AM 2035 Accessing Sewer Infrastructure Procedure

Safety and Wellbeing

October 2022

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1. Purpose

The purpose of this procedure is to set out South East Water's minimum requirements for the accessing of sewer infrastructure across the South East Water network.

2. Scope

This procedure applies as a minimum requirement for all employees, contractors and other persons who access sewer infrastructure connected to or associated with the South East Water network.

Confined space entry and restricted space entry are not covered by this procedure – refer to South East Water documents *BS 1955 Confined Space Entry Procedure* and *BS 2722 Restricted Space Procedure* respectively.

3. Definitions

Air-purifying respirator	A device that filters contaminants from inhaled air.
Air-supplied respiratory protective equipment (RPE)	A device that supplies air to the wearer from a source other than the ambient atmosphere.
Breathing apparatus (BA)	A type of air-supplied respiratory protective equipment (RPE).
Breathing zone	A hemisphere of 300 millimetres radius extending in front of a person's face measured from the mid-point of an imaginary straight line joining the ears.
Confined Space Entry (CSE)	Entry to a confined space occurs when a part of the body enters the space and there is a risk the person may be overcome or incapacitated by the conditions within the space.
Emergency work	Work that is required to be immediately undertaken to rectify an unexpected breakdown of an essential service (including gas, water, sewerage, electricity and telecommunications) to enable continuance of that service.
Maintenance Structure	A generic term that covers any structure that allows access to assets in a live sewer atmosphere, including but not limited to the following: • Maintenance Hole (formerly known as a Manhole) – greater than 1,000 mm diameter • Maintenance Chamber – between 450 and 1,000 mm diameter • Maintenance Shaft – between 300 and 450 mm diameter • Inspection Shaft - between 150 and 300 mm diameter • Wet well covers This excludes structures that are designed to be open to atmosphere, such as vent stacks, lagoons etc.
NOCC	South East Water Network Operations Control Centre.

Respiratory protective equipment (RPE)	A range of air-supplied and air-purifying equipment.
Sewer infrastructure area	An area of sewer infrastructure that does not meet the definition of a confined or restricted space, although has the potential for the existence of an unsafe atmosphere. This area of infrastructure can be within or adjacent to pump stations, buildings, structures, enclosures or trade waste apparatus – at enclosed, partially enclosed or open-air environments.
Unprotected edge	The edge of a surface from which there is a horizontal gap, void or space of more than 300 millimetres and which is not provided with a barrier to prevent a fall.

4. Prevention of falls

Where possible, openings more than 300 mm should be avoided to prevent persons being in close proximity to an *unprotected edge* or to a hole, trench, shaft or pit that is of sufficient dimensions to allow a person to fall into the hole, trench, shaft or pit.

Where it is not possible to comply with this, controls in line with the hierarchy for prevention of falls shall be implemented so far as is reasonably practicable.

For example, signs, barricades and the application of a suitably rated temporary platform in a maintenance hole may be appropriate.

5. Atmosphere

Activities that involve Confined Space Entry require full CSE training and continuous atmospheric monitoring with an appropriate and correctly calibrated gas detector.

For further details, refer to the South East Water document *BS 1955 Confined Space Entry Procedure*.

For activities that do **not** involve Confined Space Entry, the following requirements apply.

5.1. Protection of persons entering an enclosed sewer infrastructure asset

Prior to accessing a sewer infrastructure area, atmospheric testing of the entrance to the area shall be carried out by a suitably qualified or competent person, using an appropriate and correctly calibrated gas detector.

At no stage shall persons enter the area unless atmospheric levels have been established.

If at any time the gas detector alarms, persons shall be positioned outside/ upwind of the sewer infrastructure area and a retest of the area conducted after **5 minutes**.

Based on the gas detector readings:

a. if safe atmospheric levels can be maintained after this time the works can proceed
b. if safe atmospheric levels cannot be maintained after this time the work needs to be cancelled, the cover replaced and/ or doors closed and the NOCC must be notified, including details of the detected levels.

5.2. Protection of persons outside of an opened sewer maintenance structure

To protect persons from atmospheric contaminants that may be emitted from any part of a sewer maintenance structure, the atmosphere in the vicinity of an opened sewer structure shall be continuously monitored by a suitably qualified or competent person, using an appropriate and correctly calibrated gas detector.

Where practicable, gas detectors should be positioned within or as close as possible to the *breathing zone* of persons in the immediate vicinity of an opened structure cover.

Activities where a person may be in the immediate vicinity of an opened structure cover include standing over, looking into, kneeling, crouching or sitting next to, or if the person is located downwind of, an opened structure cover.

If at any time the gas detector alarms, persons shall be positioned upwind of the open maintenance structure and a retest of the area outside of the cover opening conducted after **5 minutes**.

Based on the gas detector readings:

a. if safe atmospheric levels can be maintained after this time the works can proceed
b. if safe atmospheric levels cannot be maintained after this time the work needs to be cancelled, the cover replaced and the NOCC must be notified, including details of the detected levels.

5.3. Flammable gases or vapours within a sewer structure

With the exception of a water jetting hose for cleaning/ unblocking purposes, an object - such as an eduction hose or flow monitoring device - shall not be inserted within a sewer structure until pre-activity atmospheric testing is carried out by a suitably qualified or competent person, using an appropriate and correctly calibrated gas detector.

Some gases (for example, hydrogen sulphide) are heavier than air and in unventilated areas typically settle to the bottom of a space, while other gases (for example, methane) are lighter than air and typically collect at the top of a space. Tests need to be made at a sufficient number of points to accurately reflect areas of the space in which objects are likely to be placed.

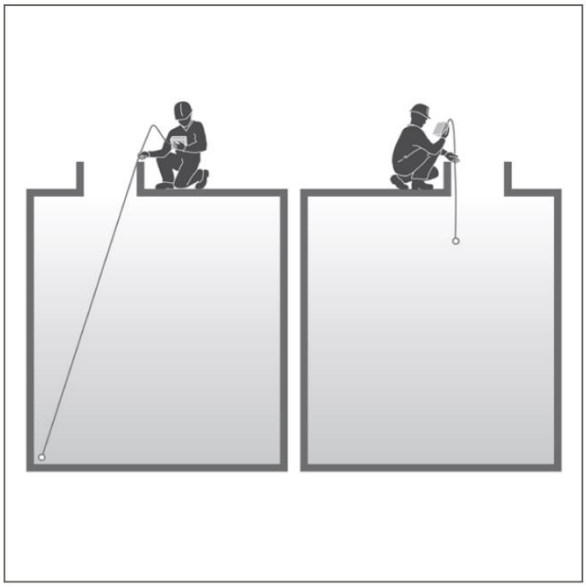

Figure 1: Atmospheric testing of remote regions and different levels within a space

Gas detector ‘peak’ readings need to be used to indicate the highest levels measured in the space.

If the concentration of any flammable gas or vapour in the atmosphere of the space is equal to or **greater than 10% of its LEL**, the work needs to be suspended until made safe - by using methods such as cleaning, purging and ventilation - or cancelled and the cover replaced. In either case the NOCC must be notified, including details of the detected levels.

When conducting activities where objects are placed within a sewer structure, continuous atmospheric monitoring of the space should be conducted with the use of a gas detector where possible.

5.4. Atmospheric levels

The atmospheric levels must comply with the following, based on the type of gas detector in use:

Substance being detected	Acceptable (safe) levels
Oxygen (O2)	An oxygen content in air under normal atmospheric pressure that: (a) is **equal to or greater than 19.5%** by volume, but (b) is **equal to or less than 23.5%** by volume
Carbon Monoxide (CO)	Less than **30 ppm (TWA)**
Hydrogen sulphide (H_2S)	Less than **10 ppm (TWA)**
Flammable gases or vapours (LEL)	Less than **5% of its LEL** (Lower Explosive Limit)
Volatile organic compounds (VOC’s)	Less than **15 ppm (TWA)**
Ammonia (NH_3)	Less than **25 ppm (TWA)**

Table 1: Safe atmospheric levels

If the works are *emergency work* and safe atmospheric levels cannot be maintained, the works may be conducted in accordance with following:

Atmospheric condition	Required controls
Oxygen (O2) **less than 19.5%** by volume	Air-supplied respiratory protective equipment (RPE)
Oxygen (O2) **greater than 23.5%** by volume	**No works permitted** except those making atmospheric levels safe, such as cleaning, purging and ventilation
Carbon Monoxide (CO) **greater than 30 ppm (TWA)**	Air-supplied respiratory protective equipment (RPE)

Hydrogen sulphide (H_2S) **greater than 10 ppm (TWA) although less than 100 ppm (TWA)**	Air-purifying respirators fitted with ABEK[A] gas and vapour cartridge filters, or Air-supplied respiratory protective equipment (RPE)
Hydrogen sulphide (H_2S) **greater than 100 ppm (TWA)**	Air-supplied respiratory protective equipment (RPE)
Flammable gases or vapours (LEL) **greater than 10% of its LEL**	**No works permitted** except those making atmospheric levels safe, such as cleaning, purging and ventilation
Volatile organic compounds (VOC's) **greater than 15 ppm (TWA) although less than 150 ppm (TWA)**	Air-purifying respirators fitted with ABEK gas and vapour cartridge filters, or Air-supplied respiratory protective equipment (RPE)
Volatile organic compounds (VOC's) **greater than 150 ppm (TWA)**	Air-supplied respiratory protective equipment (RPE)
Ammonia (NH_3) **greater than 25 ppm (TWA) although less than 250 ppm (TWA)**	Air-purifying respirators fitted with ABEK gas and vapour cartridge filters, or Air-supplied respiratory protective equipment (RPE)
Ammonia (NH_3) **greater than 250 ppm (TWA)**	Air-supplied respiratory protective equipment (RPE)

Table 2: Controls for atmospheric conditions

6. Administrative controls

6.1. Traffic management

Traffic control measures and works/ warning signage shall be established as required.

6.2. Safe Work Method Statement (SWMS)

If any ***high risk construction work*** is being conducted as part of the works, a compliant Safe Work Method Statement (SWMS) must be developed for the work and reviewed, agreed and understood by the work party prior to the works commencing.

6.3. Asset entry and exit

Lifting of sewer maintenance structure covers on South East Water assets shall only be conducted by authorised employees and contractors who are recorded in the Asset Entry system, as set out in the South East Water document *AM 2426 Asset Entry Procedure*.

South East Water treatment plants are exempt from the asset entry process, however local permit to work systems are required.

Where activities are undertaken on Melbourne Water assets, refer to MW access requirements.

[A] Multi-Gas: Organic vapour + inorganic vapour + acid gas + ammonia (ABEK)

7. Equipment

7.1. Gas detectors

Gas detectors shall be selected, installed, used and maintained in accordance with AS/ NZS 60079.29.2.

The accuracy of the gas detection unit shall be verified on a regular basis by performing a functionality (bump) test on a monthly basis, as a minimum. If the instrument fails the test, it must be calibrated before use.

Gas detectors shall be **calibrated at 6 monthly intervals,** as a minimum.

7.2. Respiratory Protective Equipment

RPE shall be compliant with AS/ NZS 1716 and selected, used and maintained in accordance with AS/ NZS 1715.

Pre use inspections and fit checking of RPE shall be conducted before use.

Where air-supplied RPE is identified as a risk control measure for the works, a fit check is to be conducted, witnessed and documented prior to those works commencing for that day/ shift.

The maximum use time for gas and vapour cartridge filters used with air-purifying respirators is **6 months**. Once the sealed packet containing the cartridge filter is opened, (even if not used) the carbon in the filter will absorb contaminants from the general environment.

8. Lifting a Sewer Maintenance Structure Cover

Structure covers shall be lifted using appropriate tools and techniques.

Caution: If a structure cover is seized, do not attempt to open it.

To control the risk of being struck by a cover that is under pressure from built up gases, specialised equipment such as hydraulic lifters may be needed.

Contact South East Water on **1300 493 680** or the relevant Water Recycling Plant (WRP) operator.

9. Completion of Sewer Maintenance Structure Works

The structure cover and frame shall be cleaned and greased prior to re-fitting the cover. Any identified defects or issues in the system need to be reported to the NOCC. Traffic control measures and any works/ warning signage shall be removed.

10. Training and competency

Opening of any structure cover on a South East Water live sewer asset requires, as a minimum, confined space awareness training as well as a live sewer induction.

10.1. Confined Space Entry

South East Water employees and contractors who enter a confined space, form part of a CSE work party, or carry out space classification assessments are required to complete the four competency units listed below, followed by **two-yearly refresher** training:

- **Enter and Work in Confined Spaces**
- **Work in accordance with an issued permit**
- **Operate breathing apparatus**
- **Undertake confined space rescue.**

In addition, the following competency unit is required to be completed, followed by **annual refresher** training:

- **Provide cardiopulmonary resuscitation**

Records of training must be current, with evidence of completion provided to the NOCC.

A register of South East Water employees who are authorised to enter a confined space shall be maintained. The above training units are a pre-requisite to be considered for inclusion on the register, although this in itself does not guarantee that all employees will be included on the register for CSE works.

10.2. Confined space awareness

South East Water employees or contractors who need to have an understanding of the risks associated with confined spaces, although do not need to enter a confined space, are required to complete a confined space awareness training course, as a minimum, followed by **annual refresher** training.

This training also covers the selection and use of gas detectors and is the minimum level of training required to undertake gas detection.

For example, a designer or surveyor who has completed a confined space awareness training course may lift a structure cover on a live sewer to inspect or measure levels from outside of the confined space, with the use of a gas detector.

Apart from a person undertaking gas detection, it is recommended although not mandatory for other persons - accessing a sewer infrastructure area or outside of a sewer maintenance structure – to have completed a confined space awareness training course.

10.3. Live sewer induction

The South East Water Sewer Operations team provide inductions for live sewer contractors to ensure compliance with Asset Entry and associated procedures. Refresher sessions are also conducted during annual meetings with contractors.

11. References

11.1. Legislation

- Occupational Health and Safety Act 2004 (Victoria)
- Occupational Health and Safety Regulations 2017 (Victoria)
- WorkSafe Victoria Compliance Code - Confined Spaces – Edition 2, December 2019

11.2. Standards

- AS/ NZS 1715 - 2009 Selection, use and maintenance of respiratory protective equipment
- AS/ NZS 1716 - 2012 Respiratory protective devices
- AS/ NZS 60079.29.2 – 2016 Explosive atmospheres - Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen

11.3. South East Water documentation

- AM 2426 Asset Entry Procedure
- BS 1955 Confined Space Entry Procedure
- BS 2722 Restricted Space Procedure
- BS 2723 Confined or Restricted Space Classification Assessment Form

12. Revision status

12.1. Revision table

Date	Description	By	Approval by
July 2005	Original Issue	KB	PS
Mar 2007	Modified SMART Contact	KB	MM
Nov 2007	Inserted “4.4 Awareness”	KB	MM
Aug 2010	System Update	PV	SM
June 2011	Inserted “4.6.1.1 Safelift”	BV	SM
July 2013	Revision	JW	CB
June 2014	Revision	CB	MM
Sept 2014	Updated revision	JW	MM
14/08/2018	Major rewrite to align with Victorian OH&S legislation and current South East Water practices	D Sweeney	T Schubach
23/11/2021	Included structure covers connected to or associated with the South East Water network. Mandated gas detector use.	D Sweeney	P Grimson
07/10/2022	Changed name of document and expanded scope to cover the access of all sewer infrastructure. Increased training refresher intervals and document review period.	D Sweeney	D Anderson

12.2. Review intervals

This document shall be reviewed and revised as necessary at no greater than five yearly intervals.