.

It should be noted that there will be a requirement to work out of hours and NO shutdowns of critical areas, i.e. Critical Care will be permitted, unless by prior arrangement. All works must be completed with zero impact to the Trust unless meticulously planned.

Installation and Phasing of the Works

The Works shall be taking place within a CDM controlled environment and coordination will be required between the Trust and the Contractor.

The installation shall comply with the current standards and regulations applicable.

All materials, equipment, work, facilities, and services necessary to undertake the Works shall be performed and supplied in accordance with the most recent legally required applicable standards, codes of practice, legislation, requirements of the relevant government, regulatory body at time of contract award.

The Contractor is responsible for identifying any conflicts found between the requirements of this Specification and any codes and standards used in the design. In the event of conflict in standards, the following hierarchy of standards shall apply in order of precedence, unless otherwise agreed:

- Statutory requirements
- Standards identified in the Specification
- European Standards (EN)
- British, National or International Standards (BS, ISO, DIN, ASME, ASTM etc.)

This document contains representative examples of the Standards and Codes of Practice only and should not to be considered as comprehensive. Additional Standards and Codes of Practice are identified throughout the Specification.

Phasing of the Works

The main supply and LV distribution systems is to remain operational at all times during the works and this will require a multi-phase approach to the installation.

The potential works phasing subject to confirmation and acceptance by the successful contractor includes:

1. Area preparation including site clearance
2. Isolation, strip-out and removal of any Trust storage and general waste
3. Thermographic scans of all panels
4. Maintenance of Substation 2, Substation 6 and A&E switch panels as far as practicable without an outage
5. Installation and connection of mobile generator to support H Block switch panel and all associated loads to be migrated
6. Prove operation of the connected mobile generator system
7. Migration of all existing loads from H Block switchgear over to temporary generator switch panel
8. Full isolation of H Block panel
9. H Block switch panel controls replacement
10. H Block switch panel intrusive maintenance
11. H Block switch panel offline testing
12. Reconnection of loads back on to H Block switch panel
13. H Block switch panel online testing
14. Disconnection and removal of mobile generator
15. Removal of redundant systems
16. Clearance of site

Throughout the installation there is a significant risk to the Trust, so the contractor must ensure generator coverage at all times by a minimum of two generators and ancillary equipment available such that these will be able to provide power at their nominal rated capacity to maintain the power distribution systems.

The contractor shall include within their tender breakdown clearly identified costs for the provision of the following individually priced temporary arrangements on a per week basis:

1. 2No 500kVA generator

2. All necessary temporary cabling to support the full systems and all switch panels designated for connection (allow for 3-weeks hire in the tender)

In the event these systems are not required these monies will be omitted from the final account. The contractor can employ the services of GWF Energy or similar to provide these temporary supply systems.

LV Switchboard Enclosure
(The below text are general elements of what the existing panels are expected to comprise)

The extensible cubicle constructed switchboard are generally an all welded 2mm sheet metal framework for strength and robustness. The complete modular internal assembly are designed to allow for increased flexibility and is also manufactured from 2mm thick steel.

All cubicle compartments are accessed via hinged lockable doors, which are manufactured from 2mm thick sheet steel complete with double returned edges and neoprene gaskets.

All MCCB compartments have door interlocked rotary handles, which are all fuse ways MCCB's and ACB's fixed or withdraw able and lockable in the Off position. All busbar chambers and cableways are accessed via bolt-on covers. Busbars are generally completely segregated via 2mm thick sheet metal partitions.

Cable entry either top or bottom as required is achieved via removable undrilled gland plates.
For larger cross-sectional area cables cable entry can be made directly onto the device via a cable access compartment located directly above or below the device compartment (depending on cable entry).

To allow for ease of installation in restricted areas the switchboard framework is sometimes capable of being split down into sections with a minimum width of 750mm if necessary.

Busbars – Front Access

The HDHC copper busbar system are generally air insulated according to BS1432 with an ASTA certified busbar system fault current rated up to 50KA for 3 Second depending on current rating.

Sherburn Busbars – Rear Access

The HDHC copper busbar system are generally air insulated according to BS1432 with an ASTA certified busbar system fault current rated 50KA for 3 Seconds, 80KA for 1 Second or 100KA for 1 Second depending on current rating.

The busbar system design generally allows for all connections from the main busbar system to the protective device via solid copper connection studs. These solid copper connections are usually fully rated to the maximum current rated device that can be fitted in the cubicle it supplies

LV Switchboard Paint Standards

The following is the general paint specification, which conforms to BS3189 Type 2

- Pre-treatment Alkaline degreaser and cleaner cold-water rinse
- Acid degreaser and etch
- Cold water rinse
- Zinc Phosphate
- Cold water rinse
- Final hot water rinse
- Powder Coating

- Polyester powder coating

Finished in epoxy polyester powder coat RAL 7035 Grey or similar approved.

LV Switchboard Labels

All items of equipment are generally identified by suitable engraved laminated white/black lettering Traffolite labels and are secured by fixing screws

LV Switchboard Outgoing Devices

The switchboard are typically manufactured to - Form 4 Type 6 – Front Access

Form 4 is achieved by each functional device including its Neutral having its own compartment that are mechanically separated from all other devices and busbar system using 2mm thick rigid metallic barriers. These compartments shall be accessed via door interlocked lockable rotary handles.

The armoured cable for each outgoing way are generally glanded onto a common metallic gland plate, the tails of said cable are then passed through the cable way and into the device compartment and terminated directly onto the device (via copper extension terminals for larger C.S.A cables)

Busbars

The HDHC Copper Busbar System are generally rated in accordance with BS60439-1 Temperature Rise requirements; the diversity factor applied is unknown but assumed to be as stated within BS60439-1 dependant on number of outgoing ways.

Commissioning

The contractor will allow for commissioning of the new control system in H Block Panel including stage tests and demonstration. Once installed a complete and full system commissioning check must be carried out, checking mains failure and return.

The Trust must be consulted with at each stage to ensure they are fully aware and prepared for the inevitable disruption which will arise.

Engineering Site Survey

The contractor will allow for a detailed site survey to obtain full information to provide a fixed price offer and acquire technical information for the system design.

Documentation

The contractor will produce / update the following documentation for all new and existing equipment incorporated, maintained and supplied.

- LV Switch Panel electrical schematics showing new control systems
- The Control Management User Manual
- Details on the automatic operation of LV breakers

Contractor responsibilities

1. The contractor will finalise all Contractor Design Portions which include but may not be limited to
    - i Surveys (Internal to switchgear and external)
    - ii Control system design
    - iii Cable sizings and fuse ratings
    - iv Finalisation of maintenance requirements
    - v Delivery of all equipment including mobile generators

2. The contractor will allow for commissioning (Out of hours) the LV switch panel
3. The contractor will provide all welfare facilities for their personnel working on site.
4. The trust will provide 230vac supply for their 110vac portable tools.
5. The contractor will include to carry out full testing of the supplied equipment and working with the Trust and employment of the DNO witnessing engineers if necessary.
6. The contractor will allow for all Power Control and Comms cable installation and all Civil works as necessary.
7. The contractor will allow for all deliveries, Cranes Offloading, Mechanical and Electrical works and Installation of the new equipment
8. The Contractor shall note the space and access limitations in the North Side Mains intake areas as they are very restrictive.

Design Criteria

General

The Contractor shall provide equipment and systems of proven technology that has operated commercially at other locations of a similar type, scale, nature and complexity. The Plant shall be designed to be safe, economic (in both capital cost and operating cost) and offer a high availability / reliability with low outage / downtime. The Plant shall be automated and require minimum operator intervention under normal operating conditions.

The maintained LV Switch Panel shall be capable of delivering the outputs over the full range of anticipated ambient conditions as defined in the Specification. Adequate allowance shall also be included for normal variations in Plant operating conditions. All supporting auxiliary systems shall be inspected and checked as having adequate margins of capacity to achieve this requirement.

Design Life

The “Design Life” is the period of time over which the Plant is required to continue to meet its expected performance with predictable operating and maintenance costs and without the necessity to rebuild major structural elements.

The Plant shall be designed for a life of at least 25 years and will be operated and maintained in accordance with the Contractor’s O&M manuals. Civil works shall generally be designed for a minimum working lifetime of not less than 25 years such that major structural repair shall not be required during this period.

The Plant shall be designed to facilitate safe inspection, cleaning, maintenance and repair. The design shall incorporate every reasonable precaution and provision for the safety of all persons concerned in the operation and maintenance of the Plant.

Wherever possible, Plant systems and components shall be designed for standardisation and interchangeability utilising equipment of reliable and proven performance from reputable manufacturers.

Design Conformity

All equipment supplied shall conform to the requirements of the Specification.

The Plant shall be capable of withstanding, without damage, undue heat, strain, vibration, noise, corrosion or other operating difficulties, all stresses which may be experienced during normal operation, cyclic load operation, sudden load swings and under all specified test conditions. No part of the Plant shall suffer from accelerated ageing as a result of exposure to the specified ambient and operating conditions.

All materials, equipment and systems to be incorporated into the works shall be new and of a standard proven design.

The Plant shall be designed so that no single fault of auxiliary Plant shall initiate the failure of the whole installation up stream.

All equipment and systems shall have sufficient margin to cater for equipment and system wear, tear and deterioration.

Design Standards & Codes of Practice

The Contractor shall comply with all Laws and regulations of the United Kingdom. All systems and equipment supplied, all work carried out in fulfilment of the Contract shall conform in all respects to all the laws and regulations, by-laws and requirements of National / local or other authorities which are applicable to the Works.

The Plant shall comply with the current Occupational Health and Safety Regulations.

European Standards (EN) shall be used for the design, construction and testing of the Plant. Where EN standards are not available, the Contractor may request to use appropriate National or International Standards.

All materials, equipment, work, facilities, and services necessary to undertake the Works shall be performed and supplied in accordance with the most recent legally required applicable standards, codes of practice, legislation, requirements of the relevant government, regulatory body at time of contract award.

The Contractor is responsible for identifying any conflicts found between the requirements of this Specification and any codes and standards used in the design of the. In the event of conflict in standards, the following hierarchy of standards shall apply in order of precedence, unless otherwise agreed:

- Statutory requirements
- Standards identified in the Specification
- European Standards (EN)
- British, National or International Standards (BS, ISO, DIN, ASME, ASTM etc.)

The Contractor shall provide Electrical equipment that enables operation and maintenance to be performed in a safe and efficient manner in compliance with all Statutory regulations including and the most current standards and codes of practice at time of contract including but not limited to:

- Electricity At Work Regulations 1989
- Electricity Safety, Quality and Continuity Regulations
- Health and Safety at Work etc. Act 1974
- BS EN 50160 – Voltage Characteristics of Electricity Supplied by Public Distribution Systems
- BS 7671: Requirements for Electrical Installations
- BS EN 7430 – Code of Practice for Earthing
- Control of pollution (Oil Storage) (England) Regulations 2001
- HSG 176 - Storage of Flammable Liquids in Tanks 2015
- PPG2 Pollution Prevention Guidelines 2004
- The Building Regulations 2012 Approved Document J6.
- Recommendations for Fire Safety in the Storage of Highly Flammable and Flammable Liquids - Part 1 General Principles RC20 part 1. The Fire Protection Association.
- Risk Control - Storage and Use of Highly Flammable and Flammable Liquids in External Storage Tanks RC57. RISC Authority.
- GAPS Guidance 2.5.2 Table 3.
- Material Safety Data Sheet - Diesel Fuel Oil - Nationwide Fuels.
- Oil Fired Technical Association (OFTEC) guidance OFT 200.
- HSE website http://www.hse.gov.uk/fireandexplosion/petroleum-faqs.htm.
- BS EN 12285-2.

- Engineering Recommendation P25 – The Short-Circuit Characteristics of Electricity Boards Low Voltage Distribution Networks and the Co-ordination of Overcurrent Protective devices on 230V Single Phase Supplies up to 100A (1984)
- Engineering Recommendation P26 – The Estimation of the Maximum Prospective Short- Circuit Current for Three Phase 400V Supplies
- Engineering Recommendation P28 – Planning Limits for Voltage Fluctuations Caused by Industrial, Commercial and Domestic Equipment in the UK
- Engineering Recommendation G5/4 – Limits for Harmonics in the UK Electricity Supply
- Engineering Recommendation G74 – Procedure to Meet the Requirements of IEC 60909 for the Calculation of Short Circuit Currents in Three Phase AC Power Systems
- Engineering Technical Report 120 – Application Guide to Engineering Recommendation G74
- ATEX
- DSEAR

Design Site Operating Conditions

The generator plant is situated outside and ambient temperature and humidity values are typically those that are prevailing in Harrow.

Air quality is unchanged from local ambient air; no filtration is used or required.

The site is not considered to be subject to unusual levels of shock, vibration, chemical pollution or radiation but the contactor shall confirm this as part of their final design checks.

Information to be Provided By The Contractor

Working Drawings

Upon the receipt of the confirmation of the acceptance of his tender, the Contractor shall prepare and issue to the CA for comment fully detailed working drawings showing all electrical services systems and associated works.

The Contractor shall also prepare and issue for comment builders work drawings. Working drawings shall include:

- 1:50 scale plan drawings of the proposed installation
- 1:50 section drawings of the proposed installation
- Schematic drawings of the proposed installation
- Control wiring diagrams for the proposed installation and controls description of operation
- Manufacturers' drawings of equipment proposed for the installation
- Builders work drawings

Certificates

Copies of all test/commissioning certificates as identified in the specification shall be issued to the Contract Administrator for comment.

Equipment, Plant And Materials

A complete schedule of equipment, plant and materials to be used in the Contract shall be included at the time of tendering.

This schedule shall give details of the manufacturers, types, sizes and catalogue numbers (where applicable).

Installation Requirements

All of the installations shall be in accordance with the requirements of this Specification in respect of standards of materials and workmanship.

Responsibilities

The Contractor shall be responsible for all elements of this project including the survey, detailed design, supply of labour, equipment and materials, erection, testing, commissioning, setting to work, providing records and instructions for the mechanical building services systems described in this specification, and for handing over all systems in full working order ready for immediate use.

The installation shall be complete in all respects, including all ancillaries necessary for the systems to be tested, commissioned and perform correctly as required in the design intent.

The Contractor shall be responsible for co-ordination of his work in technical, position and program with all other contractors, sub-contractors and suppliers.

The entire installation and performance of the systems including all materials, equipment and plant etc., used shall be "fit for the purpose" for which they are intended.

The acceptance of the tender and the comment on the calculations and drawings shall not absolve the Contractor from his responsibilities.

Existing Services Provisions

Details of the existing services installations are given for general guidance only and are not complete and accurate in any respect. The Contractor shall examine the systems on site and shall be deemed to have done so in order to establish the full extent of the existing installation.

Redundant fittings and equipment shall be offered to the Client prior to the removal from site.

The Contractor shall be responsible for any necessary reinstatement and making good following the removal of redundant equipment.

Should any connections be required into existing services then any necessary shutdown shall be fully co-ordinated with the Client

Testing And Commissioning

The Contractor shall test/commission the whole of the electrical system to the satisfaction of the Contract Administrator, Building Inspector, Client's representative, utilities and all other parties having jurisdiction over these works.

In general, all swicthpanels shall be cleaned out and cleared of debris and prepared ready for operation by the Contractor who shall satisfy himself that the systems meet the design intent.

The Contractor shall provide all test records to the Contract Administrator and include copies within the maintenance documentation.

The Contractor shall allow for full demonstration to the Client, or his representative, of the operation of all systems, new and existing.

All testing and commissioning shall be completed before handover.

Protection

The Contractor shall provide all things necessary for the protection of the building infrastructure and

systems.

The Contractor shall provide all things necessary including dust covers for the protection of the Client's equipment and books, etc., that may be present in rooms in which work is being undertaken.

Any damages sustained during the installation works will be made good at the Contractor's expense.

RISK ASSESMENTS AND METHOD STATEMENTS

The Contractor shall provide as a minimum the following Risk Assessments and Method Statements:

- Works to Electrical Systems
- General Access to undertake works
- Access to "LIVE" systems
- Isolation of services
- Monitoring.
- Testing and commissioning

Implementation Strategy

The process that the Trust intends to follow to implement the project will include a distinct number of phases both pre and post contract and will include

Phase 1 - Outline performance design produced by Lakes Join Grandly Ltd to outline the Trusts preferences and most appropriate solution

Phase 2 - Competitive tender to obtain prices from specialist contractors to

1. Undertake detailed surveys to confirm system configuration and access requirements
2. Determine the specific connection requirements
3. Complete detailed design and schedule all the necessary works
4. Undertake intrusive access to undertake work

This outline design specification also includes a preliminary phasing methodology and plan that we have outlined above and now needs to be refined and completed by the successful contractor

Northwick park Hospital shall also be fully informed of all works throughout the processes by issuing the appropriate Risk Assessments and Method Statements necessary to undertake the works.

This specification should be read in conjunction with the Trusts Health and Safety Standards which are available from Northwick Park Hospital.

DELIVERABLES

For each written deliverable, draft and final, the Contractor shall submit to the Trust one hard copy and one electronic copy compatible with Microsoft Office 2007, Microsoft Project 2007 and/or Visio 2007.

Drafts of all final deliverables are required at least two weeks in advance of when all final deliverables are due. Written deliverables defined as draft documents must demonstrate due diligence in meeting the scope and requirements of the associated final written deliverable. A draft written deliverable may contain limited structural errors such as poor grammar, misspellings or incorrect punctuation, but must:

A. Be presented in a format appropriate for the subject matter and depth of discussion.
B. Be organised in a manner that presents a logical flow of the deliverable's content.
C. Represent factual information reasonably expected to have been known at the time of submittal.
D. Present information that is relevant to the Section of the deliverable being discussed.

E. Represent a significant level of completeness towards the associated final written deliverable that supports a concise final deliverable acceptance process.

Upon completion of a deliverable, the Contractor shall document such in final form to the Trust for acceptance. The Contractor shall record such delivery in a detailed Document Transmittal record / Acceptance Form to provide a full audit trail of any necessary revisions.

Upon receipt of a final deliverable, the Trust shall commence a review of the information as required to validate the completeness and quality in meeting the Trust's requirements. Upon completion of the review, the Trust shall issue to the Contractor a notice of either acceptance or rejection of the deliverables along with any comments they may raise. In the event of rejection, the Contractor shall correct the identified deficiencies or non-conformities.

Subsequent project tasks may not continue until deficiencies with a deliverables are rectified and accepted by the Trust or they have specifically issued, in writing, a waiver for conditional continuance of project tasks. Once the Trust's issues have been addressed and resolutions are accepted, the Contractor will incorporate the resolutions into the deliverable and resubmit the information for acceptance. Accepted deliverables shall be invoiced within 30 days in the applicable invoice format included in the Trusts Standing Financial Instructions (SFI's)

When presented for acceptance, a written / drawn deliverable defined as a final document must satisfy the scope and requirements of this specification. Final deliverables shall not contain structural errors such as poor grammar, misspellings or incorrect punctuation, and must:

A. Be presented in a format appropriate for the subject matter and depth of discussion.
B. Be organised in a manner that presents a logical flow of the deliverable's content.
C. Represent factual information reasonably expected to have been known at the time of submittal.
D. Present information that is relevant to the Section of the deliverable being discussed.

The Trust's required deliverables are defined below. Within each task, the Contractor may suggest other subtasks or deliverables to improve the quality and success of the project. The key deliverables are:

1. Project Management Plan

To include detailed project scope, task schedules, allocated resources and interrelationships with other projects. It also needs to provide details on the involved functional units, required job tasks, cost and schedule performance measurement, and milestone and review schedule.

The Project Management Plan shall be included on the Document Transmittal / Acceptance Form developed by the Contractor for approval by the Trust

- Customer information and project data.
- Enclosure information: At a minimum, enclosure information is to include minimum and adjusted design concentrations, minimum and maximum enclosure temperatures, minimum agent required and volume of enclosures, including non-permeable volume if applicable.
- Agent information: At a minimum, agent information is to include cylinder size and part number, quantity of cylinders, main and/or reserve cylinders, pipe take off direction and the floor loading for agent cylinder.
- Pipe network information: At a minimum, pipe network information is to include pipe type, pipe diameter, pipe length, change in direction or elevation, pipe equivalent length and any added accessory equivalent length. In addition, the following nozzle information shall be provided; number of nozzles and identification of enclosure location, flow rate of associated nozzle, nozzle nominal size, nozzle type, and nozzle orifice area.
- Pipes and pipe fittings: A detailed list of pipes and pipe fittings used in the design of the pipe network

The Flow Calculation Reports shall be included on the Acceptance Form developed by the Contractor for approval by the Trust

2. Installation Drawings

Four (4) sets of installation drawings for each installed engineered system and one (1) set of the calculation report, owner's manual and product data sheets shall be submitted to the end-user/owner. Upon completion of installation and commissioning acceptance, two (2) sets of "As-Built" installation drawings and One (1) set of the calculation report for each installed engineered system shall be given to the owner/end-user for use and reference. Two (2) copies of the System Design, Installation, Operation and Maintenance Manual shall be submitted

The Received Documentation shall be included on the Acceptance Form developed by the Contractor for approval by the Trust

3. Risk Management Plan

Present a clear, concise statement of the purpose of the Risk Management (RM) plan. Include the name and code name of the project, the name(s) of the associated system(s), and the identity of the organization that is responsible for writing and maintaining the RM plan.

The Risk Management shall be included on the Document Transmittal / Acceptance Form developed by the Contractor for approval by the Trust

4. System Design Document

Describes the system requirements, operating environment, system and subsystem architecture, detailed design, processing logic, and external interfaces. Also include Draft design (line diagrams) documents showing schematic arrangement of piping, electrical conduit and location of equipment. Draft works programme including timelines and milestones; as well as conclusions to inspection of spaces both indoors and outside to confirm equipment location suitability. This will include both a physical inspection of the spaces and an inspection of the electrical infrastructure to verify adequacy of service.

Note: Advance notification may be needed for access to plant rooms.

The System Design shall be included on the Document Transmittal / Acceptance Form developed by the Contractor for approval by the Trust

5. Implementation Plan

Describes how the system will be deployed and installed. The plan contains an overview of the system, a brief description of the major tasks involved in the implementation, the overall resources needed to support the implementation effort, and any site-specific implementation requirements.

The Implementation Plan shall be included on the Document Transmittal / Acceptance Form developed by the Contractor for approval by the Trust

6. Test Plan

The Contractor shall submit a test plan that describes how the system equipment and duct integrity shall be tested. This shall include a step-by-step description of all tests and shall indicate type and location of test apparatus to be used. At a minimum, the tests to be conducted shall be British Standards and any additional supplemental tests required by the System Manufacturer. Tests shall not be scheduled or conducted until the Trust approves the test plan.

The Test Plan shall be included on the Document Transmittal / Acceptance Form developed by the Contractor for approval by the Trust

Required Project Policies, Guidelines And Methodologies

The Contractor shall be required to comply with all applicable laws, regulations, policies, standards and guidelines affecting information technology projects, which may be created or changed periodically. The Contractor shall also adhere to and remain abreast of current, new, and revised laws, regulations, policies, standards and guidelines affecting project execution.

These must include design and installation practices set forth by system manufacturer, who along with the contractor shall

- Meet ISO 9001 requirements for the design, production and distribution of the engineered system.
- Ensure all components of the installed system shall be the products of the same manufacturer or listed by that manufacturer as compatible with those devices, components and equipment.

Contractor Expertise Required

The Contractor must document a professional level of expertise in Electrical system testing and have a proven track record in works of this type.

Contractor Minimum Qualifications

The following minimum qualifications are mandatory. The Contractor shall be capable of furnishing all necessary services required to successfully complete all tasks and work requirements and produce high quality deliverables described above. The tendering Contractors shall demonstrate, in their proposal, that it possesses such expertise in-house or has fostered strategic alliances with other firms for providing such services:

- Certified Electrician
- Certified Tester
- Ideally Competent Person trained
- Manufacturer must have:

1. The contractor shall have a minimum of five (5) years' experience in the design and repair of systems of similar type.
2. The contractor shall be certified to ISO 9001 for a minimum period of five (5) year.
3. The name of the manufacturer and manufacturer part numbers shall appear on all major components.
4. All devices, components and equipment shall be the products of the same manufacturer / supplier.
5. All devices, components and equipment shall be listed by the standardising agencies.

- The Contractor must:

1. Employ a person who can show proficiency in certification of special hazards design.
2. Confirm in writing that he stocks a full complement of spare parts and offers 24-hour emergency service for all equipment being furnished.

Progress Reports

The Contractor and the Trust shall conduct Monthly progress meetings and a detailed project progress report shall be submitted by COB at least three (3) days in advance of each progress meeting and shall contain, at a minimum, the following information:

- Trust name,
- Trust Project number,
- Functional area name and number,
- Reporting period
- Progress Report Number

- Work accomplished during the reporting period.
- Deliverable progress, as a percentage of completion.
- Problem areas, including scope creep or deviation from the work plan.
- Planned activities for the next reporting period.
- Gantt chart updated from the original to show actual progress; as applicable, explanations for variances and plan for completion on schedule.
- An accounting report for the current reporting period and a cumulative summary of the totals for both the current and previous reporting periods. The accounting report shall include amounts invoiced-to-date and paid-to-date.

Change Orders

If the Contractor is required to perform additional work, or there is a work reduction due to unforeseen scope changes, the Contractor and Trust shall negotiate an acceptable price modification based on the Contractor's proposed rates in the Main Contract and scope of the work change.

No scope of work modifications shall be performed until a change order is executed by the Trust and formally accepted by the Contractor.

Warranty

The contractor shall warrant all works for Twelve (12) months from the date of installation.

All Works And Departments Are To Be Inspected By The Tendering Contractor Prior To Pricing

Health and Safety Requirements

ALL Health and Safety precautions are required to be taken during the process of undertaking works both external and internally within buildings and must not be underestimated by the tendering contractors as all departments are live and fully operational.

Reference shall be made to The Northwick Park Hospital Health and Safety Policy and Contractors Guidance documents available from The Northwick Park Hospital Estates Office.

The Health and Safety Executive (HSE) publish a series of guidance documents regarding the many different methods of protecting the workforce and people in general when working with hazardous chemicals (COSHH) and undertaking potential dangerous work activities.

Installers engaged in any work for the Trust shall be registered with the Construction Skills Certificate Scheme (CSCS) and be in possession of a valid skills card. This is a mandatory requirement and no exclusions will be permitted.

MANUFACTURERS INFORMATION Section 7.00

MAINTENANCE TASK SHEETS Section 8.00

The below text covers the outline work requirements for each element of the electrical infrastructure

Switchgear - Thermographic Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Thermographic inspection should be performed at least once every three years on all switchgear, distribution panels, cable and bus connections, motor control centres and starters, and other critical equipment	
2	Infrared inspections are extremely beneficial in reducing electrical failures by identifying potentially dangerous conditions; such as, lose or dirty connections, overloaded or imbalanced circuits, or improperly installed equipment	
3	By measuring the heat imbalance relative to the environment and to surrounding equipment, abnormal or adverse conditions can be uncovered that if left unattended would worsen to the point of failure	
4	Thermographic surveys are very helpful in planning the work scope of an upcoming scheduled outage	
5	Prior to the planned maintenance, an IR survey should be conducted to help identify areas that need specific and immediate attention. Resources can then be allocated to address these specific problems during the de-energized period	
6	Thermographic surveys are done on energized equipment and should be conducted during peak demand periods if possible as this will reveal the most serious problems and those that would otherwise go undetected	
7	At a minimum, the loading should be at least 40% of the rated load of the equipment being inspected	

Switchgear - External Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check function of all power meters before shutdown	
2	Check function of lamps and indicators	
3	Inspect locking devices for signs damage or worn	
4	Clean thoroughly, vacuum and full visual inspection of exterior only	
5	Check electronic surge protection is intact where installed	
6	Visual inspection for signs of overheating or deterioration	
7	Inspection of all panels for paint work damage and signs of corrosion	

Switchgear - Enclosure Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Ensure that all enclosure panels, doors, and structures are well-maintained ideally in accordance with the manufacturer's specifications.	
2	During agreed maintenance, all enclosures are to be vacuum cleaned of all loose dirt and debris and any excessive dirt or other contaminates that do not come off with vacuuming should be cleaned with lint free rags using cleaning solvents but only those recommended by the switchgear manufacturer.	
3	The contractor shall note the use of compressed air is not recommended as this can cause foreign particles to become embedded in the insulation or in extreme cases damage insulators.	
4	All vents and fan grills are to be cleaned of all dust and dirt accumulations, ensuring that ventilation openings are not obstructed at the end of the cleaning process.	
5	Where seals and/or gaskets are installed, these should be examined and repaired or if necessary, replaced with new.	
6	All doors and access panels should be properly re-secured once the cleaning operations have been finished.	
7	Electrical equipment should be examined for evidence of water ingress with all enclosures examined for evidence of water since this is a common entryway that often goes undetected until a failure occurs. The source of the water should be immediately identified, and corrective measures taken to permanently correct the condition	

Switchgear - Insulators, Supports, and Connectors Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect insulators and conductor supports for signs of cracking, broken pieces, and other physical damage or deterioration.	
2	Clean all loose dirt with lint free rags. For contaminates that will not remove easily, solvents approved by the manufacturer may again be used albeit sparingly.	
3	Whilst cleaning take time to examine for evidence of moisture that may lead to tracking or flashover while in operation and examine surrounding areas for signs of tracking, arcing, or overheating.	
4	Repair or replace damaged insulators and supports as necessary but only with those approved / produced by the switchgear manufacturer.	
5	Examine all bolts and connecting devices for signs of deterioration, corrosion, or overheating, ensuring that bolts and connecting devices are tight, according to manufacturer's torque setting specifications.	
6	Be careful not to over-torque bolts and connecting devices since insulators are easy to damage and difficult to replace.	
7	In the event that copper and aluminium conductors and/or connectors have been used together, examine connections for signs of galvanic action, ensuring that the connectors are properly used and installed in accordance with manufacturer's specifications. Apply an antioxidant compound to all aluminium-to copper connections.	

Switchgear - Conductor Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Examine insulation for signs of deterioration, cracking, flaking, or overheating.	
2	Examine all connections for signs of overheating, cracked or broken connectors, and signs of tracking or arcing.	
3	Ensure that conductors are clean and dry.	
4	Examine and clean all connections, and torque to manufacturer's recommendations.	
5	Visual inspections of control wiring, relays, power supply units, timers and fuse carriers.	

Switchgear – General Intrusive Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect control wiring, relays, power supply units, timers, etc. where applicable	
2	Inspect mechanical interlock control wire, and other interlock where applicable	
3	Check electronic surge protection is intact where installed	
4	Verify control circuit fuse rating and continuity.	
5	Check and torque test bolted electrical connections as necessary to specified levels	

Switchgear – ACB Chassis / General Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Rack out ACB.	
2	Clean/ vacuum internal chassis	
3	Check operation of safety shutters closing	
4	Check shutter locking devices are intact	
5	Check operation and position of contacts	
6	Operate padlocking system	

7	Grease clusters as necessary	
8	Final visual inspection to insure all clear after work completed	
9	Check general condition of the device	
10	Check ACB locking devices	
11	Open/close manually	
12	Charge the device manually	

Switchgear – ACB Insulation Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check general condition of the device	
2	Remove and clean inter-phase barriers	
3	Clean all insulating materials with vacuum and/or clean lint free rags	
4	If it is necessary to use cleaning solvents, use only solvents recommended by the manufacturer	
5	Inspect for signs of corona, tracking, arcing, or thermal or physical damage.	
6	Ensure that insulation is left clean and dry	

Switchgear – ACB Contacts Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Ensure that all contacts are clean, smooth, and in proper alignment	
2	Ensure that spring pressures are maintained according to manufacturer's specifications	
3	Clean with diluents Henkel 273471, vacuum ACB	
4	On silver contacts, discoloration is not usually harmful unless caused by insulating deposits. Clean silver contacts with alcohol or silver cleaner using non-abrasive cloths	
5	Manually close breaker to check for proper wipe, contact pressure, contact alignment, and to ensure that all contacts make at the same time	
6	If possible, a contact resistance test should be performed to determine the quality of the contacts	

7	Older breakers equipped with carbon contactors generally require very little maintenance. But still examine for proper pressure, deterioration, or excessive dressing which may interfere with their proper operation	
8	Draw-out contacts on the circuit breaker and the stationary contacts in the cubicle should be cleaned and inspected for overheating, alignment, and broken or weak springs	
9	Coat contact surfaces with contact lubricant to ease mating	

Switchgear – ACB Arc Interrupters Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean all ceramic materials of loose dirt and examine for signs of moisture, making sure the assemblies are clean and dry	
2	Examine for cracked or broken pieces	
3	Dirt and arcing deposits may be removed by light sanding — do not use emery cloth or wire brushes which may leave conductive residue behind	
4	Repair or replace as necessary Examine arc chutes for dirt and/or dust accumulations and clean as necessary	
5	Dielectric testing of arc shields may be recommended by the manufacturer and if so shall be undertaken	
6	Check air puffer for proper operation	

Switchgear – ACB Operating Mechanism Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Inspect for loose, broken, worn, or missing parts (consult manufacturer's schematics for required parts)	
2	Examine for excessive wear of moving parts	
3	Observe that operating mechanisms function properly without binding, hanging, or without delayed action	
4	Ensure any lubrication is in accordance with the manufacturer's specifications	
5	Ensure mechanisms are clean, properly lubricated, and all bolts and screws are properly secured	
6	Repair or replace as necessary	

Switchgear – ACB Auxiliary Devices Inspection

Item	Works / Test Description	Tick when done
1	Inspect operating devices for proper operation and general condition	
2	Check auxiliary wiring insulation	
3	Ensure all indicating devices are fully functional and properly set	
4	Protective relays and circuit breaker trip devices should be inspected and tested according to manufacturers' specifications and applicable industry standards such as those issued by the Institution of Engineering and Technology (IET)	
5	Secondary injection with FFT Kit, produce trip curve report	
6	Check earth fault protection/earth leakage protection	

Switchgear – Moulded Case Circuit Breakers Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Moulded Case Circuit Breakers (MCCB's) should be kept clean for proper ventilation of the breakers	
2	These types of breakers are usually tripped by a thermal element that senses an increase in temperature due to excessive current draw	
3	If dirt accumulates on the surrounding of the breaker, the heat build-up may not be permitted to dissipate properly and result in nuisance tripping. All moulded case circuit breaker panels should therefore be cleaned of all dirt, dust, and debris using a vacuum	
4	Clean the breaker housing and inspect it for cracks or signs of overheating	
5	Visual inspection all Power bar runs	
6	Check supports, Check and torque bolts and nuts	
7	Check alignment, straight runs, joint packs and directional change pieces	
8	Check panel flanges, earth continuity etc.	
9	Thermal image survey of complete runs	
10	Tighten all connections.	
11	Exercise the breaker several times to ensure the mechanism has freedom of movement and to allow contact wiping	
12	Larger duty circuit breakers (225 amps or above) should be electrically trip tested to ensure proper operation of the trip elements and trip linkages	
13	If possible, test contact resistance to ensure quality of breaker contacts	

14	Check motor operator	
15	Check under voltage release	
16	Check power supply unit	
17	Check control relays	
18	Check fuse and fuse holders if present	
19	Whilst not fully applicable under UK regulations, the latest edition of the National Electrical Manufacturer's Association (NEMA) Standard AB4, Procedures for Verifying Field Inspections and Performance Verification of Moulded-Case Circuit Breakers is a very good reference document for MCCB PPM	

Switchgear – Meters Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Check voltage connections	
2	Check CT connections	
3	Check Modbus connections	
4	Check range of functions	
5	Verify load on each phase using instantaneous clamp meter test	

Switchgear – PDU Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean thoroughly exterior and interior PDU switchboards	
2	Check function of all power meters	
3	Verify control circuit fuse rating and continuity	
4	Check function of lamps and indicators	
5	Check and torque test bolted electrical connections as necessary to specified levels	
6	Check all cable connections for tightness and torque terminals	

7	Visual inspection for signs of overheating or deterioration	
8	Inspection of all panels for paint work damage and signs of corrosion	
9	Inspection to insure all clear after work completed before fitting covers	

Switchgear – Battery Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Thoroughly clean all battery surfaces of dust and/or dirt accumulations.	
2	Clean and tighten all terminal connections	
3	Remove any corrosion on battery terminals with bicarbonate of soda	
4	Clean battery studs and cable ends	
5	On stranded cable, if ends are corroded, cut off ends or separate strands and clean internally	
6	Check electrolyte levels and specific gravity. Variations of more than fifty (50) points between cells may indicate a bad cell	

Switchgear – Charger Inspection		
Item	**Works / Test Description**	**Tick when done**
1	Clean all dust and/or dirt accumulations from charger	
2	Clean all vent openings and ensure that they are free from obstructions	
3	Check terminals and connections for tightness	
4	Check all relays, lights, and other indicating devices for proper operation	
5	If all cells consistently read low, check charger for proper operation	
6	If electrolyte levels are low, check charger rate settings against the manufacturer’s specifications	
7	Consistently low levels may indicate the charge rate is too fast	

Switchgear – Battery General Safety Inspection		
Item	**Works / Test Description**	**Tick when done**

1	While charging, batteries emit explosive gases	
2	Allow no open flames or sparks near charging batteries	
3	Battery rooms should be well ventilated, and smoking should not be permitted	

H BLOCK WEIRGROVE PANEL INFORMATION

Section 9.0