Key Requirement

Entering and Working in a Confined Space

Watercare
An Auckland Council Organisation

Contents

Introduction

Confined spaces shall be identified at the design stage of a project to construct a new facility or at the design stage of any significant modification of a facility.

Where ever practicable designers shall design the assets so as to avoid the creation of confined spaces. Where the creation of a confined space cannot be avoided at the design phase, all practicable steps shall be taken by the designers to eliminate or minimise the need to enter the confined space for routine operations (Safety in Design).

Where confined space entries are to be undertaken by a contractor on a designated construction site, where control of that site has been formally handed to a contractor, the procedures to be used will be agreed upon and written into the contract documentation.

Responsible Managers for the Assets shall ensure that confined spaces under their control are identified and where practicable labelled.

Enclosed or partially enclosed spaces that do not meet the definition of a confined space per se, but could under different circumstances become a confined space, are not to be labelled.

Where a space is identified (either through signage or through an assessment) as a confined space and entry is required, the requirements of this document apply.

Responsible Managers for Confined Space Work shall ensure competent people assess risks, and endeavour to eliminate entry through new work methods or technology.

If working in a confined space is unavoidable, then:

- Any person planning Confined Space Work shall consult the parties that the work will affect
- The confined space work team shall review and verify the hazards identified on the risk score decision tree, associated with the confined space work and will review the controls recorded on the JSA
- Any person involved in confined space activities, shall be trained and hold the relevant competency for that activity
- Risk control requirements and emergency response plans shall be documented and communicated to the parties that they affect
- Audits shall be conducted on confined space work sites, work methods, plant, and equipment to ensure activities are being conducted in accordance with this Key Requirement and the agreed controls
- A record shall be maintained for logging the location, time, date and nature of any incidents and irregularities within the confined space (e.g. gas monitor alarms).

Where a confined space entry is to be made, controls shall be applied that take all reasonably practicable steps to ensure the safety of the personnel working in or on the confined space. Those controls are to be based on the risk score decision tree and the JSA process. Some examples of controls include:

- Managing the control of hydraulic assets (including flow)
- The mechanical isolation of hazardous plant and equipment (lock out, tag out)
- Air quality testing and monitoring of the confined space

- Ventilation of the space (Mandatory in Wastewater confined space entries) or extraction of the immediate source of contaminant (e.g. welding fumes)
- Mandatory standby person(s) are provided to monitor entry and egress of the space, and to maintain continuous contact with the people inside the confined space
- Protective barriers and signs are in place at each entry point to prevent unauthorised entry
- A task specific emergency response plan (ERP) is to be established and rehearsed prior to entry
- A written Confined Space Entry Form is to be completed by the Responsible Person for Entry/Permit Receiver

Purpose

The purpose of this Key Requirement is to help eliminate or control the risks for anyone who enters or works in or on confined spaces for Watercare, and to create a safe place of work free of risk as required by the Health and Safety at Work Act 2015.

This Key Requirement applies to people who design, build, procure and manage confined spaces for Watercare. It also applies to:

- People who work in or on confined spaces and/or
- People who work in or on confined spaces and/or their responsible managers
- People who do Hazard Identification and Risk Assessments and/or provide emergency response and/or prepare emergency response plans
- People who complete confined space audit activities.

The principles and minimum requirements set out in this Key Requirement are expected to be met or exceeded by Watercare contractors. Contractors must apply the Watercare risk decision tree to confirm if a permit to work is required, then, if applicable, to establish the Watercare Authorisation levels. Contractor's procedures, if used, must meet or exceed the standards set out in this Key Requirement.

Entry into a confined space shall not be made under lone work conditions. Refer to the Watercare Working Alone Key Requirement.

Responsibilities

The Responsible Manager for the Asset is responsible for:

- Ensuring they hold the current competencies in confined space work as outlined in the Training and Competency section of this Key Requirement
- Identifying all confined spaces and potential confined spaces within their areas of control and responsibility
- Maintaining a register of all confined spaces within their assets
- Ensuring that all confined spaces are labelled as confined spaces (where ever practicable)

- Maintaining a hazard register of all known static hazards
- Ensuring a copy of the register of hazards is provided to, or available to the Responsible Person for Confined Space work
- Ensuring all confined space activities undertaken on their asset complies with this key Requirement and AS2865:2009
- Providing operational requirements and specifications of confined spaces
- Determining if tasks can be completed without the need to enter the confined space
- Ensuring people affected by confined space activities are consulted
- Escalating any confined space incident to their manager immediately it is practicable to do so (e.g. after initial response)
- Ensuring a review of the hazard identification and risk assessment is completed following a report of an incident or a change in conditions, in conjunction with the Responsible Person for Confined Space Work and the Responsible Person for Entry
- Ensuring incidents reported are recorded in accordance with the Watercare Toolkit Element Managing Incidents and
- Ensuring any anchorage points are within certification before use.

The Responsible Person for Asset Designers is responsible for:

- Ensuring they hold the current competencies in confined space work as outlined in the Training and Competency section of this Key Requirement, (if doing more than concept design work)
- Ensuring designers identify confined spaces during the design stage
- Having designers, design out confined spaces at the design stage where ever that is practicable
- Ensuring that as part of the design phase of a project, designers seek to identify hazards that may contribute to the risks of confined space work and endeavour to design these risks out of the assets at this stage where ever that is practicable
- Ensuring that where ever practicable, designers provide for the implementation of effective controls of confined spaces (e.g. ease of access and egress, ventilation etc.)
- Ensuring that the designers understand restrictions or conditions of use for plant, equipment and accessories within confined spaces
- Ensuring that designers understand and comply with their legal duty of care
- Determining if the need for entry can be eliminated through design
- Complying with the responsibilities outlined in the Watercare Safety in Design guide, and
- To ensure that people potentially affected by any confined space, identified during the design phase of a project, are consulted about the potential impact and potential solutions

The Responsible Person for Confined Space Work is responsible for:

- Ensuring they hold the current competencies in confined space work as outlined in the Training and Competency section of this Key Requirement
- Ensuring a confined space hazard identification and risk assessment has been completed, documented, reviewed and entry authorised prior to completing the confined space entry form
- Ensuring the relevant control measures are implemented before allowing entry

- Determining if the task(s) can be completed without the need for entry into the confined space
- Escalating any confined space incident to their supervisor/manager and the Responsible Manager for the Asset immediately it is practicable to do so (e.g. after initial response)
- Ensuring inspections of confined space activities, emergency response plans, training plans, and corrective and preventative actions are regularly implemented
- Ensuring persons affected by confined space hazard identification and risk assessment, elimination through design or technologies, risk control requirements and emergency response plans, are consulted
- Communicating hazard and risk control procedures, Emergency Response Plans, new hazards and the results of incident investigation and corrective or preventative actions
- Ensuring the supply of training and confined space plant, equipment including safety equipment and communication devices
- Ensuring the Responsible Person for Entry is appropriately qualified, competent and authorised to do the type of confined space work that they will be responsible for
- Ensuring confined space equipment is serviceable, fit for purpose and is within current certification or issue period
- Communicating details of any incidents within the confined space to the Responsible Manager for the Asset

The Responsible Person for Entry is responsible for:

- Ensuring they hold the current competencies in confined space work as outlined in the Training and Competency section of this Key Requirement
- Remaining on site throughout the confined space work
- Completing and signing acceptance of the Confined Space Entry form as the Permit Receiver. This involves:
  - Verifying that the hazards and risks identified are accurate
  - Verifying that the specified controls have been applied correctly
  - Allowing or denying entry based on whether they are satisfied that the controls have been implemented
  - verifying entry sign in and exit sign out for all confined space entry personnel
  - closing or cancelling the permit once the job is finished
  - Suspending work immediately conditions change, e.g. gas detector alarms, and evacuating the space until the hazard identification and risk assessment has been fully reviewed
  - Escalating any incident or condition change to the Responsible Person for Confined Space Work, and
  - Participate in a review of the hazard identification and risk assessment for the job following any incident or change in conditions
- Being the contact point for controls that require sign off or confirmation, such as: isolation, air quality, hot work permits, etc.
- Denying entry to any person if they are not satisfied that the risk to that person can be adequately controlled
- Ensuring they understand their authority, before doing the role, and
- Providing the pre-job briefing before work commences
- Ensuring confined space equipment is serviceable, fit for purpose and is within current certification or issue period
- Recording details of any incident that occurs during the confined space entry

The Standby Person/Safety Observer (Note: they can also be the Responsible Person for Entry if the controls don't include hydraulic isolation or flow management), is responsible for:

- Ensuring they hold the current competencies in confined space work as outlined in the Training and Competency section of this Key Requirement
- Ensuring they are fit for confined space work
- Remaining outside the confined space, within close proximity of the entry point and to operate communication systems and devices
- Maintaining communication with the entry person or team
- Not securing or leaving the access point until the Responsible Person for Entry has confirmed that all people have exited the confined space (either at that entry point or another entry point)
- Preventing unauthorised people or animals from entry
- Assisting with access and emergency response if required
- Carrying out air quality testing at the entry point and to maintain a record of all air quality testing and monitoring carried out, and
- Confirming that the air quality (at the entry point and through communications with the entrants) is within the safe range before entry, and remains at safe levels throughout the confined space work activity

All Confined Space Work Team Members are responsible for:

- Taking personal responsibility for ensuring that they have a current first aid competency and the current confined space training competencies required for confined space work plus the current induction and are fit for work
- Actively participating in the hazard identification and risk assessment process for the confined space entry
- Applying the controls, communicate new hazards and effective controls to impacted people on the job
- Noting and understanding restrictions or conditions of use for plant, equipment and accessories within the confined space
- Checking all their PPE and confined space equipment to ensure it is serviceable, is fit for purpose and is within the current certification or issue period
- Understanding the task(s) that they are to do within the confined space
- Signing onto the confined space entry form
- Signing into and out of the confined space on each occasion they enter and exit the confined space, and
- Reporting any incident to their Supervisor/Manager immediately it is practicable to do so (e.g. after initial response)

Requirements for control

Consultation and Communication

Asset designers shall consult with the Watercare Responsible Person for Asset Designers, whenever confined spaces are identified within the design. All reasonably practicable steps shall be taken to eliminate confined spaces and/or the need for entry into confined spaces at the design phase of a project.

The Responsible Person for Asset Designers shall consult with the people affected by confined spaces, including Health and Safety Representatives, to identify methods for eliminating the need for a confined space.

The Responsible Manager for the Asset shall ensure that the people doing the work are advised that a particular space is a confined space (where practicable – signage is sufficient for this communication) and shall ensure that appropriate controls are routinely applied.

The Responsible Person for Confined Space Work shall ensure that the people doing the specific confined space work are advised of and consulted on the work scope and must ensure that they participate in the documentation of the:

- Hazard identification
- Risk assessment/JSA
- Risk control measures and procedures, including the elimination of entry through work methods or technologies where ever practicable
- Emergency response plan

Internal affected people must actively engage in the consultative arrangements. External affected people must be advised and asked to engage in the consultative arrangements.

Safety in Design

Responsible Persons for Asset Designers shall ensure that designers of assets eliminate confined spaces in the assets during the design, manufacture, supply and modification phases wherever reasonably practicable; including allowing for adequate isolation points, automatic shut-off valves and intrinsically safe electrical equipment.

Where designers cannot practicably eliminate a confined space within the design, manufacture, supply and modification phases, Responsible Persons for Asset Designers shall ensure designers determine if the need for entry into the confined space can be eliminated when the assets are designed or the design modified.

Responsible Managers for the Asset shall also understand and document why it was not reasonably practicable to apply higher level hazard and risk controls, and/or where a lower level control is chosen. The Responsible Manager for the Asset shall forward the report to the Chief Operations Officer and/or the Chief Infrastructure Officer for authorisation.

Responsible Person for Asset Designers and Responsible Persons for Confined Space Work shall determine if the need for entry can be eliminated through the use of new work methods or technologies, (e.g. closed circuit television).

Access into a Confined Space

Access into a confined space shall be designed so as to ensure the safe entry and egress of all entrants. Examples of entry and egress equipment include lifts, stairways, ladders, ropes, winches etc. The selection of the most appropriate entry and egress equipment should be based on the following factors:

- The hazards present in the confined space
- The risk level of the confined space
- The type of work likely to be performed in that space
- The type size and volume of other equipment that is to be taken into the confined space
- The number of people entering the space
- The time taken to extract each person from the space, particularly in an emergency, and
- The ability to rescue a person from the space

The design of permanent entry or egress ladders or stairs shall comply with the requirements of the current version of AS/NZS1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation.

Where there are concerns about the safe entry into a confined space because of the structural integrity of the asset, the Responsible Person for Entry shall immediately stop entry at that entry point and shall advise the Responsible Person for Confined Space Work, who shall immediately advise the Responsible Manager for the Asset.

The Responsible Manager for the Asset may need to obtain an engineer's report before further entry may be approved at that point again. Where ever practicable that asset should be managed from another safe access point or all work stopped until it can be made safe to enter.

Natural Ventilation

Responsible Persons for Asset Designers shall ensure that where ever practicable, designers plan natural ventilation into new facilities to minimise the risk of atmospheric hazards being present (e.g. gas build up from either internal or external sources).

Documentation

Responsible Persons for Asset Designers shall document and keep records of asset plans and specifications, which are passed to the Responsible Manager for the Asset upon completion of the works.

Responsible Person for Confined Space Work shall ensure the following is documented and forwarded to the Responsible Manager for Assets:

- Hazard and Risk assessments, including JSA's, Risk Score decision tree assessments, and control measures such as: traverse plans or safe work method statements
- Emergency Response Plans

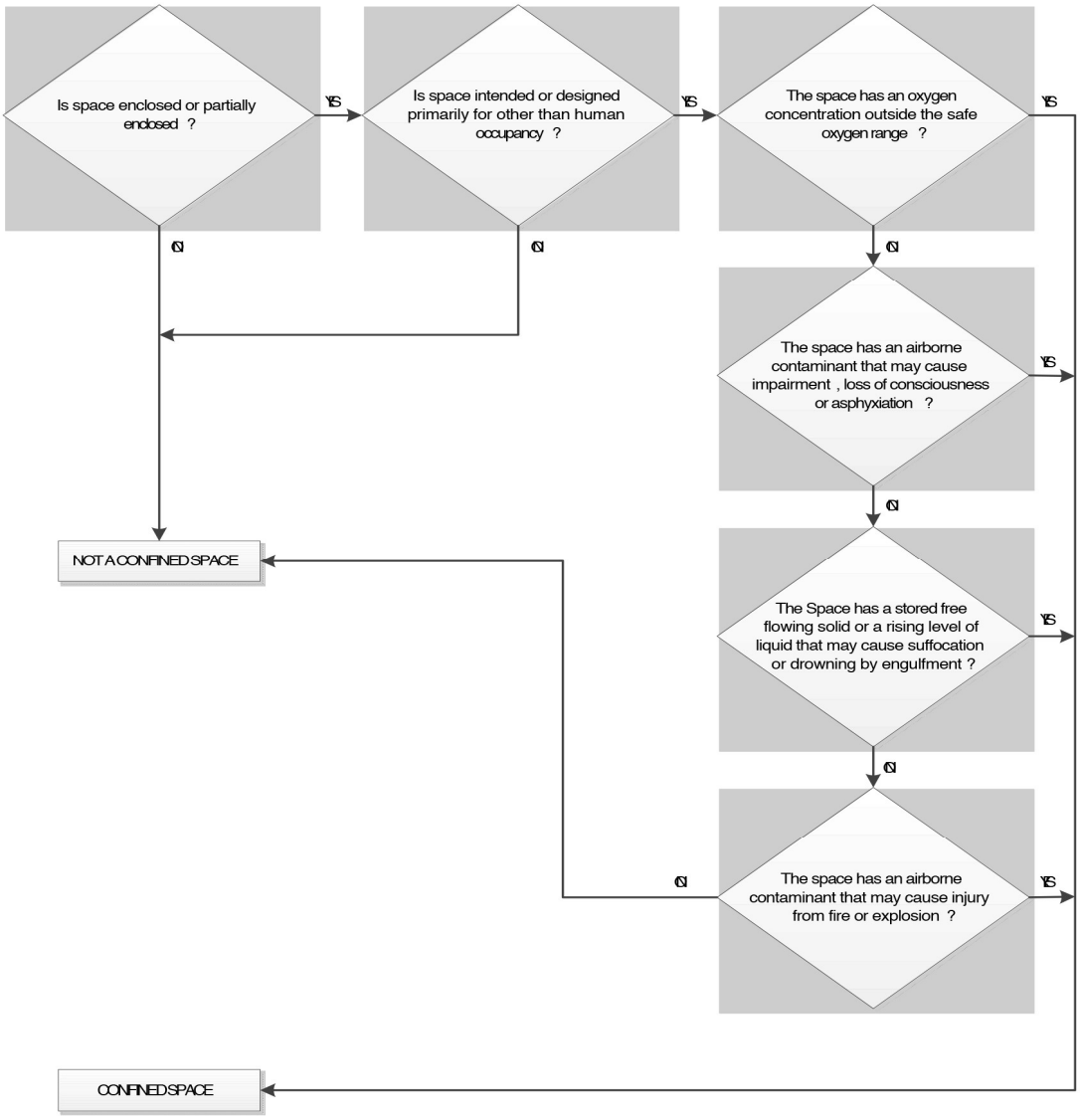
The Responsible Manager for the Asset shall ensure that a copy of these records are filed against the specific asset. The Responsible Manager for Assets, shall also ensure a record of the confined space assets at manned and unmanned sites under their area of responsibility (e.g. in a Confined Space Register) is maintained.

These records may be categorised or described by title, unique identifier, location or bulk descriptor (e.g. manholes) or a combination of any of the above provided that the descriptor makes it clear to work crews which spaces are to be treated as confined spaces at all times and which spaces are potential confined spaces.

Confined Space Identification

The Responsible Manager for the Asset shall ensure that all enclosed or partially enclosed spaces within their asset base are reviewed and assessed against the definition of a confined space within the Definitions section (Appendix A) of this Key Requirement.

The identification of a confined space shall be done in accordance with the following process:



There are some assets that are always confined spaces, irrespective of the task being undertaken. Some assets will become confined spaces based on the activity being undertaken, and the hazards that the activity introduces. Examples are included in the Examples of Confined Spaces Guide.

Designated Confined Spaces

Where ever reasonably practicable, spaces designated as always being a confined space, must have affixed to each entry point, approved signage identifying them as a "Confined Space".

A confined space register shall record the location of each space that is categorised as being a confined space at all times.

Hazard Identification & Risk Assessment

A hazard identification and risk assessment must be completed and documented prior to entry into any space that has been identified as a confined space. This information shall form part of the confined space entry procedure. The comprehensive completion of a thorough JSA (or other agreed documentation) may be sufficient for this process.

Risk Control Measures

The Responsible Person for Entry, as defined in the Responsibilities Section of this Key Requirement, shall not allow entry into or work within the confined space until relevant controls are confirmed to have been implemented.

Responsible Persons for Confined Space Work (unless otherwise stated) shall ensure that risk controls are documented in the risk assessment and control form, (JSA or other agreed form), and shall ensure that the controls specific to the confined space entry and work are implemented in full.

Entry and work within any confined space across Watercare is not authorised unless:

- The hazards have been identified
- The risk level has been determined
- The risks have been managed to as low as is reasonably practicable
- The appropriate level of authority (relevant to the controlled risk score) has been sought and authorisation given based on the controls applied

The Responsible Person for Confined Space Work shall complete the planning phase of the confined space work. No confined space work shall be commenced without being planned and thought through. **This includes emergency work after hours.**

Where ever practicable the Responsible Person for Confined Space Work should involve the Responsible Person for Entry.

This planning includes an assessment of the expected hazards and risks for the planned work, using the risk score decision tree as a minimum guide. Circle each hazard and risk present on the risk score decision tree. This could be a table top exercise or completed at the site.

Every hazard and risk identified is to be transferred to the JSA. Documented alongside each hazard and risk listed, there must be controls that will adequately manage that risk or hazard.

A hierarchy of risk control measures to eliminate or, if this is not possible, minimise the risk should be followed in the priority order listed. The Hierarchy comprises -

(a) elimination
(b) substitution
(c) isolation
(d) engineering controls
(e) administrative controls; and
(f) use of personal protective equipment

Personal protective equipment should only be used either as a last resort when all of the other risk control measures (individually or in combination) have failed to adequately control the risk, or in an emergency response.

Once the controls have been identified and recorded alongside the listed hazards and risks on the JSA, the residual risk score shall be recorded onto the risk score decision tree alongside the raw risk and then the appropriate level of authority (relevant to the controlled risk score) obtained.

Isolation or Control of Potentially Hazardous Services

Hydraulic Isolation

Hydraulic isolation is the process of isolating liquid that may cause a risk to people inside the confined space. Follow the isolation procedure, relevant to the work area and asset.

Entry into a confined space hydraulic asset is not permitted until the Responsible Manager for the Asset, or his/her delegate, has confirmed isolation and/or flow management has been successfully implemented.

De-isolation shall not commence until the Responsible Person for Entry closes or cancels the confined space entry permit.

The Responsible Manager for the Asset, shall ensure that any confined space work in a non-isolated asset (e.g. a live wastewater pipe), has a traverse plan prepared and signed off by the Responsible Manager for the Asset, or his/her delegate. This traverse plan shall include the identification and management of the flow control process to be applied and is to be based on the risk assessment.

Flow Management

If hydraulic isolation is not possible, a flow management plan shall be implemented, following the relevant procedure.

Entry and work within a confined space hydraulic asset is not permitted until the Responsible Manager for the Asset (or their formally authorised delegate) has confirmed flow management has been successfully implemented.

Hydrographic Monitoring

Where a flow management plan is required in accordance with the above section, flow, depth, rainfall (making use of weather forecasting tools), retention time, tide and peak system flow shall be monitored and limits set within the plan.

When working up or down stream of storages such as wastewater pump stations, ensure they are monitored to warn of power or equipment failure, which may cause flow to enter the work area.

The SCADA System should be used to get information about flow when planning work in any hydraulic asset (where the system is available) and can also be used to send hazard alarms to the responsible person for entry.

Mechanical or Electrical Plant and Equipment

Before entry and work within a confined space can be authorised, all electrical or mechanical plant and equipment that may create a risk to persons inside or working on the confined space should be isolated. Examples include: pumps, mixers, switch rooms and carbon dioxide fire suppression systems or chemical dosing units.

Entry is not permitted until the Responsible Person for Entry has confirmed that mechanical and electrical plant and equipment has been isolated in accordance with the Watercare Isolation Procedure.

The confined space work team are also required to attach their isolation locks to the isolation points, and to remove them upon completion of the work and exit from the confined space.

Re-commissioning of that plant and equipment will not be allowed until the Responsible Person for Entry:

- Has confirmed that the isolation locks from the confined space work team have been removed
- Has confirmed that all personnel have signed out of the confined space and are accounted for
- The Confined Space Entry form is closed or cancelled

Trade Waste Discharge

For wastewater work, check the GIS to see if there are any discharge hazards nearby.

Contact the Trade Waste team within the Water Value Business Unit to find out if there are any 'significant skin contact' or 'significant air quality' hazards (note this does not preclude the need for atmosphere testing).

At wastewater pump stations, check the site hazard information and follow the controls for any trade waste discharge that is identified.

If entry is unavoidable, where ever practicable the trade waste discharge should be isolated before entry. Arrange this with the Trade Waste team. If the trade waste discharge cannot be isolated, ensure controls are in place to manage the potential risk associated with the discharge.

Alternatively, avoid entry when high risk discharge is occurring, or if directed by the Trade Waste group or the site hazard information.

Purging before entry

Chemical Dosing

In some specific situations within larger wastewater pipes, chemical dosing may be in operation to control hydrogen sulphide gas. Entry into the confined space under these circumstances may remain within tolerable risk levels, provided that the pH of the wastewater stays between 6-8 while the wastewater pipe is occupied, and a safe level of dilution is determined based on the flow volume and continuous gas monitor is carried out while working inside the confined space.

These hazards must be identified on the JSA and controlled appropriately.

Cleaning of Chemical Storage Tanks

Chemical storage tanks shall be emptied and cleaned before entry by a method recommended by the tank manufacturer and the SDS for the stored chemical.

Access chambers or wastewater wet wells identified in the Hazard Register as having a discharge hazard or chemical dosing point, may need to be washed down before entry.

Treatment process vessels, shall be cleaned if it improves hygiene and ease of movement.

Authorisation

The **controlled risk score will determine the authorisation level** for that confined space activity (See the risk score decision tree). The raw risk score should be reduced as far as is reasonably practicable, and where ever it is practicable, it should be reduced to a risk score of 2 or lower.

The Authorisation level for risk assessments and controls will be based on the controlled risk score.

Examples of factors that may determine the risk ranking include:

- The work area, for instance the risk of hydrogen sulphide gas may be higher in a wastewater wet well than a dry well
- Task related hazards have higher risks in a confined space, such as entrapment for divers, flow if working in water, fumes or smoke from hot work, vapours from painting or cleaning, noise from ventilation fans or tools, and heat or entrapment by plant
- The design of the confined space. A deep access chamber may have higher risks than a shallow one, or a narrow pipe may have higher risks than a wide pipe
- The distance between access points. The longer the distance, the higher the risk
- Work inside a confined space might have higher risks if there is also work being done on the outside, particularly if that work is incompatible (e.g. hot work and refuelling)
- The amount of natural ventilation available. Less ventilation is a higher risk
- System demand: Peak demand creates a higher risk of flooding than off peak, or the risk of exposure to trade waste may be higher on weekdays than weekends
- The risk of flooding in a sewer pipe, or an asset located in a flood zone, is higher if there is rainfall in its storm water catchment
- Unrelated activity nearby, such as: excavation causing a water or gas main break, or vapours entering the confined space from fuel transfer facilities

The relevant authoriser must verify that the controls to be applied will reduce the risk score to the specified risk score level. If the authoriser does not believe that the controls reduce the risk to that level, and cannot specify additional controls that would control the risk to the required level, the proposed authoriser must refuse to authorise the document and must elevate the decision to the next level up.

Table 1 - Assessment and Authorisation Process

Emergency Works Authorisation

Any emergency works involving confined space entry, shall involve the same level of planning, rigor and preparation as any other confined space entry activity. The only difference is that the authoriser may not be available at the site of the work activity. As a result another form of authorisation process is required that meets the rigor needed.

Therefore, where the initial risk assessment identifies that the **raw** risk score is above 1 (that is a 2, 3, 4 or 5 level risk score) the **residual** risk score (after controls have been applied) must be verified by the duty controller/supervisor via a detailed phone conversation. The duty controller/supervisor will then co-ordinate and document the authorisation process.

In these circumstances the Responsible Person for Entry will complete the initial assessment on the risk score decision tree. They will also complete the JSA and document the controls to be applied and then document the residual risk score.

The person responsible for entry will then call the duty controller/supervisor and describe the confined space, the raw risk score, the proposed controls and the assessed residual risk score.

If the duty controller/supervisor agrees with the Responsible Person for Entry, and the risk score level is a 1 or 2, the duty controller/supervisor may authorise the assessment over the phone.

If the duty controller/supervisor does not agree, the duty controller/supervisor must either suggest additional controls that will meet the required standard, or escalate the authorisation to the next level up to suggest the changes necessary.

Where the authorisation risk score is a 3, 4 or 5, the duty controller/supervisor must make phone contact with the appropriate level for authorisation and communicate the details of the work, the assessment, the controls and the risk scores.

The phone authorisation must be documented by the duty controller/supervisor.

Only when this assessment is authorised, will the Responsible Person for Entry be able to complete the confined space entry permit.

Final Hold Point

Before entry is permitted, the Responsible Person for Entry must verify that the hazards and risks recorded on the risk score decision tree and the controls recorded on the JSA are accurate and that no additional hazards or risks are present.

The Responsible Person for Entry must then sign the verification section of the risk score decision tree, verifying that there are no additional hazards or risks, AND that the controls described have been applied, before that person is authorised to complete the confined space entry permit.

Monitoring

Regardless of the controlled risk level, the implemented controls shall be continuously monitored by the Responsible Person for Entry, (and the confined space entrants) to ensure they remain effective.

If an incident does occur in the confined space, the space is to be immediately evacuated and the permit closed.

See the confined space incident definition in the Definitions section (Appendix A) of this Key Requirement.

Delivery

Safety of Atmosphere

The air quality inside a confined space is critical to the safety of those working in the space. As a result forced air ventilation is mandatory before entry into any Watercare wastewater confined space, or any water transmission scour chamber.

For all other Watercare confined spaces or potential confined spaces, the air quality shall be tested before entry and a gas detector must be worn as an added level of protection.

For all confined space work, the atmosphere shall be continuously monitored (with a gas detector) while any person is inside the space. As a minimum at least one gas detector is required to be carried by the confined space work team inside the confined space. Where that work team are working further apart than 5m, additional gas detectors will be required to ensure coverage of the total working area.

The atmosphere inside the confined space shall remain within the tolerable range, set out within the "Air Quality Hazard" definition, Appendix A, of this Key Requirement.

In addition, any gas detector used to measure the air quality shall be within its current certification period and shall be regularly checked by the user to:

- Confirm it is still working
- To check the atmospheric readings
- To record the readings

The duration between physical checks of the gas detector will vary between 10 minutes and 30 minutes, depending on the risk level of the space.

Mechanical Ventilation or Extraction

Where the air quality is not within the specified range, the air quality hazards may be controlled by forced ventilation, or extraction, or a combination of both.

At least one team member shall be responsible for the portable mechanical ventilation or extraction equipment in use and while it is working. This must not be the safety standby person.

Mechanical Ventilation

Mandatory forced air ventilation is required in the following circumstances, regardless of pre-entry air monitor readings and regardless of duration:

- Before entering or working in any wastewater confined space
- When traversing any water or wastewater confined space
- Before entering or working in any water transmission scour chamber
- When completing any work where the air quality hazards (*except oxygen rich air or ionising radiation) are outside the limits set out in the definition for Air quality hazard in the Definitions section, Appendix A, and/or
- Where there is a risk of high temperature and humidity

Mechanical ventilation and/or extraction may also be useful or applicable before entering and while working in any other confined space.

Where ventilation is used, commence the ventilation before entry, and check the air quality to ensure it is within the specified range before entry is allowed.

Continue the ventilation throughout the period of work and until all personnel have exited the space.

Entry is not permitted until the gas tester confirms that the air quality is within the safe limits (see Definitions - Air Quality Hazard).

* Forced ventilation is not a recognised control for oxygen rich air or where ionising radiation is present.

Mechanical Extraction

Mechanical extraction may be more efficient where the work is confined to a small area and could generate or release fumes, smoke or vapours, such as: welding, painting or cleaning.

Mechanical extraction may be used instead of forced ventilation or in combination with forced ventilation.

For any confined space work, ensure flammable gases are, and remain below 5% of the lower explosive limit, (LEL), of the product used. If this level is exceeded, the confined space shall be evacuated and the risk assessment and controls reassessed.

See "Air Quality Hazard" within the Definitions section (Appendix A) of this Key Requirement for details of atmospheric gas safe and alarm levels.

Note that where forced ventilation or mechanical extraction systems are used, and where the product to be extracted may contain volatile compounds, the extraction equipment shall be intrinsically safe and the exhaust point for the extraction system shall be monitored and protected against ignition the introduction of ignition sources.

Hazardous Plant or Processes

The following specific hazards are not permitted in a confined space:

- Any ignition sources inside a confined space or within 3 m of an opening into a confined space, until flammable gas levels have been proved safe by air quality testing. Note - Ignition sources includes any powered plant, as well as: flames, hand tools, power tools, and non-intrinsically safe: lights, radios, camera's and phones
- Liquid oxygen or hydrogen peroxide dosing of any wastewater system when people are inside that system. These are banned during confined space activities to help control the risk of explosion from an oxygen rich atmosphere
- Gas cylinders (except those used for self-contained breathing apparatus)

Also ensure that nearby vehicles or plant, such as: a generator used to power ventilation fans, are positioned so that exhaust fumes or vapours (such as refuelling vapours) can't enter the confined space.

Hazardous Atmosphere Warning Signs

A warning sign shall be displayed if air quality hazards are not within the safe limits, as set out in the definition of an "Air Quality hazard" within the Definitions section (Appendix A) of this Key Requirement.

An example of the signage is: 'Danger - Confined Space - Hazardous Atmosphere - Check Oxygen Level Before and During Entry'.

Breathing Apparatus

While the use of BA during confined space entry is normally only in emergency response, used by experienced and qualified users; where entry cannot be avoided and the air quality hazards can't be controlled to within the safe limits specified within the Air quality hazard definitions, breathing apparatus (BA) shall be used.

NOTE 1 – The use of BA is "Notifiable works" and must be reported to WorkSafe New Zealand 24 hours before the work commences.

NOTE 2 - NO ENTRY is permitted when the atmosphere is flammable or ionising radiation exceeds safe levels.

Breathing Apparatus shall comply with AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment.

Entry Protection

Danger Signs at Entrance

The Responsible Person for Entry shall ensure that while any personnel are working in and preparing to work in the confined space, a sign 'Danger - Confined Space - Entry by Permit Only' is erected in an obvious position close to each open entry point to the confined space.

This requirement is in addition to the permanent signage affixed to each entry point as specified in the Designated Confined Spaces section of this Key Requirement.

Openings Used for Access

Openings used for entry shall remain open with Standby Person(s) present at each, until the Responsible Person for Entry, confirms that all people have exited and signed out of the confined space.

All entry points shall be closed and secured when work is finished and all personnel have exited and signed out of the space.

During the work, or when entering or exiting, ensure there are no obstructions around entry/egress points that may obstruct or delay worker access or egress.

Barriers to Prevent Unauthorised Entry

Barriers to prevent unauthorised or accidental entry shall be placed over or around open vertical access points, such as maintenance holes and hatches, and around open horizontal access points, while work is underway.

They shall be designed and positioned so they don't restrict ventilation.

Pay attention to the type of barrier used where children or animals are at risk of falls.

The entrance to the space or leading to the space shall be closed when work is finished to prevent unauthorised or accidental entry.

Fall Arrest System

A fall arrest system shall be used, if edge protection barriers, or safety grills are not reasonably practicable and there is a risk of falling into any opening with a depth of 2 m or more.

The type of fall arrest system to be used shall be fit for purpose and suitable for the task being undertaken. The fall arrest system shall meet AS/NZS 1891.4:2009.

The loading of an anchorage point shall not be exceeded. An engineer shall be able to confirm that fixed anchorage points, and the structure it is fixed to, meet the required load capacity in the direction of loading for the number of people it is intended to carry, to a maximum of two.

The load capacity for tripods and davits shall be specified by the manufacturer.

Recertification of anchorage points, tripods and davits will be required as per manufacturer's specifications and AS/NZS1891.4:2009 requirements.

An anchorage sling may be used to form an anchorage around a solid permanent structure, provided that the sling complies with AS/NZS1891.4:2009 and is at least capable of a loading of 1 tonne for one person and 2 tonne for two people, (maximum of two people) and the structure that the sling is attached to is also capable of withstanding the 1 or 2 tonne load expected.

A Standby Person may anchor to the same tripod or davit as the person on the rope access system, provided that it meets the required strength for two people.

Fall arrest system components (safety harnesses and safety lines or rescue lines) shall comply with AS/NZS1891.4:2009 - Industrial fall-arrest systems and devices - selection, use and maintenance.

Rope/Cable Access

A tripod or davit with a winch and working rope/cable, full harness and lanyard shall be used on all entries into any vertical shaft, opening, hatches or manhole as the fall arrest system. In addition, where:

- there is no form of fixed access system such as a fixed ladder
- it is too deep to climb in and out unassisted

A secondary safety line shall be used. A fall arrest device can be used as the secondary safety line.

A winch should be used to minimise manual handling risks.

Tripods and mobile davits shall be used in a way that prevents them falling over.

The system shall comply with AS/NZS4488.2:1997 - Industrial rope access systems - selection, use and maintenance.

Lighting for Access and Work

The confined space shall be sufficiently lit to allow safe access and work.

Lighting shall be intrinsically safe unless air quality testing can confirm flammable gases are below 5% of their LEL, before lights are switched on, or off.

Access from Roads

Where ever reasonably practicable, entry should be made where there are no road traffic hazards.

If entry and/or ventilation equipment are on or near a road where traffic hazards exist, or where they could disrupt traffic, or cause a risk to any personnel (such as exhaust fumes or ignition of flammable gases) then a traffic management plan will be required.

An approved traffic management plan shall be implemented in accordance with the Safe Traffic Management System (STMS) requirements.

Electrical Equipment

All electrical equipment that is to be used in a confined space and connected to an external supply should comply with AS/NZS 3100 and, where required, installed in accordance with AS/NZS 3000.

Where an electrical apparatus is to be used in an explosive gas atmosphere, the apparatus should comply with the AS/NZS 60079 series, and in particular with AS/NZS 60079.11 and AS/NZS 60079.25.

Electrical equipment for the detection and measurement of flammable gases should comply with the appropriate requirements of the AS/NZS 61779 series of Standards.

Ignition Sources

Where flammable airborne contaminants might exist, precautions should be taken to eliminate all sources of ignition. (Refer AS/NZS 60079.10.1 and AS/NZS 61241.10.)

Portable Electrical Equipment

Portable electrical equipment should either –

(a) be connected, individually or collectively, to an earth-free, protected extra-low voltage supply (see AS/NZS 3000) from an isolating transformer(s) complying with AS/NZS 61558, , with the transformer(s) located outside the Confined Space; or
(b) be protected through residual current device complying with AS/NZS 3190, located outside of the Confined Space

Where there is a potential for combustibles, portable electrical equipment should be intrinsically safe.

Supply Cable

Portable electrical equipment should be fitted with a flexible supply cable not inferior to a heavy duty type complying with AS/NZS 3191. The cables should be located, suspended or guarded to minimise accidental damage.

Double Insulated Tools

Where available, it is recommended that double-insulated electrical tools be used. Appropriate IP rated electrical equipment should be used where required by the risk assessment, taking into account the confined space environment. (See AS 60529)

Gas Cylinders and Hoses

Except for cylinders for use with self-contained breathing apparatus, no cylinder of compressed or liquefied gas should be taken into a Confined Space. The compressed or liquefied gas supply to equipment in the Confined Space should be turned off at the cylinder valve when not in use. Gas cylinders should be secured.

Hoses supplying gas-operated equipment used in a Confined Space should be located, suspended or otherwise guarded to avoid accidental damage. These hoses should be tested for leaks prior to installation.

Confined Space Entry Protection

Personal Protective Equipment

The task and conditions inside the confined space must be documented in the confined space hazard and risk assessment and/or JSA.

The JSA will determine what PPE is required.

Note: The use and wearing of a gas detector is mandatory for any confined space entry. At least one person per entry team must have a gas detector, and where the work team are working across an area greater than 5m, additional gas detectors must be used.

Refer to the Watercare Personal Protective Equipment Procedure for guidance.

Communication

There shall be a constant means of communication between the standby person(s) and the people within the confined space.

The method of communication shall consider transmission, or reception black spots, and restrictions caused by: asset design, or use, line of sight, distance, noise, light, darkness, dust, people, or equipment blocking the signal.

A back up method shall be tested and ready in case the primary system fails.

Entry is not permitted until they are tested and understood by the confined space work team.

For confined spaces with restricted radio transmission, such as curved pipes; a hardwire system or a wireless: microwave, long wave or low frequency system may be required. This may need to be operated by a communication specialist.

The communication system shall be monitored at enough points along the confined space to maintain a constant transmission between the people inside and the standby person(s).

Confined Space Entry Permitting

Confined Space Entry Permits fall under the Watercare Permit to Work Procedure, and permission to work must be obtained before any confined space entry is performed.

The Responsible Person for Entry, (as defined in the Definitions section (Appendix A)), shall not complete a Confined Space Entry Form until the risk assessment has been authorised. This requirement also applies for any emergency works in a confined space. (See the Emergency Works Authorisation section and note that authorisation is not required for risk score level 1).

The Responsible Person for Entry shall not allow entry into a confined space until all controls are confirmed as applied, and all people entering the confined space have current confined space competencies, have been inducted and briefed on the hazards relating to the specific entry and work activity and all entry personnel have signed onto the permit.

The Confined Space Entry Form should be displayed in a prominent place, usually adjacent to the confined space entry, to facilitate signing and clearance.

The Confined Space Entry Form **shall be reviewed** to ensure it remains appropriate to the current risks whenever there is:

- A change of team member or
- A break in the occupancy of the confined space for more than 30 minutes, such as: a lunch break.

A New Confined Space Entry Form is required when:

- More than one team enters the same confined space from separate locations, (unless both teams are included on the single form)
- An additional confined space work team(s) enter the same confined space, at the same location or any other entry point and have not been considered in the initial hazard identification and risk assessment for the primary Confined Space Entry Form
- New hazards arise. In which case the space shall be evacuated and the hazard identification and risk assessment shall be reviewed and updated
- There has been an evacuation and the confined space work team plans to re-enter the confined space, (regardless of whether the re-entry is via the same entry point or another entry point)

An Additional Confined Space Entry Form is Required When:

- The confined space team exits and then re-enters the same confined space at another location, (unless that re-entry is into the same confined space AND the re-entry was included in the initial risk assessment)

The Responsible Person for Entry shall ensure the risk assessment is reviewed and approved by the correct authority level, before completing a new confined space entry permit and before the confined space is returned to service.

The Responsible Person for Entry, Confined Space Entry Team, and the Standby Person doing the work are to implement, and/or follow, (as relevant) the risk control measures from the risk assessment.

Confined Space Emergencies

Each confined space work activity requires an Emergency Response Plan (ERP) to be developed and documented. Each ERP shall be approved in accordance with the Authorisation section of this Key Requirement and in accordance with the relevant risk category of the specific confined space work.

In general, third party services (e.g. Fire Service), shall be used to complete rescues, except where the confined space entry team can complete self-rescue or where it is to provide local first aid and the confined space conditions have not changed.

The Rescue Plan shall take into account the following:

- The likely emergency conditions that could occur
- The specific hazards likely to be encountered
- The suitable response required

The Emergency Response Plan shall be:

- Planned (documented to ensure a co-ordinated approach)
- Organised (specific duties and actions assigned)
- Rehearsed (practiced to ensure desirable outcome)
- Communicated (to members of the confined space team and any other relevant persons as to the roles that each person will fulfil)
- Recorded or attached to the Confined Space Entry Permit

Factors to consider include:

- The roles and duties of the people inside the space, the Responsible Person for Entry and the Standby Persons in an evacuation or rescue
- What rescue equipment is required? For instance: a rope access system, breathing apparatus and/or oxygen self-rescuers
- The evacuation route and the location of, and distance to the exit points, for complex confined spaces such as wastewater systems
- The likely conditions inside, the size, weight and number of affected people and how to rescue unconscious, or injured people from awkward areas that aren't near exits
- How obstructions may impact an evacuation or rescue. For instance: a rope access system needs a direct path free from entanglement
- The back-up communication method if the primary system fails
- Response time and accessibility for emergency services
- Engaging a specialist rescue service if the confined space team does not have sufficient capability for a rescue
- Consulting Fire and Emergency New Zealand (FENZ) if they are relied on as the primary rescue service. Should the risk assessment deem the level of risk high due to the nature of the entry and the external emergency response as critical, then the emergency services may need to be advised as part of the planning process of the work. The emergency services may request a prior visit to the location and a copy of the Emergency Response Plan
- The location of the nearest medical facility

Incident reporting and escalation

Any person who becomes aware of a confined space incident (as defined in the Definitions section (Appendix A) of this Key Requirement) shall report the incident to the Person Responsible for Entry immediately and to the Responsible Person for Confined Space Work as soon as possible.

The Responsible Person for Confined Space Work shall ensure that all incidents are escalated to the Responsible Manager for the Asset as soon as possible.

The Responsible Manager for the Asset shall ensure that all reported incidents are entered into the Watercare incident Management system (Synergi), within the timeframes set out within the Watercare Toolkit Element Managing Incidents.

Accounting for Variable Change

It is imperative that every person working in a confined space understands that as soon as any confined space incident occurs or when the working environment changes within a confined space, the confined space is to be evacuated immediately.

The confined space is not to be re-entered by any person until the hazard identification and risk assessment document has been reviewed in accordance and the appropriate controls have been applied to manage the changed work environment and a new permit to enter has been completed in accordance with this Key Requirement.

Monitoring

Confined space work methods, plant and equipment, may impact on workers' health and safety. As a result the following responsible people shall ensure there is an inspection process in place to monitor confined space work activities.

- Responsible Persons for Asset Designers
- Responsible Managers for the Asset, and
- Responsible Persons for Confined Space Work.

Non-conformances shall be addressed by corrective action.

Work Areas

Inspect confined space work areas for things such as:

- The function of pumps, valves and switchboards after they have been isolated to ensure they are isolated correctly
- The equipment available to facilitate isolation (e.g. locks, tags and locking mechanisms on plant) function as intended
- The condition of manholes, ladders, stairways, platforms and guardrails

Work Methods

Inspect items, such as:

- The risk controls to ensure they are implemented as stated
- Completed hazard Identification and risk assessment forms to ensure all risks are identified and managed
- Completed Confined Space Entry Forms to ensure they are completed in full
- Emergency Response Plans to ensure they exist and are practical to achieve

Plant and Equipment

Audit documentation and inspect physical items, such as:

- gas detectors
- ventilator/extractor fans
- breathing apparatus

- air cylinders
- shackles
- ropes
- tripods and davits
- communication devices

The frequency of inspections and acceptable standards shall be based on the manufacturers recommendation and / or Australian/New Zealand Standards and where relevant, previous maintenance schedules and/or incident investigation findings.

Corrective and Preventative Action

Responsible Managers for the Asset shall ensure that corrective actions are initiated to address reported incidents, near misses and non-conformances, such as:

- Communication system failures
- Isolation failures
- Breaches of procedures, such as personnel entering a confined space without a Confined Space Entry Form

Preventative actions are to be initiated to address potential non-conformances, such as:

- When a gas detector is close to its calibration due date
- When a person's confined space competency is due to expire

Training and Competency

All Watercare Managers holding responsibilities under this Key Requirement shall identify the training needs for themselves and their staff, and then arrange training with a Watercare approved training provider. Training records for Watercare employees are to be maintained in a centralised system.

Watercare staff required to enter or to work in confined spaces shall meet the requirements of Watercare's Fitness for Work health assessment.

Responsible Manager for the Asset, Responsible Person for Asset Designers, Responsible Person for Confined Space Work:

- Internal training on Entering and Working in a Confined Space Key Requirement

Responsible Person for Confined Space Entry, Confined Space Work Team Member, Standby Person:

- Unit standard 18426 - Demonstrate knowledge of hazards associated with confined space
- Unit standard 19207 - Enter, work in and exit a confined space
- Unit standard 25510 - Operate an atmospheric testing device to determine a suitable atmosphere exists to work safely
- First Aid training (a current first aid competency is a pre-requisite for confined space training)

- Unit standard 26551: Provide First aid for life threatening conditions, and
- Unit standard 26552: Demonstrate knowledge of common first aid conditions and how to respond to them

or:

- Unit standard 6400: Manage first aid in an emergency situation, and
- Unit standard 6401: Provide first aid, and
- Unit standard 6402: Provide basic life support

(2 yearly renewal)

Note: Other NZQA courses may offer compliance with Watercare Confined Space requirements. Please check with the Health and Safety team to confirm.

Appendix A: Definitions

Terminology	Description
Access Authority (AA)	A Document used to authorise work on Watercare assets or property
Access chamber	Means a chamber in which a person can enter to inspect, test, clear and remove obstructions in safety.
Affected Persons	Persons affected by confined space entry and work activity varies depending on the stage of the process (e.g. at design or at entry) and the risk level of the confined space, but means any level of impact on their ability to perform their normal daily tasks or go about their daily routine, and may include one or more of the following; • All persons entering a confined space • The Standby Person • The Responsible Person for Entry • The confined space asset designer • The Responsible Person for the Asset Designer • The Responsible Manager for the Asset, and Any personnel affected by the controls applied during any specific confined space work activities
Air Quality Hazard	• Non-flammable: fumes, mist, dust, gas, vapour, volatile substances, smoke and other asphyxiates must be below their Workplace exposure standards, (WES) • Volatile Organic compounds (VOC's) must be less than 20 Parts Per Million (PPM) • Oxygen must be between 19.5% and 22.0% of air content • Flammable gases (eg: methane, LPG gas) must be less than 5% of the lower explosive limit (LEL) of the gas • Hydrogen Sulphide (H2S) must be less than 5 Parts Per Million (ppm) • Carbon Monoxide (CO) must be less than 25 Parts Per Million (ppm) Wastewater aerosols (e.g. Bacteria, viruses etc.) **(This is the minimum standard for air quality - Prior to entry)** **(Note the gas detector alarm levels are different)**

Confined Space	A confined space means an enclosed or partially enclosed space that: • is not designed or intended primarily to be occupied by a person, for example, it has poor ventilation, poor lighting, and the size or location of the opening makes it physically difficult to get in and out of or to remove an injured or unconscious person from the space, and; • is, or is designed or intended to be, at normal atmospheric pressure while any person is in the space, and • is or is likely to be a risk to health and safety from one or more of the following: ➢ An atmosphere that does not have a safe level of oxygen, (i.e. not between 19.5 and 23.5%) ➢ Contaminants, including airborne gases, vapours or dusts that may cause injury from fire or explosion, (e.g. methane) ➢ Harmful concentrations of any airborne contaminants, (i.e. those above the relevant exposure standard, or are likely to cause impairment, loss of consciousness or asphyxiation, such as hydrogen sulphide, carbon monoxide, Volatile Organic compounds), or ➢ Engulfment by any liquid or free flowing solid that may cause suffocation or drowning (such as: water, wastewater, storm water or sludge)
Confined Space Decision Tree	Document used to assess the level of risk and relevant authorisation level used prior to any confined space entry to a Watercare asset
Confined Space Entrant	Any person that enters a confined space. A person is deemed to have entered a confined space when their head or upper body is within the boundary of the confined space. Inserting an arm is not entry.
Confined Space Entry Form	Document which is used to safely control a confined space entry undertaking

Confined Space Incident	A confined space incident includes any of the following events that occur in or in relation to the specific confined space to which a current confined space permit is active: • An evacuation from the confined space for any reason • The activation of any Gas detector alarms while any person(s) are in the confined space • Any Isolation failure (mechanical, electrical or hydraulic) relating to that confined space • Where any person within the confined space becomes affected by gases, low oxygen or thermal stress • Any new hazard that is identified within the confined space, that was not identified in the initial hazard identification and risk assessment for that confined space entry, and/or • Any sudden change in the work environment, such as air quality, visibility, flow rates, flow type/colour A record of each confined space incident must be recorded and filed against the specific asset so that the information is available for future entry risk assessments or asset condition assessments.
Job Safety Analysis (JSA)	Document outlining the activities, potential hazards that may be encountered and mitigating actions to be taken to control those hazards pertaining to a specific undertaking as described in the OHSMS Manual
Permit Authoriser (PA)	The PA is required where a confined space entry score is determined to be high risk (i.e. level 2, 3, 4 or 5)
Permit Receiver (PR)	The PR plans the work activities and identifies the hazards, assesses the risks and implements controls to enable high-risk work to be undertaken in a safe manner. Communicating and co-ordinating with both the work crew and the Permit Issuer, the PR ensures that risk controls are maintained and verified throughout the course of the work.
Permit to Work Key Requirement	The process to be followed when undertaking any works designated to require a permit
Responsible Manager for the Asset	The Manager Responsible for the Asset is the Manager who has overall control of that asset at the time (e.g. when an asset is owned and operated by Watercare, it is under the control and ownership of the Watercare Manager of that facility. When it is a green field or brown field site and the asset has been formally handed over to a contractor or Infrastructure Delivery either to build, or to modify, the asset is under the control of the relevant manager to whom ownership has been formally handed. When the asset is built or modifications completed and it has been formally handed back to Watercare, the asset again comes under the control of the Manager of the facility). The "Formal" written handover is the key to person in control of the place of work.

APPENDIX B: Bow tie analysis

Appendix C: Further reading

Internal documents

- Permit To Work Key Requirement
- Personal Protective Equipment (PPE) Procedure
- Isolation Procedure
- Working Alone Key Requirement

Legislation

- Health and Safety at Work Act 2015
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016

Standards

- AS 2865-2009 Confined Spaces
- NZS/AS 1319:1994 Safety signs for the occupational environment
- NZS/AS 1657:1992 Fixed platforms, walkways, stairways and ladders – design, construction and installation
- AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
- AS/NZS 1891.4:2009 Industrial fall-arrest systems and devices - selection, use and maintenance
- AS/NZS 3000:2007 Electrical Installations
- AS/NZS 3100:2009 Approval and test specification – General requirements for electrical equipment
- AS/NZS 3190:2016 Approval and test specification – Residual current devices
- AS/NZS 3191:2008 Electrical flexible cords
- AS/NZS 4488.2:1997 Industrial rope access systems - selection, use and maintenance
- AS/NZS 60079 Set:2009 Electrical apparatus for explosive gas atmosphere
- AS 60529-2004 Degrees of protection provided by enclosures (IP Code)
- AS/NZS 61241 Set 2008 Electrical apparatus for use in the presence of combustible dust
- AS/NZS 61558 Set 2008: Safety of power transformers
- AS/NZS 61779 Set 2000: Electrical apparatus for the detection and measurement of flammable gas

Guidance

- WHS Queensland Code of Practice Confined Spaces 2011

Websites

- www.business.govt.nz/worksafe
- www.legislation.govt.nz