GROUND DISTURBANCE

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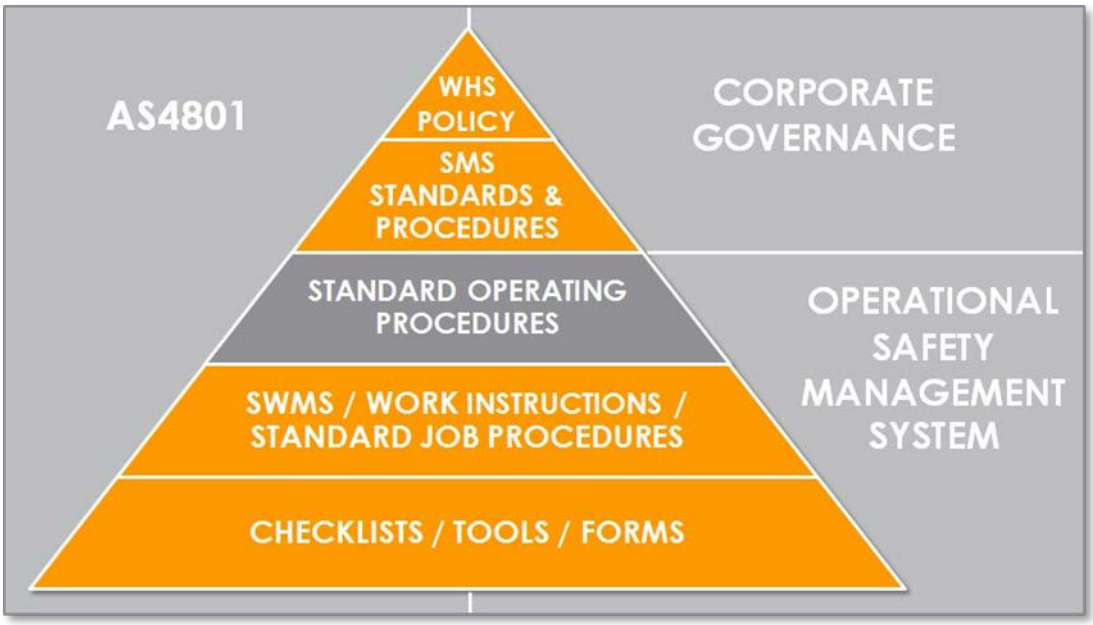
1. SMS DOCUMENT HIERARCHY



2. PURPOSE

This Standard Operating Procedure (SOP) documents the requirements for the management of risks associated with ground disturbance activities such as excavation, trenching and pot holing at Queensland Urban Utilities (QUU) controlled work sites. In particular it:

- Sets out the requirements and procedures for the protection of people undertaking Ground Disturbance work.
- Details the risk assessment process and compliance requirements to eliminate or minimise potential fatalities, injuries and incidents arising from risks related to Ground Disturbance.

3. SCOPE

This SOP applies to all QUU employees and contractors that undertake ground disturbance activities on behalf of QUU.

4. DEFINITIONS AND ACRONYMS

Barricade: Any object or structure that creates a barrier obstacle to control, block passage or force the flow of traffic in the desired direction.

Backfill: a material used for refilling excavations.

Battering: to form the face or side or wall of an excavation to an angle, usually less than the natural angle of repose, to prevent earth slippage.

Bench: horizontal stepping of the face, side or wall of an excavation.

Competent Person: a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

Department of Environment and Heritage Protection (EPA): *https://www.ehp.qld.gov.au/*

DBYD: acronym used for Dial Before You Dig.

Excavation Work: Work involving removal of soil or rock from a site to form an open face, hole or cavity using tools, machinery or explosives.

Fire Ants: Key characteristics are:

- Fire ant workers come in an unusual variety of sizes within one nest.
- Fire ant workers are small (ranging from 2-6 mm).
- Fire ants are copper-brown in colour, with a darker abdomen.
- Fire ants inflict a fiery sting and are usually aggressive.
- Fire ant nests usually have no obvious entry hole.
- The inside of a fire ant nest has a honeycomb structure.
- A mature nest is often dome-shaped if in an open area but can also be found under logs, rocks or garden materials.

Ground Disturbance: work activities including trenching, excavation, pot holing and ground probing.

Hazardous Area: an area in which an adverse change may occur through, natural ground condition, vibration, weakening of structural integrity, outside services, equipment movements.

Hierarchy of Control: is a system used to Eliminate or minimise exposure to hazards.

Manager – as per QUU naming conventions, the Manager who has direct responsibility for the activity being performed or the area the activity is occurring in.

Notifiable Incident: The collapse or failure of an excavation or of any shoring supporting an excavation is a dangerous incident and must be notified to Workplace Health and Safety Queensland.

SWMS: acronym used for Safe Work Method Statement.

Spotter: A person assigned to work with the people conducting the excavation work processes, normally located outside the work area, to watch for any condition changes resulting from the excavation work process.

Shoring: use of timber, steel or other structural material to support an excavation in order to prevent collapse so that construction can proceed.

PCBU: A person conducting a business or undertaking alone or with others, whether or not for profit or gain. A PCBU can be a sole trader (e.g. a self-employed person), a partnership, company, unincorporated associated or a government department of public authority (including a municipal council). Specific to QUU, a PCBU includes QUU operating as a statutory body as well as other PCBUs interacting with or engaged by QUU such as, but not limited to independent contractors, manufactures, designers and suppliers.

Permit Receiver: A person who receives a permit from a permit issuer.

Permit Issuer: A person who is authorised to complete and issue a permit.

Permit to Work: A document authorising a person to undertake specific work in a designated area.

PPE: acronym used for Personal Protective Equipment.

Supervisor/PICOW – term used for any QUU employee who acts or is appointed as a Supervisor, Coordinator or Team Leader within QUU. A PICOW (Person In Control Of Worksite) is the person designated to be in control of a workplace by QUU/

SMS – acronym used for QUU's Safety Management System.

Trench: horizontal or inclined way or opening below ground level.

WHS – acronym used for Work Health and Safety.

Worker – employees, contractors, subcontractors, outworkers, apprentices and trainees, work experience students, volunteers and PCBUs who are individuals if they perform work for the business.

WRAP – acronym used for Work Risk Assessment Process

5. ROLES AND RESPONSIBILITIES

Outlined below are responsibilities specific to ground disturbance requirements at all QUU workplaces and controlled sites.

5.1 QUU EXECUTIVE

QUU Executive and Senior Management (CEO, ELT, General Managers – Officer and Non-Officer Appointed) are responsible for overseeing and ensuring the implementation of the requirements of this SOP and related procedures within their respective functional areas. This includes ensuring all Ground Disturbance tasks are suitably risk assessed and that appropriate controls are implemented to minimise the risk of injury or harm to workers.

5.2 MANAGERS

Managers in all operational areas and QUU worksites are responsible for ensuring the review and management of risks associated with ground disturbance tasks. This includes:

- Ensuring adequate resources are available to enable the effective implementation of systems to control and manage risks;
- Review and manage risks associated with Ground Disturbance;
- Ensuring all applicable employees are aware of this Ground Disturbance procedure;
- Providing resources for the Ground Disturbance program works; and

5.3 SUPERVISORS/PICOW

Supervisors and Team Leaders in all operational areas and QUU worksites are responsible for ensuring that risks associated with Ground Disturbance are managed by ensuring workers are made aware of and comply with the Ground Disturbance SOP and QUU's SMS requirements. This includes:

- Ensuring underground services near proposed work have been identified (DBYD);
- Ensuring a Permit to Work is issued and complied with;
- Ensure the Excavation, Trenching and Underground Services Safe Work Method Statement (SWMS5) is complied with;
- Addressing the risks associated with Ground Disturbance in site inductions;
- Ensuring all workers are familiarised with the relevant parts of this SOP;
- Documenting and retaining records of excavation inspections;

- Ensuring only appropriately trained and competent people undertake ground disturbance activities.

5.4 WORKERS

All workers shall ensure that they:

- Follow the requirements detailed in this SOP and associated documents;
- Report any hazards/incidents/injuries immediately to their supervisor in accordance with QUU **WHS Incident Reporting, Investigation and Escalation Procedure (PRO364)**.

5.5 Spotter (Administrative Control)

A Spotter must at all times:

- Be aware of the need to use appropriate PPE during the excavation/penetration work;
- Inspect adjoining compartments, if any condition changes are possible;
- Not allow excavation/penetration work to proceed outside the area specified on the excavation inspection form;
- Immediately stop the work, if a hazardous condition is observed;
- Assemble appropriate safety rescue equipment close to work as outlined in the emergency rescue plan;
- Be alert for any collapse or hazard;
- Take immediate action as per the emergency plan if any unexpected changes occur, including the use of rescue equipment;
- Not leave the job unless properly relieved by an authorised and competent person.

5.6 QUU SAFETY TEAM

QUU Safety Team will work with the business to ensure:

- Will work with the business to facilitate the establishment, review and continual improvement of management systems, arrangements and related procedures relating to the management and use of PPE.
- Provide advice to assist in the active management and resolution of identified ground disturbance hazards and risks in accordance with QUU SMS and relevant legislative requirements

5.7 CONTRACTORS

At all times when performing work on a QUU site or for/on behalf of QUU, contractors must meet and comply with QUU's ground disturbance work requirements. This includes:

- Providing adequate resources to ensure implementation of the requirements of this SOP;
- Complying with this SOP and all relevant legislation, codes of practice, standards and licensing requirements that apply to their respective scope of work.

6. RELATED DOCUMENTS

- WHS Hazard and Risk Management Procedure (PRO363)
- WHS Incident Reporting, Investigation and Escalation Procedure (PRO364)
- WHS Consultation and Communication (PRO361)
- Emergency Rescue Plan
- Excavation, Trenching and Underground Services SWMS (SWMS5)
- Record of excavation inspection (FOR222)

- Confined Space SOP (PRO444)
- Managing the Risk of Falls SOP (PRO409)
- Plant SOP (PRO386)
- Hazardous Chemicals SOP (PRO377)
- WHS Emergency Response and Preparedness Procedure (PRO365)
- Lifting & Pulling Using Mechanical Devices SOP (PRO459)

7. PROCEDURE

7.1 OVERVIEW

QUU will manage their facilities, plant, work environment and tasks to eliminate the risk of associated with Ground Disturbance at their worksites. Where this is not possible, QUU will minimise the risks so far as is reasonably practicable.

Note: This SOP does not incorporate all specific control measures required to safely undertake tunnelling activities therefore QUU workers must also follow Safe Work Australia's *Guide for Tunnelling Work(2013)* for further guidance on safe operating procedures
http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/824/Guide-Tunnelling.DOCX

7.2 RISK ASSESSMENT

A risk assessment shall be conducted prior to undertaking all Ground Disturbance using the Excavation, Trenching and Underground Services Safe Work Method Statement (SWMS5). The SWMS shall be reviewed/ consulted in accordance with this SOP and the **QUU WHS Hazard and Risk Management (PRO363)**.

SWMS / risk assessment must be performed when ground disturbance occurs:

- When a super saturated trench reaches a depth of 1 m;
- When a dry trench reaches a depth of >1.5 m;
- Change of anticipated excavation dimensions;
- As necessary due to changes in soil type or condition, weather conditions, particularly after rainfall;
- Each day before the commencement of work; and
- After a break.

The details of the risk assessment must be recorded on the Excavation Inspection form for each occasion (e.g. SWMS, WRAP etc.) as per the QUU **WHS Hazard and Risk Management (PRO363).**

Ground disturbance work including pot holing and ground probing must be undertaken in accordance with the relevant work instruction only if the works being undertaken is less than 1metre.

A Record of excavation inspection (FOR222) is to be completed where a SWMS has been implemented.

At the end of the job, completed documents (i.e. SWMS, permits, inspection records) are to be kept and stored in accordance with PRO362 WHS Documentation Data Control and Record Management.

Workers and other affected stakeholders such as contractors shall be consulted during the risk assessment process. Consultation shall be conducted in accordance with QUU **WHS Consultation & Communication Procedure (PRO361)**. Risk assessments undertaken by contractors shall consider the requirements of this SOP.

A summary of potential hazards to consider during the risk assessment is listed in Table 1.

Table 1 Examples of Ground Disturbance Hazards

Underground essential services - electricity, sewerage, water, gas, chemicals or refrigerant in pipes or lines.	Hazardous chemicals that for example may be present in the soil, & natural gases & naturally formed hazardous chemicals i.e. sulphur etc.
Fall or dislodgement of earth or rock	Hazardous atmosphere in an excavation
Falling objects	Inappropriate placement of excavated materials, plant or other loads
Instability of any adjoining structure caused by the excavation	Presence of or possible inrush of water or other liquid
Asbestos including naturally occurring asbestos	Suspected contaminated soils or other contaminated matter

When assessing the risks associated with Ground Disturbance work the following should be considered:

- Local site conditions including access, ground slope, adjacent buildings and structures, water courses and trees;
- Depth of the excavation;
- Soil properties including variable soil types, stability, shear strength, cohesion, presence of groundwater, effect of exposure to the elements or suspected contaminated soil;
- Fractures or faults in rocks including joints, bedding planes, dip and strike directions and angles, clay seams;
- Any specialised plant or work methods required (e.g. ground support);
- Method of transport, haul routes and disposal;
- Development of lift plans by suitably qualified personnel i.e. geotechnical engineers, qualified rigger etc.
- What exposures might occur such as to noise, lasers, Radiation electromagnetic and or chemical, ultra violet rays, hazardous chemicals or environmental hazards;
- Number of people involved;
- The possibility of unauthorised access to work areas;
- Weather conditions;
- Length of time that the excavation or trench will be open.
- Geographical location and previous land use should be established, for example, old mine shaft location, old land fill location, flood prone areas etc.

7.3 PLANNING THE GROUND DISTURBANCE WORK

7.3.1 Location of Services

Before any excavation or trenching is undertaken, a check must be conducted for all known underground utilities. This must be undertaken by:

- Checking existing site maps
- Contact Dial Before You Dig (Call 1100 or www.1100.com.au)
- Cable avoidance tool

- Pot holing with hand tools
- Ground probing
- Use of Vac truck and/or locator by a location company

The location of services must be documented prior to commencement of works and provided to the PICOW. This information must be kept on site until the work is completed.

7.3.2 Adjacent Buildings and Structures

The Engineer/PICOW is responsible for assessing any ground disturbance works where excavation occurs below the level of the footing of a building or structure to determine whether the building or structure could be impacted. Ensure a suitable ground support system is in place. Assess surrounding and adjacent buildings and structures will be impacted by vibration, flooding or water penetration. Backfill shall be clean fill or other geotechnical approved materials.

7.3.3 WRAP

All worksites where there is a requirement for ground disturbance activities shall be risk assessed by a competent person prior to commencement of the work. This is to determine the need for:

- Shoring (and which type).
- Benching or battering.

This shall include an evaluation of the effects of this work on adjacent structures. All relevant matters must be considered in managing the risks, including:

- The nature of the excavation.
- The nature of the excavation work, including the range of possible methods of carrying out the work.
- The means of entry into and exit from the excavation (if applicable).

The excavation and trench must be assessed to determine if it is a confined space. If so, refer to the Confined Space SOP (PRO444) and SWMS. A record of all details of this inspection must be kept on site as per Section 7.6 of this procedure.

7.3.4 Record of excavation inspection

No ground disturbance works are to proceed without a current Record of excavation inspection form (FOR222). Record of excavation inspection form can be authorised by Supervisor/PICOW.

The inspection shall take into account the following:

- Identification of all potential natural hazards within a 15 metre radius of the work. Consideration should also be given to hazards above and below the excavation or trenching work;
- With excavations, it is mandatory to undertake underground service location and depth detection;
- Provide details of emergency planning arrangements;
- Isolation or barricading the area in which excavation or trenching work is being conducted;
- Outline general safe access and entry into an excavation or trench;
- Outline method for prevention of collapse;
- Ventilation of the work area;
- Identification and management of WHS or environmental hazards (e.g. waste, asbestos, contaminated soil etc);
- Safe storage and disposal of waste or hazardous material;

- Management of changing circumstances during the period of work;
- Instructions for workers in safe practices relating to the ground disturbance activities;
- Implement and prepare a written emergency plan for trenching work; and
- Allocation of designated person to be a Spotter.

7.3.5 Planning the Ground Disturbance - Supervision

All Ground Disturbance work shall be conducted under the control of the PICOW.

The Permit Issuer is responsible for allowing the work to proceed. The Permit Receiver is responsible for ensuring the work proceeds as per the requirements of the permit. This shall apply to all QUU staff and contractors. The PICOW cannot complete the Excavation Inspection form by themself.

Before ground disturbance work is commenced in any location, the Site Supervisor/PICOW shall ensure that;

- Implement an emergency plan compiled in consultation with relevant workers;
- Risk Assessments, SWMS and Permits to Work have been completed, communicated and signed;
- The hazards of the location have been identified and reported;
- Controls for managing all hazards are in place;
- The plant is fit for purpose;
- The equipment is located so that, in the event of malfunction of the equipment, a collapse or unsafe hazard is not created;
- There is no inherent hazard due to the nature of the area on which the excavation work is to be performed;
- Relevant stakeholders are informed.

7.3.6 Isolation of Services

Where practicable, buried or concealed services and utilities must be double isolated / de-energised before commencing excavation activity. Reference to the QUU Energy Lock Out and Tag Out Procedure (PRO379).

Where there is an exposed gas or fuel line, continuous gas detection must be in place at all times.

7.3.7 Barricades

Suitable barriers and warning signs must be installed if any person is at risk of harm in the ground disturbance area. The nature of barricades will be determined during the risk assessment. The Site Supervisor/PICOW is responsible for ensuring barricades are in place, as outlined in a risk assessment.

7.3.8 Communications

An effective communication system based on two-way acknowledgement between mobile plant operators and ground personnel must be established and communicated before work commences.

7.3.9 Emergency Plan

An emergency plan to deal with unexpected incidents, such as ground slip, flooding, gas leaks and the rescue of workers from an excavation must be developed. All operators must be trained in this emergency plan and regular rehearsals are to be conducted. Refer to the QUU **WHS Emergency Response and Preparedness Procedure (PRO365)**.

In the event of a collapse, immediately contact Emergency Services (000) and implement emergency response plan. Details are to be included in the job Emergency Plan.

7.4 CONTROLLING THE RISK

The ways of controlling the risk of Ground Disturbance work are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of risk control. The Queensland WHS Regulations 2011 require duty holders to work through this hierarchy to choose the control that most effectively eliminates or minimises the risk for the related circumstances. This may involve a single control measure or a combination of two or more different controls. QUU has outlined its process for managing risk in **WHS Hazard and Risk Management Procedure (PRO363)**.

7.4.1 Spotter

For any excavation or trenching work a spotter (stand-by person) is required. For any penetration work where one side of the penetration is not visible a stand-by person needs to be on the blind side or the area needs to be completely barricaded off and must include signage.

The role of the spotter is to check adjacent equipment and observe practices to ensure that they are being conducted safely and in accordance with risk assessments, SWMS and Permit to Work.

NOTE: The Spotter does NOT simply conduct periodic checks; it is a continuous and thorough inspection and presence in the area and its vicinity by the assigned personnel, with special attention being given to any new developments that might affect the safe condition of operations.

While carrying out any excavation/penetration work, the following requirements apply:

- Each person associated with the work shall be able to follow the precautions to be taken as specified on the Record of excavation inspection (FOR222), risk assessment and SWMS as per the site safety requirements;
- No person shall enter an excavation or trench to carry out work alone;
- The Permit Issuer will provide any assistance that is considered necessary in order to enable the excavation works to be completed;
- Excavation work shall be carried out only during the period stated on the Record of excavation inspection (FOR222);
- A new Record of excavation inspection (FOR222)is required in the event of the current work extending beyond the currency of the permit;
- A site inspection must be carried out each day of a permit, before work can commence;
- No equipment or plant that produces fumes or gases shall be used in or around trenches or excavations.

7.4.2 Access and Egress into Trench or Excavation

Persons shall not enter or direct another person to enter any trench or excavation unless control measures, identified by a risk assessment have been implemented.

Specifically, hazards associated with the following potential events are to be identified, risk-assessed and control measures implemented as part of the pre-start risk assessment:

- An emergency response plan must be developed prior to undertaking the activity.
- A person shall not step nor jump over an excavation or trench.
- A person being trapped by the collapse of the excavation or trench.
- A person being struck by an object falling into the excavation or trench.
- A person falling into the excavation or trench.
- A person must not walk within .5 metre from the edge of an excavation or trench unless actually conducting a specific task.
- A person inhaling, or otherwise being exposed to, airborne contaminants, fumes and gases in the excavation or trench.

A safe means of access in and out of a trench or excavation must be available at all times, as outlined in the Excavation, Trenching and Underground Services SWMS (SWMS5).

Ladders are to be used to enter and exit trenches as per the requirements outlined in the Managing the Risk of Falls SOP (PRO409). Ladders must be no more than 9m apart and at least 1m of the ladder must extend out of the trench.

7.4.3 PPE

PPE must be appropriate to the task performed as outlined in the Personal Protective Equipment SOP (PRO424). As a minimum this will include ankle high laced safety boots (or safety gumboots), long-sleeve high visibility clothing, drill long pants, gloves, hard hat with a wide brim, clear/tinted safety glasses, sunscreen, aural protectors, and any others as identified in a risk assessment.

7.4.4 Plant and Equipment

Petrol or diesel equipment such as vehicles, generators and pumps must not be used in or near the trench if there is a risk of exhaust fumes entering an excavation that is or will be occupied by personnel (refer to Confined Space SOP (PR0444), or a risk of flammable mixtures igniting (refer to **Hazardous Chemicals SOP (PRO377)**). All plant WHS risks must be managed as per the requirements outlined in the **Plant SOP (PRO386)**.

Areas in which plant and equipment is required to be operated should be adequately assessed for all potential risks for example, ground composition and materials, geographical location, ground compaction & stability, location of existing services, vibration caused by the plant, human interaction etc.

7.4.5 Excavation Stability

Controls for maintaining the stability of disturbed soil during excavation activities must be in place. Engineering controls such as battering, benching, shoring or shielding must be used to support or stabilise the faces if the excavation to prevent collapse and harm, as determined by the risk assessment or at trench depths greater than 1.5m (super saturated excavation is 1m). These controls must be designed and prepared by an appropriately qualified person (current trenching and shoring training) and comply with the *WHSQ Excavation Work Code of Practice 2013*.

Any support systems must be removed in a way that protects workers from cave-ins, structural collapse or being struck. Temporary structural measures may be required during the removal process.

Written approval by a geotechnical engineer must be obtained stating that the trench is safe to work in for trenches deeper than 3m. The approval must be kept on site at all times during the work activity.

Excavation Activities

Mobile plant, materials and spoil must be kept at a distance of 1 metre or more from the excavation edge to prevent potential hazards to the person working in the excavation (refer to the **Plant SOP (PRO386)**. Vibration from external sources such as roads and railways may need to be considered in the risk assessment.

Dewatering

Dewatering operations must be performed where there is a risk of excess water accumulating around the excavation. Dewatering tasks must be included in the WRAP.

Placement of Soil

Excavated spoil must be placed at least one metre away from the edge of the excavation. Height of spoil pile should be no higher than 1 metre. The PICOW shall determine through a risk assessment whether a geological load bearing test is required.

Backfilling

Backfilling and rehabilitation requirements shall be determined by the supervisor/PICOW prior to excavation works commencing.

7.5 HAZARD/INCIDENT REPORTING AND INVESTIGATION

Any hazard/incident involving ground disturbance work on a QUU controlled site must be reported in accordance with the QUU **WHS Incident Reporting, Investigation and Escalation Procedure (PRO364).**

7.6 DOCUMENTATION AND RECORD KEEPING

A copy of all records (i.e. completed SWMS, permits, inspection records etc) will be held in TRIM with physical hard-copies securely kept / held at site in a manner that is easily accessible for audit and review process.

8. REFERENCES

The following references contain information used in the preparation and development of this Ground Disturbance SOP:

- Queensland Work Health and Safety Act 2011
- Queensland Work Health and Safety Regulations 2011
- Environmental Protection Act 1994
- Environmental Protection Regulation 2008
- Excavation Work Code of Practice 2013
- AS3190 Approval and test specification - Residual current devices (current-operated earth-leakage devices)

9. REVIEW

The Ground Disturbance SOP is to be reviewed every 2 years or earlier if:

- There is an identified risk to business;
- A significant safety or serious injury event occurs;
- Incident investigation or audit results show that application of the standard fails to deliver the required outcomes;
- There are changes in associated legislation; or
- There is evidence that the standard is not having a positive impact on safety-related KPIs.

10. FURTHER INFORMATION

For further information, contact your Health and Safety Representative or the QUU Safety Team.