STANDARD OPERATING PROCEDURE
Engineering and Operations

Contents

1. PURPOSE & SCOPE

1.1 Purpose

The purpose of this Standard Operational Procedure (SOP) is to outline the engineering management and operational arrangements to support the Pirbright Institutes mission to deliver high quality fundamental, strategic and applied science focused on infectious animal diseases, including some that affect people.

The Department works under the Capability Directorate and is responsible for the delivery of the site maintenance programme and reactive response, in accordance with this SOP, Corporate Risk Policies, processes and legal obligations with the aim of:

- Maintaining Health, Safety and Biosafety
- Ensuring facilities are kept operational with adequate business continuity
- Maintaining compliance in accordance with relevant legislation and Specified Animal Pathogen Order (SAPO) Licence
- Maintaining Quality Assurance in accordance with local and central site procedures /policies
- Ensuring relevant staff, consultants and contractors are aware of their obligations.

1.2 Scope

This document will cover the following key areas:

- Engineering and Operations (E&O) Team Strategy
- Organisation of the E&O Team and Responsibilities
- Maintenance Routines and Health & Safety Arrangements
- Maintenance Programme and Management
- Maintenance Compliance Management
- Other EMS Business Arrangements and Processes: -
    - EMS-SOP-105 Building Automation and Control Systems (BACS)
    - EMS-SOP-106 Capital Projects and Development.

1.3 E&O Team Strategy

To develop and continually improve the E&O function with suitably skilled and trained staff, by:

- Providing 24-hour site monitoring of critical containment systems by means of alarm and priority alarm response through the BACS Shift Team.

- Delivering all statutory and mandatory obligations.

- Maintaining the right infrastructure that creates the right environment for the delivery of the Institute vision in line with our values.

1.4 Directory List

The table below provides a guide as to where certain documents can be located.

Document	**Location**
Annual Planner	N-drive
EMS CAPA Action Tracker	Microsoft Teams
EMS KPI Spreadsheet	Microsoft Teams
EMS SLB Report	N-drive
Engineering & Operations Matrix	Microsoft Teams
Operational Dashboard	N-drive

1.5 Acronyms

The table below details the acronyms referenced in this document.

BACS	Building Automation Control Systems
BBSRC	Biotechnology and Biological Sciences Research Council
BMS	Building Management System
CAD	Computer Aided Design
CAPA	Corrective And Preventative Actions
CDM	Construction Design Management
CMMS	Computerised Maintenance Management System
COSHH	Control of Substances Hazardous to Health
CR	Change Request
CTD	Control Transfer Documentation
EICR	Electrical Installation Condition Report
EMS	Estate Management Services
E&O	Engineering and Operations
ETPs	Effluent Treatment Plants
EWR	Electricity at Work Regulations
FMDV	Foot-and-mouth disease virus
HASAWA	Health and Safety at Work Act
HAZOP	Hazard and Operability Study
H&S	Health and Safety
HSE	Health and Safety Executive
HVAC	Heating, Ventilation and Air Conditioning
KPIs	Key Performance Indicators
LOLER	Lifting Operations and Lifting Equipment Regulations
MTS	Maintenance Tasking Schedule
OS	Operational Support
PAT	Portable Appliance Testing

PIF	Programme Information File
PoWRA	Point of Work Risk Assessment
PPE	Personal Protective Equipment
PPM	Planned Preventative Maintenance
PSSR	Pressure Systems Safety Regulations
PUWER	Provision and Use of Work Equipment Regulations
PWBCS	Planned Work on Bio-Containment Systems
RAMS	Risk Assessment & Method Statement
R&A	Risk and Assurance
RICS	Royal Institution of Chartered Surveyors
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
R&M	Repairs and Maintenance
RM	Reactive Maintenance
SAP	Senior Approved Person
SAPO	Specified Animal Pathogens Order
SEOs	Specialist Equipment Owners
SLB	Senior Leadership Board
SOPs	Standard Operating Procedures
SSoW	Safe System of Work
SWIFT	Structured What If Technique
UKRI	UK Research and Innovation
WI	Work Instruction

2. RESPONSIBILITIES

2.1 Departmental Organogram

The Departmental Organogram (EMS-FORM-309) defines the Estate Management Services (EMS) department structure.

All roles are essential to the delivery of both reliability and compliance critical mechanical, electrical and public health maintenance programmes supporting overall operations of high containment systems. The teams also provide technical support and resource to Operational Projects and the Development Programme activities.

2.2 Responsibilities Matrix

The roles defined in the Departmental Organogram (EMS-FORM-309) are documented in the Department Responsibilities Matrix (EMS-FORM-105). All staff are required to fulfil their responsibilities as defined in this document.

All EMS personnel are required to;

- Work safely in accordance with site procedures and policies
- Abide by health & safety, biosafety and security protocols
- Attend operational management and process meetings as required
- Attend pre-planned work briefings as required
- Attend training courses and toolbox talks as scheduled

- Effectively communicate information between all relevant parties and stakeholder when planning work and/or during operations
- Respond and input into Risk and Assurance monitoring programmes such as investigations, audits and inspections where applicable
- Report and/or challenge unsafe practices observed
- Uphold and abide by The Pirbright Institute P.R.I.D.E values

2.3 Specialist Equipment Owners (SEOs) Team

Specialist Equipment Owners are responsible for the management & delivery of the asset care programme for specific technical areas and systems. These responsibilities are defined in the Department Responsibilities Matrix (EMS-FORM-105).

2.4 Repairs & Maintenance (R&M) Team

Due to the high level of skills required to maintain the site effectively, an in-house team has been structured and developed to provide the technical support required to deliver a safe, secure and compliant site in conjunction with specialist subcontractor support on a 24/7 basis.

- There is high focus on the engineering and operational focus of the planned and reactive maintenance tasks associated with the Containment Systems and Critical Building Services.

- The E&O Team will ensure that the maintenance tasks and their periodicity are completed in accordance with Maintenance Tasking Schedule (MTS). This includes the statutory tasking obligations for legal compliance and the mandatory tasking that relates to the SAPO Licence or other site critical equipment.

- Repairs and maintenance are managed via the Computerised Maintenance Management System (CMMS) to ensure that facilities and services are compliant and operational, with an auditable trail.

- The BACS Alarm Management Strategy forms an integral part of the overall operational programme.

The structure of the R&M Team is shown in the Departmental Organogram (EMS-FORM-309). They are responsible for conducting Planned Preventative Maintenance (PPM) to ensure the biocontainment security of the site through a proactive, predictive maintenance approach. This combined with analytics, Key Performance Indicators (KPIs), continuous monitoring of the plant condition and reviewing of resource productivity, enables the site to adopt a failsafe approach to its engineering function.

A further requirement is to continually review assets included in the site lifecycle plan to develop forward control. This approach provides feedback to the SEOs to ensure the equipment is maintained at a continuously high level through the EMS Change Control Process. Opportunity reports (as detailed in EMS-SOP-106) should be generated for application of capital expenditure.

The reactive element of the business is closely monitored in relation to PPM activity to identify trends, improvements and in particular to prioritise and plan required maintenance shutdowns in conjunction with the Facility Coordinators and Science Teams.

The development of Standard Operating Procedures (SOPs) and Work Instructions (WIs) with a high level of training and continual auditing to promote continuous improvement is essential in the development of the engineering and operational function. The E&O Team therefore work closely with all other teams across the site to develop relationships and understanding.

The department is highly focussed on communication and human factors and the potential impact this could have on our operating systems and maintenance programmes. To ensure continuity and communication across departments designated meetings form part of the overall E&O Strategy. These can be in the form of continuous monthly meetings or working groups which are to be set up to deal with a specific solution.

2.5 Building Automation Control Systems (BACS) Team

The BACS team, which is part of the EMS department, work on a 24/7 shift pattern and are responsible for the Building Automation. This is the automatic centralised control of a building's heating, ventilation and air conditioning (HVAC), electrical, lighting, and other interrelated systems through BACS. The objectives of building automation are to:

- Monitor and control all biocontainment and critical site systems
- Create alarms and alerts when parameters are exceeded
- Control of the alarm handling process
- Provide historical performance documentation
- Allow operators to understand how buildings and systems are operating
- Control and adjust systems to optimise their performance
- Reduce operating and maintenance costs
- Improve lifecycle of equipment and related utilities
- Identify potential system failures

2.6 Operational Support (OS) Team

The OS Team provides technical and operational support to the EMS team with responsibility for overseeing the programme management and co-ordination of business-as-usual activities, operational projects and building shutdowns across the department. The team also has responsibility for management of the Institute's residential housing stock, departmental procurement activities and facilities management of site buildings and grounds.

The OS Team is led by the EMS Operations Programme Manager and supported by the Technical Co-ordinator, Housing & Facilities Officer and Commercial Officer.

2.7 Compliance Team

The Compliance Team's role is to manage the Quality Management Systems and quality management documentation used by the EMS team. They take the lead on internal engineering quality investigations, including identification of root cause to incidents and ensure appropriate corrective actions are implemented. They also control the monitoring of EMS performance through Key Performance Indicators (KPI's) and report findings.

The Compliance Team supports EMS managers to monitor agreed actions from KPI analysis, audits, inspections, and investigations, and to implement these actions within agreed time frames. The EMS Health, Safety and Risk Manager ensures routine safety checks are undertaken to ensure areas are safe for all staff to work in.

The EMS department is audited by the Risk and Assurance department on a rolling programme. This programme selects specific topics and areas to be reviewed to ensure compliance with both

internal procedures and external legislation and SAPO licence requirements. The results of these audits are fed back to the EMS department through the Compliance Team to provide implementation and monitoring support.

2.8 Development Programme Team

The EMS Projects are divided into two categories.

1. Operational Projects Team
2. Development Projects Team

Operational Projects Team delivers ad hoc project identified during normal business delivery. The delivery of the project is overseen by the EMS Operational Projects Manager. Depending on the complexity and resource requirements delivery can be managed in-house or via external Project Managers (funded through the project's business cases which in turn are developed from Opportunity reports developed through the technical teams.

Development Project Team delivers the strategic vision of campus redevelopment of buildings and infrastructure. The Development Programme consists of three phases.
DP1 – Southern Services Route, Gatehouse, Plowright, old restricted area demolition
DP2 – Jenner, Houghton, Biggs, Brooksby.
DP3 – To be defined but in line with Master Outline Planning Application (MPOA).

The Development and Operational Projects are funded through BBSRC.

Further information for both the Operational Project Team and Development Project Team organisation, scope and project delivery can be found in EMS -SOP- 106.

2.9 Process and Functional Safety

Process Safety (PS) is a blend of engineering and management skills focused on preventing catastrophic accidents and near hits, particularly, exposure to pathogens & toxins, structural collapse, explosions, fires, and damaging releases associated with a loss of containment of hazardous chemicals, biohazardous substances and energy.

The Estates Management Services (EMS) department provides a large in-house management function across the Pirbright Institute. Due to the requirement of specialised technical skills to maintain high levels of operational and technical excellence, a dedicated in-house team has been formed to provide the technical support required to deliver a safe, secure, and compliant site in conjunction with the Operations, Maintenance, BACS, and Operational Support team. The objectives of Process/ Functional Safety team are to:

- Have overall responsibility for the identification of Criticality of engineering systems and to ensure that there is a process established for defect rectification. This combined with analytics and continual performance assessment, through Key performance indicators.
- Deliver maintenance against prioritisation and categories with the aim of developing enhanced and structured data for review.
- Develop Proof testing regimes and assessments.

- Adopt high emphasis on the engineering and operational focus. Review and approve/amend EMS Change Control Requests for safety critical assets and systems.
- Participate in Planned Work on Bio-Safety Containment Systems risk assessments (PWBCS) and the development of Validated Processes.
- Develop and implement PSM/FSM training for staff across responsible departments, including EMS Process Safety Technicians and other technical engineering staff as required.
- Determine a fit for purpose Key Performance Indicators (KPIs), continuous monitoring of the plant condition and reviewing of resource productivity, enabling the site to adopt a failsafe approach to its engineering function.

A further requirement is to continually:

- Review BACS utilisation, alarm management to technically support gaps in engineering operating systems and human factors.
- Continually engage with the BACS team to involve staff in planning and overall site operations.
- Develop BACS training to support the maintenance programme.
- The BACS Alarm Management Strategy forms an integral part of the overall operational programme.

The structure of the Process/ Functional Safety team is shown in the Departmental Organogram (EMS-FORM-309).

Process/ Functional Safety Management System SOP (PS-SOP-107)

The purpose of this Standard Operational Procedure (SOP) is to describe the structure of Pirbright Institute's adopted Process Safety Management (PSM) framework, which is based on four focus areas, consisting of sixteen PSM elements, as shown in the following table:

Focus Areas	Leadership & Culture	Knowledge Management & Risk Identification	Risk Management	Review and Improvement
PSM Elements	**1.** Process Safety Leadership	**4.** Documentation and Records	**6.** Operating and Maintenance Procedures	**14.** Incident Reporting and Investigation
	2. Compliance with Technical Standards & Legislation	**5.** Hazard Identification and Risk Analysis	**7.** Safe Work Practices	**15.** Management Review & Continuous Improvement
	3. Training and Competency	-	**8.** Asset Integrity and Reliability	**16.** Auditing and Regulatory Interventions
	-	-	**9.** Management of Change	-
	-	-	**10.** Operational Readiness	-
	-	-	**11.** Contractor Management	-
	-	-	**12.** Conduct of Operations	-
	-	-	**13.** Emergency Preparedness and Response	-

The document also explains the procedure for the development and maintenance of WIs for all PSM elements, to ensure that:

- All the PSM Elements (documented as Wis with a designation of PS-WI-x x) remain accurate, up-to-date, and consistent with Pirbright Quality Management System and applicable UK regulatory requirements.

- Reviewed, approved, and modified as necessary.

- All concerned personnel are engaged and/or informed about the new and revised PSM WIs.

Process Safety Element 5: Hazard Identification and Risk Analysis-HIRA:

Hazard identification and risk analysis is a fundamental requirement of any PSM system. Hazard Identification and Risk Analysis (HIRA) is a collective term that encompasses all activities involved in identifying hazards and evaluating risk at facilities, throughout their life cycle, to make certain that risks to employees, the public, and/or the environment are consistently controlled within the organization's risk tolerance. Accordingly, this PSM element ensures that all new, existing, and modified facilities are subjected to a systematic HIRA review system using appropriate techniques, such as HAZOP, Bowtie, FMEA, LOPA and SWIFT to:

a. Identify and evaluate potential Process Safety Hazards associated with operation.

b. Assess risk of the identified hazards.

c. Provide recommendations to eliminate the identified hazards or to minimize the likelihood of occurrence and / or the consequences of assessed risk of the identified hazards.

For further details regarding Hazard Identification and Risk Analysis, refer to PS-WI-05, Process Safety Element 5 (HIRA) work instruction. In this work instruction, Failure Mode Effects Analysis (FMEA) Template (EMS-FORM-364) is to be used as a risk analysis tool.

Process Safety Element 8: Asset Integrity and Reliability:

Asset integrity and management of process/bio safety risks are closely linked. Maintaining asset integrity is a major preventive measure to manage risks such as loss of containment, release of energy and injury due to structural failure.

This PSM Element ensures integrity of assets throughout all phases of their lifecycle, i.e., equipment is properly designed, installed in accordance with specifications, and remains fit for use until it is retired. Hence, effective systems are developed and implemented to establish and maintain the initial and ongoing integrity of:

a. All safety critical equipment, instruments, devices and systems, whose failure could result in loss of containment of hazardous chemicals, biohazardous substances and energy.

b. The equipment installed for the prevention or mitigation of the effects of a loss of containment.

For further details regarding Asset Criticality, refer to PS-WI-08, Process Safety Element 8 (Asset Integrity and Reliability) Work Instruction. In this work instruction, EMS-FORM-365: Asset Criticality Template is to be used to assess asset criticality task classification.

2.10 Meetings

Meetings form an integral part of the communication and control strategy for the site. This is to ensure that all departments within the Capability and Science departments are fully aware of all site activities and routines.

The key meetings are as follows:

- EMS Daily Operations Meeting (8.30am weekdays)
- EMS AOB Meeting (9am Tuesdays & Fridays)
- Key Performance Indicator Review Meetings
- Development & Project Meetings
- Pre and Post Shutdown Meetings
- Process Team Meetings
- CAPA Tracker Review Meetings

All relevant personnel must attend appropriate meetings as directed by their line manager and/or EMS Senior Management.

3. HEALTH, SAFETY AND BIOSAFETY ARRANGEMENTS

3.1 Site Facilities and General Health, Safety and Biosafety

The Pirbright Institute holds a licence to carry out work on hazardous biological agents on site and is regularly inspected by the Health and Safety Executive (HSE) to make sure the institute complies with the requirements stated in its licence. There are various biocontainment facilities on site, each with specific biosafety rules and procedures which need to be followed. Health & Safety (H&S) information and requirements for all staff are detailed in the Risk & Assurance Handbook (RISK-COP-1).

3.2 Biosafety and Biocontainment

All staff must follow the correct biosafety practices within each biocontainment and laboratory facility following relevant inductions and refresher training. Staff and Contractors are briefed on biosafety and biocontainment facilities as part of their site induction. Procedures are outlined in local Codes of Practice located on Q-Pulse. Biosafety information and requirements for all staff are detailed in the Risk & Assurance Handbook (RISK-COP-1), including the biocontainment facilities, the risk levels and quarantine rules for specific animals.

An additional level of access pass is issued to contractors who have undergone security clearance and have proved a higher level of understanding of the requirements laid down by the Institute. These “Approved Contractors” are allowed more freedom around non-contained areas of the site to undertake their work.

3.3 Decontamination

Validated fomite control processes are in place to eradicate and prevent the spread and release of pathogenic bacteria, viruses, or fungi via decontamination. A fomite is any inanimate object that,

when contaminated with or exposed to infectious agents, can transfer disease to a new host. The fomite control processes consist of a combination of surface disinfection procedures in addition to the use of validated systems such as dunk tanks, steam autoclaves, containment barrier showers, fumigation, and Effluent Treatment Plants (ETPs).

3.4 Access to Buildings

Certain facilities and plant spaces on site have access procedures that must always be adhered to. All staff including EMS are required to complete the relevant facility inductions before independent access is granted. The requirements for access to each facility/area are detailed in the Security Guide (SEC-GUIDE-1). Access to all buildings is in compliance with the Pirbright Security Policy (SEC-POL-1).

3.5 Risk Management

Risk Management is key to managing safety at the Pirbright Institute.

Risk assessments are generated for all new work and these are compiled by both contractors and internal staff prior to any new work commencing.

OSHENS is used to document hazard-based risk assessments and all work is controlled through the Safe Systems of Work (SSoW).

Human Factors is an area that is integrated into all operational activity.

Senior Managers are to maintain and update the Corporate Risk Register and specialist risk assessments and technical input from appropriate EMS personnel for HAZOPs and SWIFT assessments is provided when required.

The overall aim is to operate safely and manage the risks by acting proactively rather than reactively. It is our duty to continuously improve operations and safety, therefore effective risk management offers the potential to reduce both the possibility of a risk occurring and its potential impact.

Pirbright operate under a ‘Just Culture’ to ensure an appropriate response in the event of error or violations.

3.6 Lone Working

Lone working is defined as working alone and is a significant risk if not managed appropriately. This is because non-one is readily available to assist and summon help in the event of an accident or illness, and therefore it should be avoided where possible. Lone working is not permitted for the following high-risk safety activities:

- Confined Space working
- Hot works
- Working at height
- Works on/near HV systems
- Working on Pressure Systems (i.e., steam)
- Work in/near Explosive Atmospheres

A ‘Man-down’ system is utilised by the EMS for specific operations and identified in the risk assessment. The following routine operational activities use the ‘Man-down’ radio system.

- BACS shift team to safely respond to alarms triggered and investigate cause of alarm remotely in plant rooms.
- The ETP operatives working remotely in ETP areas when carrying out routine plant check and are also in direct communication with BACS when doing so.

3.7 Personal Protective Equipment (PPE)

Personal Protective Equipment is provided to appropriate EMS personnel as required for operational activities undertaken. EMS personnel who are issued PPE must;

- Use PPE in line with appropriate hazard-based risk assessments, task specific risk assessments and Point of Work Risk Assessment. Engineering controls should always be considered before PPE to ensure collective protection for multiple personnel rather than rely on just individual projection.
- Apply the PPE correctly in line with training received and manufacturer's instructions, to ensure adequate control for which it is being used
- Inspect their PPE regularly and before each use
- Report any damage or faulty equipment to their Supervisor or Line Manager immediately and take out of use
- Clean, maintain and store their PPE correctly. PPE must be protected so that it is not exposed to dusty environments or harmful substances it is used to protect from.
- Updated on a regular basis in line with manufacturer's recommendations.
- Have a valid 'EN' or 'BS' ISO certification label. Hazard based risk assessments outline the EN/BS numbers for PPE used in the EMS department.

3.8 Manual Handling

Manual handling injuries can have serious implications for the employer and the person who has been injured. Injuries can be sustained due to heavy manual labour, awkward postures, repetitive movements of arms, legs and back or previous/existing injury can increase the risk, therefore all EMS staff are encouraged to report any underlining health conditions that may be affected by manual handling tasks.

Impact on health to EMS personnel is minimised through supervision, instruction and training and EMS personnel are all required to complete mandatory online Manual Handling Awareness training as part of their site induction. Additional toolbox talks(ad-hoc) are delivered to the EMS maintenance team who are at increased risk from manual handling injuries.

All staff must consider and assess the following where manual handling hazards are identified:

- Nature of the Load
  Is it heavy, bulky, hard to grasp, unstable or dangerous? Use team lifts where possible.

- Individual Capability
  Is above average strength or agility needed? Is there increased risk for pregnant workers or those with health conditions?

- Task
  How to safely carry out the task without the need for repetition, twisting, over-reaching. Also consider if there is any need to twist, stoop, reach, push, pull, or hold loads away from body.

- Environmental Conditions
  Is the location safe to carry out manual handling task (confined, slippery, uneven, hot/cold/humid, windy, or dark)?

Where possible the use of lifting aids such as, vehicles, hoists, trolleys etc. should be used to assist with manual handling tasks. Other additional controls include:

- Reorganising the task
- Altering the load so it is lighter, less bulky and more stable.
- Choosing better routes, maintain, repair or upgrade floor surfaces and lighting.

3.9 Plantroom Best Practice

All plantrooms must be kept clean and tidy to maintain the standard of the site. This helps to create a safe and professional working environment. The following measures are currently in place to ensure these standards are met:

- The 5S standards (Sort, Set, Shine, Standardise, Sustain) are implemented in all plantrooms and engineering-controlled areas. These reflect the minimum standard requirement for a world leading animal research facility.
- Plantrooms are walked down regularly to identify and report any defects or issues.
- Plantroom photos are displayed to set clear visual standards to aide with compliance.
- Where possible, any stored equipment is hatched to enable it to be return to the same place after use.
- On completion of work, all used components and debris are removed and disposed of in accordance with the Code of Practice for Waste Management (RISK-COP-2). Guidance on this policy can be provided by the Engineering Safety and Risk Manager.
- All redundant equipment is removed where possible and when not, it will be clearly labelled, made safe and locked off where required.

4. SAFE SYSTEM OF WORK (SSoW)

There are several elements to the Safe System of Work, which include:

4.1 The Point of Work Risk Assessment (PoWRA)

'Specific hazards' are identified on the Point of Work Risk Assessment (PoWRA) form (EMS-FORM-100). The PoWRA document provides a standard list of hazards to be considered by EMS and Contractors carrying out maintenance task, and is applied for the following purposes:

- Used at the job planning stage to assess the hazards involved and determine if a mandatory Permit to Work is to be raised to facilitate works.
- Used before starting the job to check if any additional hazards are present that were not identified at planning stage.
- Recording any additional controls required for hazards identified throughout the duration of the works.

4.2 Planned Work on Biocontainment Systems (PWBCS)

Work on Biocontainment Systems is planned, managed and controlled via the RAMS For Planned Work on Biocontainment Systems form (PWBCS): EMS-FORM-126, consisting of a Risk Assessment and Method Statement which is applied if the scheduled works either:

Have direct impact on a biocontainment system (or a component thereof)

OR

Impact services that could directly or indirectly affect the functionality of a biocontainment system

Works planned using this form requires mandatory review by HSBS to ensure that the risk assessment in place for these works is suitable, sufficient and complies with site SAPO licence conditions and biosafety regulations. The form also requires a further review by the appropriate Facility Coordinator to ensure impact of works is managed effectively.

Further checklists are used to control and manage works for specific activities. New checklists and control forms are developed on regular review of the Safe Systems of Works used by the EMS department from proactive and reactive monitoring programs, such as audit, inspections, investigations.

4.3 The Permit-to-Work (PtW)

This is a formal written process (EMS-WI-085) used to control work and prevent injury to employees, contractors and third parties as well as to property, assets and estates. The Permit to Work form (EMS-FORM-098) sets out the work to be carried out, identifies the hazards involved, documentation outlining the precautions to be taken and responsibilities of individuals involved in managing and coordinating the work safely. A Permit to Work is applied to control activities where 'specific hazards' are involved in the scope of works, and all contractor work managed by the EMS team. The Permit process is in compliance with the Health & Safety at Work Act 1974, and The Construction, Design and Management (CDM) Regulations 2015.

4.4 Control Transfer Documentation (CTD)

Control Transfer Documentation is applied when either a science facility (EMS-FORM-265) or an area within the facility (EMS-FORM-245) is required to be formally handed over to EMS for maintenance activities and return following completion. Refer to Section 5.6 Building / Area Shutdowns and Startups for further detail.

4.5 Isolation Procedure

Lock-Out Tag-Out (LOTO) / Management of Isolations
Isolations are managed and coordinated in accordance with the Lockout Tag Out Work InstructionEMS-WI-087 and are recorded via an Isolation form (EMS-FORM-127).

4.6 Management of Electrical Safety

The Management of Operational and Electrical Safety is controlled through EMS-WI-367. No work on electrical systems can commence until this document has been acknowledged within Q-Pulse.

It is the responsibility of the of The Senior Duty Holder and Duty Holders to regularly review HSE Bulletins. Knowledge attained can significantly reduce site risk through implementation of any identified maintenance requirements. Also, this allows a judgement to be made in relation to raising on the company risk register. The Compliance Team will receive Safety Notifications in the first instance, these are reviewed and distributed to team members as required.

General Requirements for Drain Earth(s)

Where Charged Equipment may cause Danger, Drain Earth(s) shall be applied in accordance with an Earthing Schedule that will be issued along with the Safety Document.

The recipient of the Safety Document is responsible for the control and safe custody of Drain Earth(s) and associated application device issued with an Earthing Schedule.

The Competent Person, or a Person under their Personal Supervision may apply and remove Drain Earth(s) in accordance with an Earthing Schedule under a Safety Document.

When carrying out maintenance, consideration must be given to drain earths.

- **High Voltage (HV)**

All high voltage work undertaken at the Pirbright Institute is under the control of the Specialist Network Contractor (UKPN), who act as our Senior Approved Person (SAP). All work undertaken, including switching schedules, is fully reviewed by the Senior Duty Holder (Specialist Equipment Owner (Electrical)) or in their absence a suitably qualified Duty Holder. All work is controlled through the Safe System of Work (SSoW) (EMS-WI-367), this includes Planned Work on Bio-Containment Systems (PWBCS) to ensure the integrity of the Bio-Containment Barrier (EMS-WI-224).

- **Low Voltage (LV)**

The low voltage fixed distribution systems at the Pirbright Institute are designed, installed, and maintained in accordance with BS7671:2018 the IET Wiring Regulations. The frequency of inspection and testing is carried out to Guidance Note 3 of the Wiring Regulations every 5 years. EMS holds the schedule of testing and the test records.

- **Earthing Strategy**

The Earthing Strategy is formed at the Pirbright Institute through varying control documents, all of which are referenced in EMS-WI-367 Management of Operational and Electrical Safety. This includes control and maintenance requirements inclusive of testing and reporting of earthing deficiencies. This document outlines all requirements in relation to the safe working requirements derived from references in standards recorded in section 15.

The principles of design and installation are incorporated in the Earthing Standard EMS-STD-101. The overall aim of the strategy is to ensure all assets are identified and recorded and that appropriate action is taken to record any deficiencies associated with the site earthing systems due to the significant risk to personnel and plant should this system not be maintained.

The ground conditions have a significant bearing on the effectiveness of the Earthing System. To ensure we meet the acceptable tolerances a Current, Distribution, Electromagnetic fields, Grounding and Soil structure analysis (CDEGS) is to be carried out whenever practical to achieve touch and step voltage safety (EPR).

- **Electrical Equipment in Hazardous Areas**

Hazardous areas (where an explosive atmosphere may occur due to flammable gases or volatile liquid vapours) are classified according to BS EN 60079-10-2015. Electrical equipment for installation or use in hazardous areas must conform to the necessary standards Ex i (intrinsically safe), Ex d (flameproof), or Ex n (low temperature non-sparking) according to the area classification Zone 0, Zone 1, or Zone 2. Hazardous area installations must be approved by a competent electrical engineer.

4.7 Confined Space Management

The Health and Safety Executive (HSE) define a “Confined Space” as a substantially or totally enclosed space where there is a risk of death or serious injury from hazardous substances or dangerous conditions.

Guidance listed in the HSE Approved Code of Practice "Safe Work in Confined Spaces L101” is employed and implemented on site in Confined Space Management (EMS-WI-092).

Entry to Confined Spaces is eliminated where possible. Where entry is unavoidable due to the task requirements, entry is only undertaken by qualified trained and competent personnel. The EMS Training Matrix (EMS-FORM-150) details qualified personnel; certificates held within Absorb.

The EMS department holds and maintains a Confined Space Register (EMS-FORM-268). The classification of Confined Spaces on site are based on the guidance listed in the “Water UK National Classifications for Confined Spaces” used by the water industry.

4.8 CDM Arrangements

All project works follow the EMS Safe System of Work.

Where relevant, project construction works requiring “F10 Notification” under the Construction Design Management (CDM) Regulations 2020 require the “Principle Designer” and “Principle Contractor” roles to be appointed. In this case a CDM Letter of Appointment applies (EMS-FORM-090).

Where a project requires handover of a facility, or other designated area from Pirbright operational teams to projects teams, a formal handover is to be undertaken and documented using a CDM Site Handover form (EMS-FORM-259).

All work is issued to technicians via the Computerised Maintenance Management System (CMMS). The system requires a Point of Work Risk Assessment (PoWRA) prior to technicians commencing work. EMS also has an incumbent Compliance Team who audit, monitor, and review EMS high risk activities.

4.9 Contractor Arrangements

Contractor management is owned and managed by the Risk and Assurance department. The Management of Contractors process is outlined in RISK-SOP-7 as required by RISK-POL-4 ‘Risk Policy’ and must be applied by all EMS personnel including the Developments and Projects team who are responsible for contractor works on site.

All Contractors managed by EMS staff must work under a valid Point of work risk assessment, valid Permit-to-Work Form and valid in date RAMS for the task being undertaken.

EMS staff who are nominated responsible persons are to ensure that they are responsible for the contractors whilst on site and that permits are signed off upon successful completion of their work before contractors leave site.

5. ASSET, MAINTENANCE AND PROGRAMMING

5.1 Lifecycle and Obsolescence Strategy

A robust Lifecycle and Obsolescence Management Strategy can address and mitigate the risks associated with both the obsolescence and replacement of equipment.

The aim of the Lifecycle and Obsolescence Management Strategy is to proactively manage all building and engineering systems (Structural, Mechanical, Electrical and Controls) at Pirbright.

The purpose of this strategy is to define proactive obsolescence and lifecycle management process as it applies to these systems and buildings and to specify the minimum requirements and consider the impact of the supply chain, knowledge, so managing the risks of lifecycle and obsolescence through activities associated with, preventing, predicting and resolving.

The combination of these tasks will help to reduce the risks, costs and impact to the business when equipment, systems, software and knowledge become obsolete, through the continued management of the equipment life cycle status.

The basis for every building and associated system is to have a good initial design. The initial design should be carried out in such a way that any changes during the life cycle of the system does not impact or degrade the overall performance of the building or system and will not impact on the process connected to it. The design of the building or system should support the exchange and system evolution and/or addition of individual components as well as larger system parts, extensions etc.

The method of system and building maintenance and the impact on connected process should be considered with a view to reducing outage. A solid design guarantees a system and building capable of being maintained, incorporating changes and allowing for additions in the future.

During the long-expected life cycle of buildings and engineering system, the system may be affected by many different factors. And therefore, consideration should be given to:

- Technological
- Political
- Environmental
- Human Factors / Functional Safety
- Business Factor.
- System limitations and innovation potential.
- New regulations.
- Availability of knowledge.

The Life Cycle and Obsolescence Strategy has the following objectives and are directly linked to Functional Safety and Technical Reviews: -

1. Provides a roadmap on how to manage the exposure to obsolescence.
2. Focuses on identifying safety, operational concerns and the consequences as a result of obsolescence.
3. Takes account of operational resource constraints such as people and operating expenditure budget.
4. Carry out technical reviews / Obsolescence evaluation.
5. Split between proactive and reactive strategies is dependent on the result of the obsolescence and lifecycle evaluation, expected end of life of the facility and the sites risk strategy.
6. Maintain dialogue with vendors regarding life cycle status to get an early as possible indication of end of support date and to ascertain the impact or change of maintenance required.

Continuous assessment of the assets, reactive maintenance and the planned maintenance returns are to be used to develop forward control and improved lifecycle planning. Opportunity reports should be generated for application of capital expenditure.

The associated Lifecycle and Obsolescence Management Work Instruction (EMS-WI-265) and Lifecycle and Obsolescence Register (EMS-FORM-250) outlines the departmental requirements and plans recommended change.

With the ever-increasing demand to extend the life of operating assets, the risk of obsolescence has become more prevalent. Failure to manage both obsolescence and life cycle will increase the risk to Pirbright's high containment systems and commercial viability.

The impact of obsolescence is felt when equipment fails and the replacement for the failed component is no longer available, can no longer be satisfactorily supported or can no longer be sourced from approved sources. Significant and expensive downtime could ensue whilst new approved sources or alternative solutions are sourced.

The organisational responsibility for the Implementation and control of the Life Cycle and Obsolescence Management sits with the following personnel: -

- Senior Specialist Equipment Owner
- Senior BACS Owner
- Maintenance Manager
- Senior Programme Manager
- Specialist Equipment Owner Air Systems
- Specialist Equipment Owner Containment Systems
- Specialist Equipment Owner Electrical Systems
- Specialist Equipment Owner Infrastructure System

Engineering systems are expected to perform their function within the field for a typical life cycle of around 25 years, software and control systems 10 -15 years. Buildings often operating across a 60-year lifecycle period. There is a requirement for the Specialist Equipment Owners to:

- Carry out Technical Risk Assessments for critical process equipment with support from the Functional Safety Manager

- Ensure Life Cycle and Obsolescence Mapping, Monitoring and reporting is continually developed to the business need and the Process Team Risk Registers are updated as required to escalate for review at Risk Committee as required.

Focus on the Development, Design, Support and Obsolete Phases will be required. Implementation of each of these elements will deliver a robust and proactive process of obsolescence and lifecycle management and are to be recorded through the Lifecycle and Obsolescence Register (EMS-FORM-250).

5.2 Maintenance System Overview

The maintenance regime aims to ensure that the estate, as a resource, is aligned with the science objectives so that infrastructure and buildings are maintained in an efficient, safe, effective and systematic manner in compliance with legislation and site licence conditions. This includes any Institute owned building not located on the main Pirbright site such as institute housing. Due to the high level of skills required to maintain the site effectively, an in-house team has been structured and developed to provide the technical support required to deliver a safe, secure and compliant workplace in conjunction with specialist subcontractor support on a 24/7 basis.

Planned Preventative Maintenance is undertaken to ensure the Bio Containment security of the site through a proactive, predictive maintenance approach. This, combined with analytics, key performance indicators (KPI's), continuous monitoring of the plant condition and reviewing of resource productivity, enables the site to adopt a failsafe approach to its engineering function.

The EMS Maintenance Tasking Schedule (MTS) details how the standard of maintenance is defined, using four classifications in relation to risk and criticality:

- **Statutory** – Legal requirements. Non-compliance could lead to a serious H&S incident or fatality; improvement or enforcement notice from the Health and Safety Executive (HSE).
- **Mandatory** – SAPO licence condition. Non-compliance could lead to a dangerous occurrence / breach of biocontainment, removal of our SAPO licence, improvement or enforcement notice from the Health and Safety Executive (HSE).
- **Routine** – Regular maintenance to maintain safe and effective condition of plant, controls and systems.
- **Run to Failure** – None-critical plant equipment that have no effect on compliance can be allowed to failure with little/no preventative maintenance intervention, based on cost of replacement/lost time/maintenance cost, etc

Any defects reported through the planned maintenance process are raised as a reactive works order unless they can/need to be addressed immediately refer to EMS-WI-283, TopDesk Incident Management and EMS-WI-336 CMMS Service Level Agreement (Categories and Priorities). These in turn are tracked by the Supervisors & Maintenance Manager through the appropriate meetings to ensure they are closed out in a timely manner. The reactive element of the business is closely monitored in relation to PPM activity to identify trends, improvements and in particular to prioritise and plan required maintenance shutdowns in conjunction with the site science teams.

A further requirement is to continually review assets and include them in the site lifecycle plan. This approach ensures equipment is maintained at a continuously high level and the management of change is controlled with the resultant increased performance being attained.

The purpose of the planned maintenance program is to:

- Maintain the site and buildings in a condition acceptable to the funding authority, namely BBSRC
- Carry out the IEB mandate as instructed for the operational needs of the Institute across all departments in accordance with the strategic 20-year plan
- Ensure compliance with the regulatory and legal requirements pertaining to the various activities
- Maintain a safe and comfortable working environment for animals, staff and visitors
- Ensure costs are managed effectively over the current budget periods and expenditure programmes
- Prevent, as far as possible, any increase in the existing maintenance backlog in accordance with the BBSRC delegated authority and budget allocations
- Work in accordance with BBSRC's commissioned 5 yearly stock condition survey

The Institute carries out appraisals on a building, block or room and engineering service basis for internal use by the EMS department. These are used to develop annual maintenance programmes in the form of "service plans" or projects with individual or aggregated work content. By this means economies of scale are identified if possible and disruption is minimised.

The development of Standard Operating Procedures, Work Instructions and Standards with a high level of training and continual auditing to promote continuous improvement is essential in the development of the engineering and operational function. The Engineering and Operations team therefore work closely with all other teams across the site to develop relationships and understanding.

The department is highly focussed on communication and human factors and the potential impact this could have on our operating systems and maintenance programme.

There is high focus on the engineering and operational focus of the planned and reactive maintenance tasks associated with the Containment Systems - Critical Building Services. These include backflow prevention on all services, uninterruptable power supplies and emergency power generation. EMS will ensure that the maintenance tasks and their periodicity are completed in accordance with Maintenance Tasking Schedule (MTS): EMS-FORM-104.

These systems are managed / maintained via the CMMS to ensure that building containment is maintained and to ensure an auditable trail.
The Alarm Management Strategy (EMS-WI-128) forms an integral part of the overall operational programme.

5.3 OSHENS

Oshens is the Institute's risk assessment management system which is utilised by EMS to develop and review hazard-based risk assessment. Users can develop new assessment and review existing assessment when changes are required or when named assessors are notified via email. Risk assessments are also submitted for approval to EMS staff responsible for specific areas as part of the risk assessment process and subject to HSBS final review. Oshens also allows users to track open actions as well as produce management reports depending on the users level of access.

5.4 Maintenance Task Schedule (MTS)

The Maintenance Task Schedule (MTS) is a key departmental document that outlines the key maintenance items required, the frequency of these activities, and the classification for each maintenance activity (Statutory, Mandatory, Routine & Run to Failure).

The activities detailed are required or potentially required to maintain our legal obligations & SAPO Licence & to also ensure a high level of engineering excellence and reliability in support of the science programme.

The MTS is managed by the Planned Maintenance Coordinator and works in parallel with the Specialist Equipment Owner Responsibility Matrix (EMS-FORM-105) to ensure ownership of assets for each area of responsibility (Air Systems, Critical Infrastructure, etc).

The SEO for the designated area is responsible for the application of the tasking to the CMMS. The Senior Specialist Equipment Owner retains overall responsibility for the update, application and audit of the tasking applied to the asset care programme.

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The MTS is continuously reviewed and can be changed through the change management process, dependent on the current condition data which could identify differing maintenance activities, changes to licencing/regulatory requirements, frequency change requirements etc.

5.5 Computerised Maintenance Management System (CMMS)

The information in the MTS is managed via the Computerised Maintenance Management System (CMMS). The CMMS establishes the principal approach and execution of The Pirbright Institute's planned maintenance programme. The maintenance items from the MTS are applied to assets and systems within facilities and individual activities and jobs are scheduled on the system according to the MTS.

Tasking is issued from the CMMS by the Operations Resource Scheduler and Resource Allocator to either 1) the Supervisors for distribution to the Technicians or in discussion with the Supervisors to allocate on their behalf, or 2) the SEOs for specialist pieces of kit or 3) to Appointed Contractors as appropriate. Any defects reported through the planned maintenance process are raised as a reactive works order. These in turn will be tracked through the appropriate operational meetings to ensure they are closed out in a timely manner.

The Specialist Equipment Owner for the designated areas is responsible for the application of the tasking to the CMMS. The Senior Specialist Equipment Owner retains overall responsibility for the update, application and audit of the tasking within the MTS which forms the basis of the PPM programme managed through the CMMS. There is a further requirement to monitor the effectiveness of the maintenance programme and to make recommendations as required through the change management process.

All work is issued to technicians via the Computerised Maintenance Management System (CMMS). The system requires a Point of Work Risk Assessment (PoWRA) prior to technicians commencing work. EMS also has an incumbent Compliance Team who audit, monitor, and review EMS high risk activities. The CMMS is being managed by the EMS Resource Scheduler and Resource Allocation team. For further details regarding TopDesk Resource Allocation, reviewing criticality against categories and prioritisation please refer to (EMS-WI-281).

In compliance with the current EMS Asset Lifecycle Register, **EMS-WI-329** (Asset Register Code Template) and other capital projects, EMS Asset Codes template (EMS-FORM-321) will be used to prepare asset lists.

5.6 Building / Area Shutdowns and Start-ups

A shutdown is defined as the halting of normal activities within a designated area for the purposes of maintenance. The effective planning and execution of Planned Shutdowns enables The Pirbright Institute to minimise unplanned downtime and Reactive Maintenance, thus maximising facility availability and scientific & commercial output, while satisfying the Institute's statutory and mandatory requirements under the following regulations:

- Specified Animal Pathogens Order (SAPO) 2008
- Minimum standards for laboratories working with FMDV in Vitro/ In Vivo 2009
- Control of Substances Hazardous to Health (COSHH) regulations 2002
- Lifting Operations and Lifting Equipment Regulations (LOLER) 1998
- Pressure Systems Safety Regulations (PSSR) 2000
- Provision and Use of Work Equipment Regulations (PUWER) 1998
- Electricity at Work Regulations (EWR) 1989
- Health and Safety at Work Act (HASAWA) 1974

The process of planning and coordination of shutdowns (and restart upon completion) for essential Planned and Reactive Maintenance is detailed in EMS-WI-260: Management of Planned Area Shutdowns. This ensures there is a clear plan of action and that all groups are aware of the maintenance activity and the timelines for completion. The transfer of a building or area both in and out of maintenance is through Control Transfer Documentation (CTD) process (EMS-FORM-265 for complete facility or EMS-FORM-245 for individual laboratory/room).

The Pirbright Institute will always have 3 years' shutdowns scheduled to enable science to plan around facility availability. There is a 6-monthly meeting to agree shutdown dates for the following 3-year period, which are published on The Bull for wider site awareness. The shutdown programme will detail shutdowns for all science and biocontainment facilities on site. The relevant EMS Managers will liaise with the relevant facility coordinators for these facilities to ensure the maintenance program is robust and suitable in line with science programmes.

When planning works in Plowright North / East wing contained areas, consideration must be given to requirement to restart FMDV Reference Labs within 2 hours in the event of samples arriving for analysis in line with VRL-DIN-130 paragraph 5.2.1.1.

5.7 Equipment Calibration

As a high containment site, it is important that all equipment identified is reading accurately – or, more realistically, that we know what the error of measurement is. Demonstrating able control of measurement and test equipment on the Pirbright site is required. No test equipment is to be used that has not been certified. Both handheld equipment and site-based equipment is controlled through the CMMS with certificates controlled through the administration system. The CMMS ensures that instruments are calibrated on a rational periodic cycle, and that records are maintained and reviewed in line with the Pirbright audit programme.

To ensure traceability and correct certification of equipment, a laboratory that is accredited to international standard ISO17025 must be used, the Teddington-based United Kingdom Accreditation Service (UKAS) is the certification body authorised to accredit laboratories to this standard. ISO17025 and requires laboratories to demonstrate competence in both the technical aspects of the measurements and in the quality assurance aspects that ensure we get a compliant service and certification.

Human Factors is an area that is intergraded into all operational activity. Pirbright operate under a Just culture to ensure an appropriate response in the event of error or violations. The overall aim is to ensure we operate safely and continuously improve the operation.

All work is issued to technicians via the CMMS. This system is a database management system primarily aimed at managing maintenance activities on site. The system requires a review of risk and a signature from technicians that this has been done and understood. Where existing generic risks assessments are already in place that meet the requirements of a job, these are attached to the work order by the Supervisor on issue or attached to the work order as it is generated from the CMMS.

5.8 Pressure Systems and Written Scheme of Examination

Users and owners of pressure systems are required to demonstrate that they know the safe operating limits (principally pressure and temperature) of their systems and that they are safe under the conditions, as required under the HSE Approved Code of Practice (The Pressure Systems Safety Regulations 2000). They must also ensure that a suitable written scheme of examination is in place before the system is operated (EMS-FORM-353). In addition, they must make sure that the equipment and systems are examined in accordance with the written scheme of examination. The written scheme of examination is updated by the Competent Person at each inspection. All new items of pressure equipment are added via the EMS Change Control Process, notified to the incumbent contractor and the local written scheme of examination updated.

The written scheme of examination outlines the following definitions:

- A written scheme of examination is a document containing information about selected items of plant or equipment which form a pressure system, operate under pressure and contain a ‘relevant fluid’.
- The term relevant fluid covers compressed or liquefied gas, including air at a pressure greater than 0.5 bar (approximately 7 psi) above atmospheric pressure, pressurised hot water above 110 °C and steam at any pressure.

Typical contents of a written scheme of examination include:

- Identification of the items of plant or equipment within the system.
- Those parts of the system which are to be examined.
- The nature of the examination required, including the inspection and testing to be carried out on any protective devices.
- The preparatory work needed for the item to be examined safely.
- Where appropriate, the nature of any examination needed before the system is first used.
- The maximum interval between examinations.
- The critical parts of the system which, if modified or repaired, should be examined by a competent person before the system is used again.
- The name of the competent person certifying the written scheme of examination; and the date of certification.

The Pirbright Institute employs accredited contractors as designated Competent Persons to provide written schemes of examination for the systems that fall under the scope of PSSR and to carry out the examinations required under these written schemes.

5.9 Lifting Operations and Lifting Equipment Register (LOLER)

The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER or LOLER Regulations) requires control over lifting equipment. Lifting equipment is also work equipment so the Provision and Use of Work Equipment Regulations (PUWER) will also apply (including inspection and maintenance). All lifting operations involving lifting equipment must be properly planned by a competent person, appropriately supervised and carried out in a safe manner.

To ensure control is maintained and all operators have visual indication that equipment is in date for use a system and register is to be implemented in accordance with EMS-WI-365.

5.10 Electrical Testing

Fixed Wire Testing, which is also referred to as an Electrical Installation Condition Report (EICR), is the examination and testing of the circuits and wiring that distribute electricity around a building. There is a requirement to carry out periodic electrical inspection and testing in conjunction with the Pirbright CMMS system which is based on a five-year rolling programme. This includes housing stock where tenanted properties should have an inspection either every 5 years or whenever a new tenant moves into the property (depending on which comes first). The Landlords and Tenant Act 1985 requires landlords of properties with short leases to keep the electrical wiring in repair and in proper working order. These inspections should only be carried out by an electrically competent persons, such as registered electricians. They will check the condition of the electrics against the UK standard for the safety of electrical installations: BS 7671 – Requirements for Electrical Installations (IET Wiring Regulations).

The competent person will issue an Electrical Installation Condition Report detailing any observed damage, deterioration, defects, dangerous conditions and any non-conformities with the present-day safety standard that might give rise to danger. If anything dangerous or potentially dangerous is found, the overall condition of the electrical installation will be declared to be 'unsatisfactory', meaning that remedial action is required without delay to remove the risks to those in the premises. The overall test process requires a significant amount of preparation and forward notice to science staff/building occupants. It may also be appropriate in high containment areas that the testing is conducted during scheduled shutdowns. The Planned maintenance will not be deemed as complete until the electrical certification has been posted in the appropriate Engineering and Operations file structure.

5.11 Portable Appliance Testing (PAT)

Portable electrical equipment testing is controlled as per EMS-WI-207, HSG107 (2013) and INDG236 Maintaining Portable Electric Equipment in Low-risk Environments and is tested by EMS or a specialist contractor.

Every item must have a Pirbright asset ID label and a test label detailing when the test/inspection was carried out. Some higher risk items are tested at 6M intervals, including all items in ISOs, fumigation ‘kettles’, ovens, portable items in kitchens, power tools and cleaning appliances, items used outdoors, items in cold rooms, items with high voltages, and centrifuges.

New items do not need to be tested before first use but must be added to the rolling test programme managed by EMS. It is the responsibility of staff & students bringing any equipment to site to notify EMS and ensure that a tested/checked date label has been applied: if no label is present, the

equipment must be tested/checked by EMS and added to the rolling test programme before being used on site.

All new equipment should be inspected, asset tagged and a PAT label applied by EMS and added to the PAT Testing database before being put into use, so that the equipment and the environment it is being used in can be accessed for risk as per HSG107 (2013) and the appropriate recheck period assigned to the asset and detailed on the PAT label.

Any portable appliance that fails either a visual inspection or a formal test must be disconnected, withdrawn from service, made safe by a competent electrician or disabled and disposed of according to site waste disposal requirements following review by line managers.

5.12 Ladder Register

All ladders are to be recorded on the Ladder register with inspections controlled through the CMMs system. There is a requirement to maintain a Ladder Register for all Ladders / Steps used by staff when maintaining Pirbright assets.

A robust and highly visible system for displaying information relating to a ladder's inspection date is to be securely attached to all assets.

All ladders deemed not fit for purpose must be removed from service, destroyed and disposed of to stop anyone from using them on or off site. Once this action has been complete the ladder register must be updated to reflect the situation.

5.13 Gas Register

There is a requirement to maintain the F-Gas Register (EMS-FORM- 354). This is held in the SEO (Infrastructure) folder.

Annually the SEO (Infrastructure) is to liaise with the service contractor to ensure the register has been updated correctly and a copy is held within the Institute's files.

All equipment that contains F-Gas equivalent to more than 5 tons of CO_2 is to be recorded in the F-Gas register. The register contains:

- Quantity and type of gas in the equipment when it is installed
- Quantity and type of gas added during any maintenance (e.g., leak repairs)
- Details (name, address and certificate number if relevant) of any companies that install, service or decommission the equipment
- Dates and results of all mandatory leak checks
- Measures taken to recover and dispose of gases (e.g., disposal through a registered waste carrier) including recording if the gas is recycled or reclaimed and the facility that recycled or reclaimed it.

Records must be retained for 5 years and made available as required.

5.14 Water Safety Management

The Approved Code of Practice for Legionnaire's disease (L8) applies to any work activity and to premises associated within the workplace, or other undertaking where water is used or stored, and where there is a means of creating and transmitting aerosols (droplets) which may be inhaled and so cause a reasonably foreseeable risk of legionella. The Approved Code of Practice is supported by technical guidance, which identifies potential risk areas and suggests ways in which these may be controlled and is available through the HSE Web site.

This process is owned by the HSBS Department who are responsible for the Water Management Plan and Legionnaire's disease management who identify the legal duties in relation to Legionella. These include identifying and assessing sources of risk, preparing a scheme to prevent or control risk, implementing, managing and monitoring precautions, keeping records of precautions and appointing a manager to be responsible for others. Due to the nature of the site and that EMS are the maintainers of systems it is imperative we take ownership in the reduction of risk and as such designated members of the department will form part of the Water Safety Group.

The Water Management Plan (Owned by HSBS) and will cover aspects such as:

- Identification and assessment of all sources of risk. This is achieved through carrying out a Site Risk Assessment.
- Propose and implement a protocol for preventing or controlling the risk.
- Outlines the specific role of an appointed competent person, known as the Responsible Person/ Deputy Responsible Person.
- The control scheme including the maintenance of records, review of control measures and precautions.
- Duties and responsibilities of those involved in the supply of water systems.

5.15 Asbestos Management

A comprehensive risk register for asbestos is held on site. The risk register is formally reviewed annually and managed in accordance with the Control of Asbestos Regulations 2006. The Asbestos Management Plan is managed by HSBS and the Plan formally appoints Responsible Persons in for the management of Asbestos. The procedure for the management of asbestos is set out in the Asbestos Policy and Management Document.

All Contractors and Staff are made aware of the asbestos register as part of the induction process and are required to check the register before starting work on any building. Contractors are required to sign that they have read and understood the register. The register is located on Q-Pulse.

In buildings where asbestos has been confirmed to be present an annual reinspection survey is carried out by a suitably competent person.

An asbestos register is also available for the residential housing stock and is shared with contractors and staff who may be working within the houses. It should be noted that under the Control of Asbestos Regulations 2006 there is no duty to manage asbestos within domestic properties, however the register is maintained as a matter of best practice and any asbestos previously identified is visually inspected by a competent person on a periodic basis and the results are recorded and held on the central drive.

5.16 Building Equipment Condition

Housing and Property

The Pirbright Institute has management responsibility, on a long lease from BBSRC (UKRI), for 48 residential properties which are a mixture of single occupancy homes and shared houses for staff, students and visitors.

In total there are 48 properties in Bridgemead (10), White Cottages (2) and Upper Stanford Road (36), broken down as follows: 7 x 2 bedroom houses & 41 x 3 bedroom houses.
The properties are managed in-house rather than by an appointed property management agent, with the housing management function overseen by the Property & Housing Manager who sits within the EMS Capability Directorate. The properties are managed in accordance with various

pieces of legislation such as Landlord and Tenant Act 1985, Housing Act 1985, 1988 & 2004 and Health and Safety at Work Act 1974.

Rental income is collected by the Institute's Finance Department and is used to maintain the properties, grounds maintenance, carry out statutory inspections and to fund a programme of planned maintenance, such as bathroom and kitchen refurbishments. Reactive maintenance is carried out by both the EMS Direct Labour team and external contractors.

The Institute's various policies and processes for the management of the housing stock is covered by the associated Work Instructions.

- **Condition Ranking**

The overall physical condition of each building/facility and site is assessed on the basis of the condition of three elements: buildings, mechanical and electrical systems. The condition of each element is assessed to produce an overall ranking of the physical condition of the building and site, for operational maintenance purposes. The Institute uses a modified version of condition survey rankings developed by the Royal Institution of Chartered Surveyors (RICS) as follows:

Condition Ranking	Description
A	As new (i.e., built or refurbished within the last two years) and expected to perform adequately over its expected life, a facility of excellent quality.
B	A facility requiring general maintenance investment only and is sound, operationally safe, exhibiting only minor deterioration. This is the target condition for the estate and satisfies item 3.2 above (1-5).
C	Operational but major repair or replacement will be needed within three years for building and one year for engineering elements, a less than acceptable facility requiring capital investment to return it to condition B.
D	A very poor facility, with a serious risk of imminent failure or breakdown therefore requiring significant capital investment or replacement.
DX	A supplementary rating added to C or D to indicate that nothing, but a total rebuild, replacement or relocation will suffice (because improvements are either impractical or too expensive to be feasible).

- **Building Condition Priority Rankings**

Prioritising of maintenance requirements allows the alignment of maintenance resources in accordance with the Institute's strategic plans and business plans current from year to year. Again, the Institute uses the following modified RICS priority categories for repair:

Priority	Description
1	Health & Safety e.g., compliance with statute a legal duty or regulation.
2	Neglect that might lead to damage or loss of the operational use of the facility.
3	Neglect that might lead to a reduction in operational efficiency until remedied.
4	Necessary to maintain "in repair" i.e. in good condition.

When the condition is C or D the priority and urgency and cost required to either close, demolish or return the facility to the target condition B is estimated for planning purposes. If a more detailed assessment is wanted, for example for inclusion in a business case a feasibility study can be prepared. Currently the rationalisation of the estate stock is as relevant as upgrading or refurbishment. The policy allows for flexibility to suit the current stages in the evolution of the Institute and the economy.

5.17 Vehicles

EMS manages a number of different vehicles which are used on and off site.

The Institute has a vehicle insurance policy which covers all the above vehicles on a fully comprehensive policy. The insurance policy is organised by Finance.

To be eligible to drive any of the Institute vehicles, the person must register their driving licence with HR. A list of EMS staff who are eligible to drive Institute vehicles is maintained by the EMS Administrator.

Staff must use vehicles in accordance with the Highway Code and should be aware that they are representing the Institute when driving on public roads. Smoking is not permitted in any Institute vehicles.

5.18 Vehicle Maintenance

Servicing, repairs, MOTs and vehicle tax are arranged as required by the EMS Administrator.

There is a monthly requirement to complete a checklist for all vehicles (EMS-FORM-044).

5.19 Pre-journey Vehicle Checklist

A vehicle logbook (EMS-FORM-044) is kept in each of the vehicles. This must be completed by the driver before every journey (on and off site).

6. ULTILITIES

6.1 Electrical Supply

The Institute is served by two 3.5MW, 185mm^2 copper cables from the Brookwood Primary station. The cables run from Brookwood via “Splash” sub-station on Black Horse Road, via Fox’s Corner and then along Ash Road to site. Both cables are live, if the one is damaged or turned off, the other supply can be connected to site remotely by UKPN. Both cables are run in the same trench. As part of the HV upgrade the Institute made a capital contribution to the incumbent distribution network operator (UKPN) to upgrade Brookwood Primary station: two new transformers and switchgear and the existing aluminium cable from Splash Substation were uprated to copper and Splash Substation was bypassed. In turn there was significant upstream reinforcement from Brookwood to Woking on the National Grid. These new copper cables would technically allow more power to be sent to the |Institute as they have a higher carrying capacity than the aluminium ones –Potentially another 0.5 to 1.0MW could be obtained following negotiation with UPKN.

6.2 Gas Supply

Gas is supplied to site (with pressures and supply regulated) by Total Gas and Power Limited. Main gas comes to site between the gate entrance to Boehringer Ingelheim Animal Health and Bridgemead.

6.3 Water Supply

The Water Network to site is managed through Affinity and Thames water. There are two isolations at the front access to the site. One supply isolation covering Ash building, White Cottages and Mod 1; the other supplies the remainder of site. The inlet water temperature is monitored and recorded daily as part of site Legionella Management (refer to section 6.10).

6.4 Energy Management

Utility framework agreements and contracts are managed through Pirbright Procurement (Finance). This includes (though isn't limited to): Electric supply (HV), Gas, Water, Trade Effluent.

The EMS Procurement Officer is responsible for ensuring that utility bills are correct by comparing with regular monthly site meter readings and are paid on time. All invoices are to be kept on file to enable accurate forward energy forecasting. The EMS team take monthly meter readings which include Electric, Gas and Effluent for tracking and forecasting purposes.

6.5 CHP

The Combined Heat and Power Plant (CHP) is an economical way of producing Electricity and Heat for site. It produces 1521 kW of Power and 800Kg of Steam to supplement existing HV supply and steam boilers.

The CHP is operated and maintained by Centrica Business Solutions UK Ltd through an O&M contract as detailed in the CHP Operation & Maintenance contract (EMS-WI-362).

Centrica are contracted to supply a Monthly Performance Report detaiing the levels of electricity and heat generation of the CHP Unit for that month & cumulatively and other salient data. This is to be reviewed by the Infrastructure SEO, Planned Maintenance Manager and Energy Manager.

6.6 Waste and Effluent Management

Waste Management at the Pirbright institute is managed by the Environmental Officer and a site code of practice is in place (RISK-COP-2).

Liquid effluent from SAPO4 containment areas of site is treated by a heat treatment plant before being discharged to a trade sewer to be further treated at Thames Water sewage treatment plant. Four effluent treatment facilities (ETPs) are in place for individual SAPO4 facilities, located in Biggs, ISO 11 and with two in Plowright building. Discharges from all buildings on site are regularly monitored by Thames Water to ensure discharges comply with the site discharge license.

All general waste is segregated to mixed recycling and general waste. Animal/clinical Waste from the ISO facility is disposed of by means of an incinerator which is operated in accordance with and permitted by the local authority (Guilford Borough Council).

Clinical Waste from the SAPO4 containment and Containment Level 3 laboratory areas is autoclaved and removed off site by a specialised contractor for incineration.

Specific waste and decontamination management procedures for biological waste and items taken into containment areas is detailed in facility procedures as listed in RISK-COP-1.

6.7 Critical / Containment Systems and Plant

The Building Management System (BMS) data provides accurate, timely, and actionable information that can be leveraged to refine service programs even further and achieve optimal building performance and cost-effectiveness.

Owners / operators can make data-driven decisions based on the impact that the recommended maintenance will have on the efficiency of buildings' performance. This also increases safety from correctly maintained equipment, providing greater comfort and productivity for occupants, and better compliance with efficiency requirements.

Continuous assessment of the assets, reactive maintenance and the planned maintenance returns are to be used to develop forward control and improved lifecycle planning. Opportunity reports should be generated for application of capital expenditure.

7. COMPLIANCE AND DOCUMENTATION

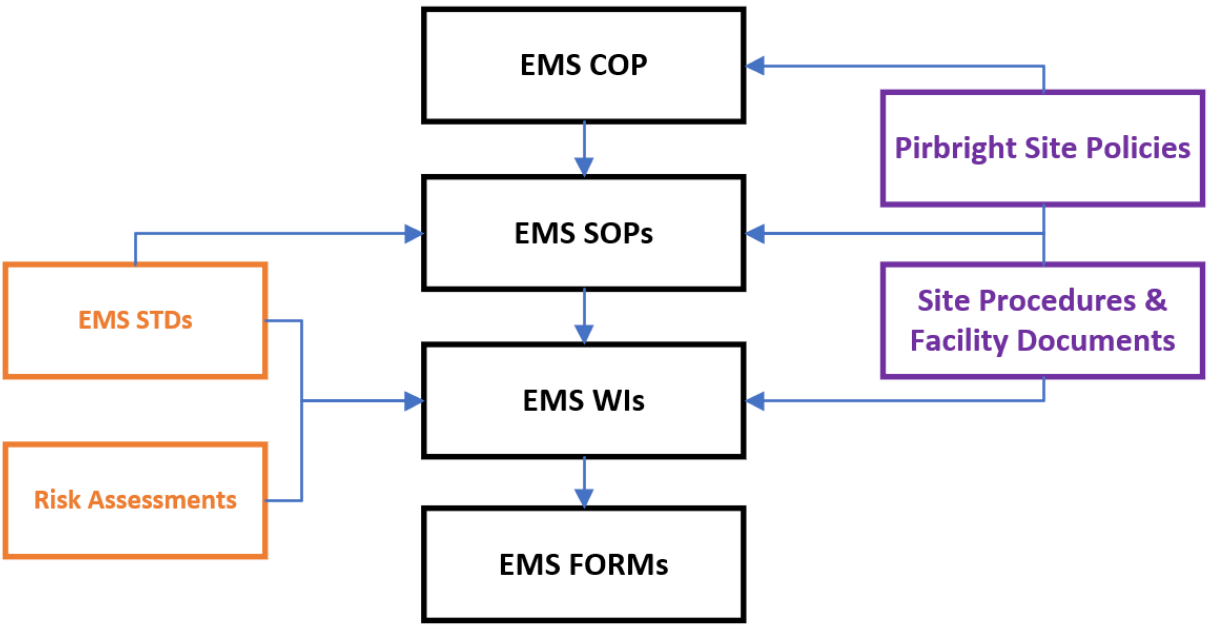
7.1 Quality Structure and Management

The Department works under the Capability Directorate and to the Estate Management Services Code of Practice EMS–COP-1 from which the Engineering and Operations SOP (Standard Operating Procedure) is generated in series with the other functions:

- EMS-SOP-104 Engineering, Maintenance and Operations
- EMS-SOP-105 Building Automation and Control System (BACS) Operations
- EMS-SOP-106 Development and Operational Projects

Work Instructions are generated at local level which outline the responsibilities and processes for the operational management and Health & Safety aspects of the business. All corporate compliance documents are controlled by the Risk and Assurance department. Documentation is held on Q-pulse such that all members of staff have access to any relevant documentation. Hazard based Risk Assessments are held and managed via Oshens.

Summary of documentation structure:



Engineering and Operations operates under the Capability Directorate and BBSRC policy on Health, Safety and the Environment, Biosecurity, IT, Procurement, Employment and Finance Polices which can be accessed through the Pirbright intranet (The Bull).

The EMS Compliance Team is responsible for the management of the Quality Management systems and quality management documentation used by the EMS team. The Compliance Team works in conjunction with the Risk and Assurance team to carry out internal engineering quality investigations, including identification of root cause to incidents and ensure appropriate corrective actions are implemented through relevant personnel.

7.2 Q – Pulse

All COP, SOP, STD, Work Instruction and Forms are saved on the Q-Pulse document management system, to ensure these documents are controlled and the latest versions are available to all staff. The Q-Pulse system ensures that documents are reviewed and approved by appropriate team members before these are issued and that modifications required to a document can be recorded on the Q-Pulse system for scrutiny.

The document control process is managed by the Lead Document Controller (LDC) for the department, who will work with the Institute's Quality Team to ensure document control processes are followed. Please refer to **QA-SOP-21 – The Document Control System** for more information on this process.

The Q-Pulse system is also used for incident reporting and investigations, which are carried out by members of the EMS Compliance Team with assistance from relevant personnel within the EMS department.

7.3 EMS Training and Competency

The Departmental training and competency levels are key to maintaining a safe and compliant engineering function.

The requirements are defined in EMS–WI–258 and describe the EMS arrangement for ensuring the training, qualifications and competency levels of personnel are sufficient for them to carry out the required activities.

7.4 Departmental Training Plan

Engineering and Operational training, as identified through the Training and Competency Matrix (EMS-FORM-150), is to be included within the Training Plan Process (EMS-WI-239) as required. This is to be reviewed annually in line with the PPDR process and business requirements and submitted on an annual basis through the Training and Learning Department.

7.5 CAPA / Action Trackers

The overarching control on actions for the EMS Department is through the Corrective and Preventative Actions (CAPA) Tracker, which can be found on Microsoft Teams. The aim of this tracker is to control departmental objectives.

Significant objectives or issues can be escalated as necessary and recorded on the CAPA Tracker.

Local action trackers can also be used to replace minutes as appropriate and to aid tracking. Trackers should operate on a traffic light system, with percentage completion and target dates being recorded.

All actions from other departments are submitted to EMS through the Compliance Inbox (EMS-Compliance-Team@pirbright.ac.uk). This ensures suitable review and agreement, prior to response from the EMS Department.

7.6 Engineering & Operations Matrix

The Operations Matrix (held on Microsoft Teams) stores records relating to training, competency, call out numbers, change control, FGas register, PPDR register, PPE & RPE logs, tool registers, calibration registers and lock numbers.

7.7 Key Performance indicators (KPI’s)

The EMS department monitors performance against selected Key Performance Indicators (KPIs) in line with institute policies and departmental requirements (e.g. Statutory / Mandatory maintenance, review of BACS alarms). The EMS managers review this data monthly to monitor performance and coordinate required changes for continuous improvement.

The EMS Compliance Team is responsible for collating the monthly KPI information and developing a monthly report for review of senior managers prior to this being sent to the Senior Leadership Board (SLB).

7.8 Management and Documentation

EMS documentation is saved in designated locations depending on the nature of the information or type of document. The majority of day-to-day information and documents are saved on the Institute's N-drive (\\DFS-ASH1\Common\E&M Dept\private), within Microsoft Teams and the CMMS (Topdesk). Other documents are held in other repositories as detailed below:

7.9 EMS Change Control Process

When making a change to an EMS process, software, drawing or asset the EMS Change Control Process must be adhered to (EMS-WI-106).

Changes can include planned installation, alteration, replacement or elimination of an asset and/or its maintenance programme. Like-for-like replacements do not require a change request.

The process requires approval of the change prior to implementation, by completing a change request form (EMS-FORM-034).

7.10 EMS Technical Library

The EMS Department maintains a cloud-based Document Management System, which is referred to as the EMS Technical Library. The contents of the EMS Technical Library include (but is not limited to) technical drawings, BIM information, O&M manuals, Description of Operations, critical spares listings and technical review documentation. The work instruction "EMS Technical Library Principles of Use" (EMS-WI-230) gives more details about how it functions. The Technical Coordinator and CAD & Technical Documentation Owner are responsible for the management of the EMS Technical Library. Regular walkdowns, naming conventions and revision control are required to ensure the accuracy of drawings and other documentation.

7.11 Procurement / Contracts

The method for raising purchases or contracts is based upon the value, as summarised in the table below:

Order/purchase/contract value	**Requirements**
< £10,000	EMS personnel can request for purchase orders to be raised by completing an EMS Purchase Order Request Form (EMS-FORM-326). At least one quotation from a supplier must be attached to the form.
£10,000 to £25,000	EMS personnel can request for purchase orders to be raised by completing an EMS Purchase Order Request Form (EMS-FORM-326). At least 3 quotations must be supplied to ensure best value for money is achieved (cost vs quality).
£25,000 to £213,477 (for Supply, Service and Design contracts) or £25,000 to £5,336,937 (for Works Contracts)	The tender process via 'Contracts Finder' is required, which is managed by EMS Commercial Officer in conjunction with end user/stakeholder and assistance from Central Procurement Function (if required).
> £213,477 (for Supply, Service and Design contracts) or > £5,336,937 (for Works Contracts	The tender process via 'Find A Contract' service is required, which is managed by Central Procurement Function.

Any orders over £10k that can only be provided by a single supplier must have a ‘Single Source Justification’ completed by relevant stakeholder and approved by Procurement Manager/Director of Finance prior to an order being raised. NB. Single Source Actions are only allowed under certain circumstances, as detailed in the Single Source Form (FIN-FORM-25)