1.0 Introduction

1.1 Staff must have the means to summon assistance from other locations within the facility in the event of an emergency. The requirements are for every member of staff to be provided with the means to activate an alarm at all times and from any location while they are on duty within the establishment using a personal alarm unit. The staff alarm system shall be user friendly for both alarm-carrying staff and Control Room staff to generate confidence through effective and reliable operation. The personal alarm unit shall be simple in design, compact, lightweight, and robust in operation. The 'front end' of the staff alarm system will be located in the Control Room and be fully integrated into the Security Management System (SMS).

2.0 Objectives and Outputs

2.1 The staff alarm system is required to:

- Provide the means to immediately summon assistance when an individual unit(s) is activated.
- 99.5% alarms received in the Control Room will be within a time of 2 seconds, but not exceeding 4 seconds from activation of the alarm unit.
- 99.5% of alarms on the personal alarm system will be received within 3 seconds, but not exceeding 4 seconds from the activation of an alarm unit.
- Indicate to the Control Room and all other users, the locus of the alarm.
- Communicate quickly and effectively and be reliable.
- Be capable of indicating any fault condition to the Control Room immediately.
- Use protocols which will allow integration with other manufacturers' equipment and development for the future; and
- Identify and alarm when handset unit is removed from establishment.

3.0 Equipment and Facilities

3.1 The system shall have the following features:

- Reliability in terms of alarm generation and location identification of individual units.
- Comfort whilst in use while being robust enough to withstand the rigours of a custodial environment.
- The personal alarm unit shall be capable of being worn on a belt, or on the shirt at chest level, with a provision to securely fix to a belt and/or shirt loop.
- A push button shall be used for normal activation.
- The push button shall be designed to be easily operated but shall also be difficult to accidentally activate.
- Any aerial on the unit shall be small and shall not interfere with the normal activity of the user.
- If possible, the aerial shall be internal to the unit.
- Alarm units will alert using audible and vibrate functions. The alarm units must possess a silent facility (e.g. vibrate) which can be selected by the user; and
- The system shall allow the pre-programming of individual units to enable group selection of alarm notification for operational purposes. The system shall have the facility to show the location of the alarm on pre-selected personal alarm units.

3.2 When activated, the alarm shall provide visual and audible indication in the Control Room:

- Audible indication shall be distinct and different from the sound of any other alarm in the Control Room. The audible alarm shall continue to be heard until it is manually accepted by the Control Room operator.
- Visual indication shall show the location at which the alarm was activated.
- A reassurance indication shall be automatically sent back to the activated unit to acknowledge receipt of the alarm.
- Should an alarm unit cease to function an indication shall be received in the Control Room; and
- Should a handset be accidentally removed from the establishment via the front entrance building then the handset shall go into alarm mode with notification only to that handset which shall continue to alarm until returned to the charging unit.

3.3 The “front end” shall be an industrial type rack mounted PC; with suitable back up capability to prevent loss of service should the main PC fail in any way. All the front-end facilities will be able to be fully interfaced into the SMS.

3.4 The complete system shall have 1 hour in-line UPS back up.

3.5 A PC based logging facility is required to record and show:

- The time and date the alarm was activated.
- The time and date the alarm was accepted.
- The time and date the alarm was reset.
- The zone in which the alarm was activated.
- The identity of the alarm unit which was activated; and
- Any fault conditions which arise.

3.6 A facility to print all events by any by any parameter or exception is required, a printer shall be provided.

3.7 The system must be able to facilitate multiple alarms in the order in which they are activated, the operator shall have the facility to scroll through and look at each alarm. Each alarm must be accepted and reset individually.

3.8 There shall be a provision to divide establishments up into any number of zones with the equipment discriminating between zones. These zones are indicated on the exemplar design drawings.

3.9 The system shall have the facility to distinguish location on different vertical levels.

The system shall have the facility to zone outside buildings.

The system shall be able to operate through all structures.

3.12 Batteries on alarm units shall be rechargeable and capable of working for a complete 12-hour shift, based on 10 operations.

3.13 A low battery alarm is required on all handsets.

3.14 The system shall use UHF radio frequencies, which do not interfere with any other equipment in the facility.

3.15 The system shall not be detrimental to the health and safety of users.

3.16 The system shall provide for real time self–diagnoses and highlight system faults. An alarm shall automatically be generated in the Control Room in the event of a technical fault in any part of the system.

3.17 The system shall use standard protocols which allow interface with other equipment, now and in the future.

4.0 Zoning

4.1 The staff alarm system shall be designed in such a way to provide for distinct zones and to annotate boundaries that ensure speedy responses to alarm conditions. The size of zones shall be determined in such a way to minimise the response times.

4.2 The front entrance doors at the main entry to the facility, and the first secure doors at the Visits and Staff entrances shall have a locator to active an alarm if a handset passes through the entrance and out of the facility. Only the particular handset shall alarm with notification to the Control Room.

4.3 The alarm zoning is indicated in the exemplar design drawings.

5.0 Technical Requirements

5.1 The system shall comprise of two parts:

- Personal alarm units and
- Fixed equipment.

5.2 The alarms will only be wirelessly transmitted by radio and received by the system.

5.2.1 The system will not use any technology that may be obstructed or interfered with by clothing e.g. being worn underneath a jacket or contained in a trouser pocket

5.2.2 The system will not use any technology or hybrid technology that requires “line of sight”, triangulation or a mixture of differing technologies e.g. Infra-red and radio to provide accurate location of the alarm, locus of a handset or similar

5.3 The system shall forward the alarm message automatically to other alarm units.

5.3.1 The system shall be able to operate up to 1,452 alarm units. There is a requirement for _____ staff alarm units to be provided along with charger and carrying pouches.

5.5 The system infrastructure shall be simple, based on a minimum standard Cat-5e communication bus for connection to all components. Alternative infrastructures will be considered, full details must be provided.

5.6 The system shall provide a means that will indicate where an alarm has been generated.

5.7 Any items, for example location beacons, shall be mains powered, and UPS protected. Such equipment shall have the ability to be wall or flush mounted, with flush mounting being the general preferred option

5.8 The equipment shall function normally in the following conditions:

- Ambient temperature: -10 °C to 55 °C; and
- Relative humidity < 95%

5.9 The equipment shall not create any interference:

- Power supplies – 230V AC, 50 Hz, standard UK supplies

5.10 The system shall meet radio authority regulations to work in the appropriate frequency ranges that will not interfere with any other equipment or the national mobile phone network. The supplier will provide licences for the system and full details of how future licences will be provided, and at what cost.

5.11 The housing of the personal alarm transmitter shall be made of impact-resistant material.

5.12 The personal alarm unit shall be reset from the Control Room or by placing the alarmed unit in a storage/charge rack.

5.13 If an alarm unit goes out of range audible and visual alarms shall be activated in the Control Room. “dead spots” within the facility’s secure perimeter will be not acceptable.

5.14 When placing the alarm unit in the charging rack a message shall be sent to the Control Room indicating that the alarm unit is now inactive.

5.15 When an alarm unit is taken out of rack the unit shall send a message to inform the Control Room that it is active, and the immediate start of the check-in messages shall inform the user that the unit is functioning correctly.

5.16 Replacement of the batteries shall be easy and without loss of programmed data.

5.17 The battery cover (if applicable) shall be secured in position. The batteries shall be commercially available and interchangeable by appropriately trained local staff.

5.18 It shall not be possible for the user to switch the personal alarm unit off.

The personal alarm unit shall have the following functionality:

- 24-character alphanumeric side display.
- Message stack of 10 alphanumeric messages in chronological order; and
- If identical messages are received, the last message will only remain in the stack.

6.0 Multiple Storage/charge Racks for Alarm Units

6.1 The contractor will supply and fit storage racks, along with any necessary power supplies for the units, within the Key, Radio and Staff Alarm Self-Issue Room (aka ‘Key Vend’ Room). The housing of the storage / charge racks shall be made of a durable material and shall be of the modular type, for easy expansion.

6.2 The design of the storage/charge racks shall be such, that the alarm units can only be placed in the correct position.

6.3 When charging, the charge racks shall show a visual indication.

6.4 Each storage / charge rack shall consist of space for at least five alarm units. There shall be space for a minimum of 100 units to be charged.

6.5 Storage / charge functions shall include:

- Alarm if units are not returned within time periods.
- De-activate the alarm functionality of alarm units; and
- Recharging battery.

6.6 Provision is required to charge every unit provided simultaneously.

7.0 Location Beacons and Transmitting / Receiving Aerials

7.1 Fixed point location beacons will be used to define location, they shall be contained in a compact and robust housing which is suitable for use in the secure environment.

7.2 Power indication shall be visible by an LED with the opportunity to programme the LED to off.

7.3 The cover of the location beacon shall be fastened with security screws.

7.4 The location beacon shall continuously (not less than 20 times a second) transmit a low frequency signal on a frequency of 55kHz containing its unique location code and checksum.

7.5 At least 1 million different location codes shall be possible. The location code shall be adjustable by a Bluetooth link to the manufacturer's software.

7.6 It shall be possible to connect a loop antenna to the location beacon for flush mount. The loop antenna shall cover at least 10 m^2.

7.7 Project designers and contractors shall liaise with the end user to agree positioning for receiving and transmitting aerials. Include all brackets and fixings with anti-climb assemblies as appropriate. Brackets shall not provide climbing aids nor extend over building roof overhangs.

7.8 The location beacon shall be programable by way of a Bluetooth link to the manufacturer's software.

7.9 The location beacon shall have the ability work in the following modes, back to back, masking, standalone and twin master, and slave antennas and single or twin loop antennas

8.0 Staff Alarm PC

8.1 The Staff Alarm PC shall be an industrial rack mounted PC appropriate for the personal alarm system. The Control Room shall be capable of programming up to 1,452 personal alarm units by default and be expandable.

8.2 The Control Room PC shall be equipped with the relevant Software.

The software shall initiate “check in” calls for all mobiles in a system.

The software shall manage all personal alarm incidents and location information.

The alarm generated in the Control Room shall show what alarm has been generated, the unit that generated the alarm and the location from where the alarm was generated. If the alarm unit moves location, the new location shall be shown.

8.3 The alarm shall be automatically sent by the PC to other alarm units. It shall be possible to send the alarm manually and automatically.

8.4 The number of receiving alarm units receiving alarms shall be programmable in at least 5 different groups.

8.5 The software shall enable alarms to be presented graphically (e.g. on floor plans) on which the alarm location, as well as the direction of movement is indicated. This graphical presentation shall allow 4 visual zoom levels.

8.6 Alarm reset shall be from the Control Room. The system shall reset only after acknowledgement/approval from the mobile of which the alarm was raised.

8.7 Programming of the system functions and mobiles shall be accessible with a password.

8.8 The PC shall allow connections to external devices or systems via standard protocol. Up to eight simultaneous connections shall be possible. A protocol editor shall be a part of the PC to define tailor made communication protocols. Furthermore, the PC shall have the facility to accommodate additional relays cards.

8.9 Logging Software

All actions and events, occurring in the system, shall be logged, to retrieve and audit them later, and if required, print them. These data shall also be made available for external statistical programs, including Microsoft Excel. A printer shall be provided.

8.10 Integration

While the staff alarm system shall be able to function as a stand-alone system under normal circumstances it will be integrated for common presentation on the Security Management System (SMS). Where there are problems with the SMS the fall-back position will be the stand-alone staff alarm system. Under use in the integrated system all the functions provided by the stand-alone function must operate and be presented in a common format.

8.11 The personal alarm system must comply with:

- EN50371 (EMF, restrictions related to human exposure of low power).
- Safety directive: IEC EN60950 (ITE, Safety of information technology equipment).
- EMC: acc. to ETSI 301.489-1 / ETSI 301.489-2.
- Paging related specifications acc. to ETS 300.224-2.
- CE marking: acc. to EMC directive 89/336/EEC and its amendments.
- R&TTE directive: 1999/05/EC.
- ISO 9001-2000.
- ISO 14001; and
- BS5839 standard

9.0 Design

9.1 As part of the exemplar design process zoning proposals have been developed.

9.4 The installation contractor / specialist shall prepare a set of detailed installation drawings including schematics, plans indicating locations of all locator, beacons, transmitters, and receivers These drawings shall be submitted to the Project Manager for review prior to any installation commencing.

9.5 The installation contractor / specialist shall agree zone descriptors for the alphanumeric display on the handsets with the Project Manager. These descriptors shall clearly identify the building, floor level, and zone / room location.

9.6 It will remain the responsibility of the installation contractor / specialist to ensure that all coverage meets the requirement on commissioning of the installation and prior to the demonstration of the system to the Project Manager, and provide additional locators, beacons, transmitters and receivers as necessary, to meet the general zonal coverage requirements as initially detailed.

10.0 Commissioning and Training

10.1 All commissioning shall be carried out with all equipment covers in place and all fixed furniture installed.

The installation contractor will provide the Project Manager with all test sheets demonstrating that the contractor has fully tested and commissioned the system.

All testing and commissioning will be validated by the Project Manager.

Testing will be on the basis of alarm activation at all location beacons and will be cross checked against the zonal drawings and zone descriptors. All other functionality shall be checked, including receiving coverage, out of range alerts/alarms, low battery power and other technical alarms.

The installation contractor will invite the Project Manager and his team to witness a demonstration of the system with the contractor demonstrating and validating all the values shown on the test sheets. As the Staff Alarm system is a critical staff safety system, 100% verification will be required.

10.2 The Contractor shall provide training to all necessary staff. This shall include Control Room operational staff (general operation of system), specialist maintenance staff (updating, fault investigation, general maintenance) and operational staff (personal alarm unit awareness).

11.0 As fitted Drawings and Maintenance Manuals

11.1 Provide for as installed/as built record drawings and operating and maintenance manuals and the following:

- Provide detailed drawings, showing zone areas and the position of all equipment, particularly the position of locator beacons including their ID's, transmitters and receivers, location of any junction boxes and cable routes.
- A set of drawings showing the schematic layout of the overall system and the interconnection diagrams. Provide an index of cables and interconnections. Cables shall be labelled and indexed according to the identification markings on the label; and
- Provide an operators' instruction handbook. This shall be written under the assumption that operators have no technical knowledge of staff alarm systems.