Zero incidents
Zero harm
Zero compromise
Keeping you healthy and safe, every day at work.

ESSENTIAL STANDARD no.31

Entry into sewers behind a point of isolation

Thames Water

KEY MESSAGES

- All works must be carried out in accordance with Thames Water's procedure HSP46 to ensure the safety of employees' and other stakeholders. For further information on the contents of the essential standard or HSP46, please contact your Thames Water representative.
- All sewer confined space entry work must go through the Independent Authorising Body (IAB) and be validated with the Waste Operations Control Centre(WOCC).
- Any works behind a point of isolation must be fully validated and authorised by IAB.
- Understand the integrity of both physical and procedural controls that are in place.

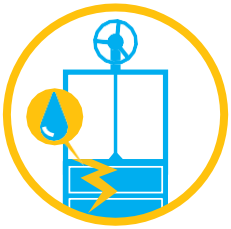
1. Introduction

This essential standard has been developed from Thames Water's internal procedure HSP46 to ensure the safety of employees and other stakeholders working on tasks that require isolation and entry into confined spaces. This standard sets out a range of criteria and controls that must be followed to ensure safe and secure isolation for the protection of people. Thames Waters Water and Wastewater system was built mostly in the Victorian era with the health and safety practices available at the time.
Entry into our networks can be complex due to the nature of working within confined spaces and:

- The size and scale of the system
- Original design constraints
- Volume and changing sewage/water level controls
- Varying asset conditions
- Aggressive substances and environment
- Tidal water, rainfall, surface water and other unplanned ingress
- Unexpected failures of controls and assets like penstocks, pumps and weirs

We must always try to avoid confined space entry if possible; if we can't, then we must ensure the right controls are in place and we understand the consequences if they were to fail, to ensure that robust emergency procedures are put in place.






Key Contacts

Independent Authorising Body - Independent.AuthorisingTeam@thameswater.co.uk - no tel contact
Waste Ops Control Centre - wocc_technical_resource_coordinator@thameswater.co.uk - phone number 0800 0093908 follow option for relevant area of works.

2. Key principles of Safe and Secure Isolation

- Ask yourself: “Can we eliminate the need for confined space entry?”
- Prevent significant heads of water building up in the system behind a point of isolation.
- Where possible, use a combination of independent control measures or points of isolation that can be secured to prevent them from being interfered with, defeated, or overridden.
- Identify the likelihood and potential consequences of failure / breach of an isolation point or management controls so that measures can be put in place to minimise the risks.
- Ensure that physical points of isolation or control measures are in good condition to prevent other points of isolation / controls failing further down in the system.
- Identify the likelihood and potential consequence of failure, so that suitable emergency procedures (*warning systems and evacuation time etc.*) for the entrants are built into the Safe System of Work.
- You must be able to prove the effectiveness of the controls and the overall isolation arrangement. All safe and secure isolations must minimise the risk to an acceptable and safe level.
- Ensure that both up and downstream influences have been considered within the Safe system of works.
- Use modelling data or carry out a trial wet run to prove the effectiveness of an isolation arrangement.
- Always ask yourself: “What if this were to fail?”

3. Role of the IAB and WOCC

All system entries involving safe and secure isolation or work that will change the way a Network operates must be independently authorised and coordinated by the Thames Water Independent Authorising Body (IAB) before work starts.

Proposed changes in the wastewater system must be raised as a diversion/isolation request to the IAB. For example, changing the way the system operates could be part of operational or maintenance activities (e.g. electrical works) which could affect flow levels, pressures or control measures (pumps etc.).

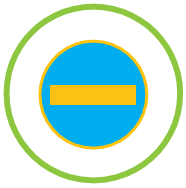
The IAB independently reviews all Safe Systems of Work to ensure all confined space entries have been properly assessed and planned, that all isolations and controls in place are effective and that there are no other works in the area that could impact the activity.

The IAB will not be responsible for reviewing the Safe System of Work for the actual physical tasks being undertaken inside the confined space.

Emergency accesses will need to be assessed, documented, and communicated and follow this procedure

Once approved by the IAB, the work is passed onto the Waste Operations Control Centre (WOCC). Immediately before entry, supervisors should contact the WOCC to ensure that controls are in place and no other factors, like rain, will influence the work. Safe exit and status updates must also be communicated to the WOCC.

IAB will provide a list of pre-approved works to the WOCC, works not on the pre-approved list will not be allowed to proceed.



4. The Complexity Table

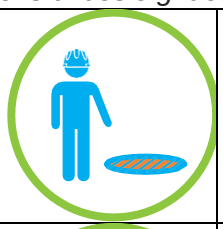
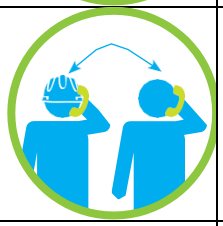
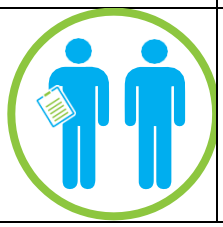
The table below shows the complexity control levels used when working within Thames Water confined spaces. Every confined space entry is different and complexity levels should be considered as part of any risk assessment and method statement. You should ensure confined space hazards are identified, understood, and mitigated to provide safe and secure entries and isolations.

High 	All entries into a Class C sewer *
	Any diversions, isolations or flow control device used for the protection of people with a Medium or High consequence of failure **
Medium 	Entries requiring a C Permit excluding a Class C sewer i.e. hot work, use of electrical tools*
	Any diversions, isolations or flow control device used for the protection of people with a Low consequence of failure ***
	Entries involving diversions or isolations not used for the protection of people
	Working in close proximity to and/or influenced by a pumping station
	All entries working in Storm Relief sewers at flow level (between invert and crown level of the sewer).
Low 	Class A & B entries to invert level not working behind a flow control device and not requiring a C Permit *
	All entries working above the crown level of the sewer, for example in a chamber, landing or grating (including Storm Relief chambers)
SHE3 Risk Assessment	A SHE 3 Risk Assessment maybe used to approve works which have been determined as low risk (for example Class A entry into small diameter pipes). This will involve a review of the planned works in conjunction with the local Health and Safety advisor and the IAB. These works will not be co-ordinated by the IAB but will be communicated with local area managers
* Please refer to HSI 41 for guidance on planning an entry that requires a C-Permit ** Flow control device Risk Assessment, condition survey and temporary works assessment may be required. Network flow modelling may also be required to understand the consequence should a failure occur *** Flow control device must be maintained and inspected prior to use. Modelling may also be required to demonstrate low consequence	

Note: Heads of water more than 40% against the flow control device must have a Penstock Risk Assessment unless demonstration of failure is minimal. Please contact the IAB for clarification of requirements.

5. Procedures

When planning entry to wastewater operations, follow the process flow below. When planning any entry, you **must understand / identify** who your key contacts are for project / activity and their roles and responsibilities *e.g. designers, modelling teams etc*.

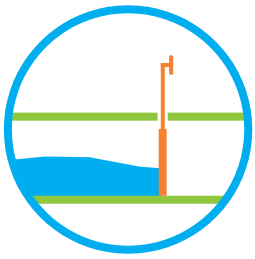
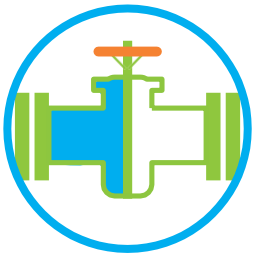
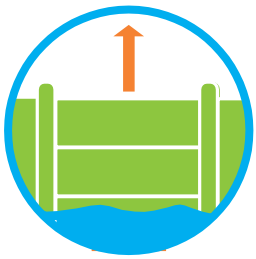
1		Identify the entry / activity that requires isolation	6		TWUL responsible person engages the Independent Authorising Body (IAB)
2		Contact and enlist the help of the relevant TWUL Operations Lead Person for the area being worked on.	7		Set up review sessions with IAB for any entry / isolation assessed to of medium / high complexity
3		Identify the complexity of the entry / isolation. You must confirm that the relevant information has been provided by TWUL e.g. modelling info, condition assessment etc	8		The entry / isolation will be reviewed and accepted or rejected by the IAB. If rejected, recommendations are needed; if accepted /approved, the task will receive a safe sewer access control form and entry number. Contractors must request TWOSA from TWUL Ops lead
		Note: for high complex entries where criteria are not met, or further information is required, the activity may be subject to a TWUL independent senior engineer and H&S review.	9		On day of the task, the responsible person(s) for the entry / isolation as identified in the IAB approval will confirm all controls / permits are in place and speak to the WOCC, if no entry is to be made then the responsible person should call the WOCC to confirm this
4		If required, select competent contractors and complete RAMs / SSoW / TW Documents for entry / isolation	10		Once the task is complete: the responsible person(s) will: • Confirm with the WOCC • Sign off with the Thames Water Operational Safety Authority (TWOSA) • Email IAB
5		Review the entry / isolation with the relevant technical expert.			

6. Controls

Controls should be unique to the environment, entry and activity taking place. Risk Assessments (HSP46) and / or structural calculations and temporary works designs must be used to prove that flow control devices (penstocks, cloughs, weirs, dams) are effective.

6.1 Physical Controls

Physical controls can stop or divert flow for a certain period of time.
When planning for entry, all control equipment, such as penstocks, valves, stop-logs etc. must be assessed. You must

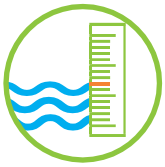
ensure they provide a safe, secure and isolated environment for confined space entry.
When assessing physical controls, you must confirm that the equipment:

- Can't be over-topped or by-passed by tides, rainwater or other unexpected ingress. Where over topping is possible this must be captured and mitigated using additional controls.
- Is robust and reliable
- Is in good condition
- Is adequate for the task
- Will not fail during entry
- Has an in-date Penstock risk assessment where consequence of failure is deemed to be High

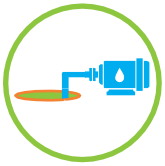
If you can't confirm the above points, then the task must not proceed, or additional controls must be put in place. All additional measures should be designed and implemented for every individual situation.

6.2 Non-Physical

Non-physical controls do not hold back flows. They include processes such as:



- Monitoring flow levels to ensure they stay in safe parameters or so an early warning can be made



- Pumping stations to reduce or remove flow levels from the work area

- Weather monitoring and forecasts used to provide advanced warnings and allow better planning

- Wet/Live testing can be used to prove flow levels and consequences where modelling data is not available

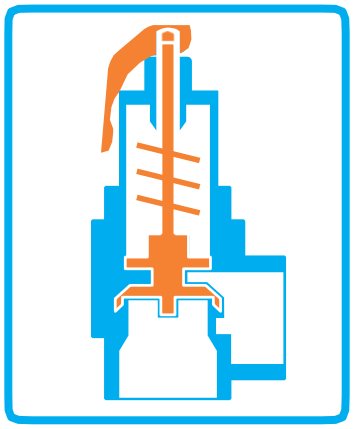
- Tide times used to calculate the best periods for safe entry

7. Penstocks, Actuated Valves and River Flaps

7.1 Penstocks

When using penstocks, you must ensure that:

- A penstock Risk assessment is in place where consequence of failure is deemed to be High.
- A penstock risk assessment produced by a third party must be approved by suitably trained and experienced TW person and the IAB prior to being used as part of a safe system of works.
- Temporary solutions / modifications are explored and independently designed and implemented if the penstock is not able to pass the Risk Assessment
- Only use a penstock for water levels greater than 40% of maximum level if there are appropriate temporary / permanent works designs



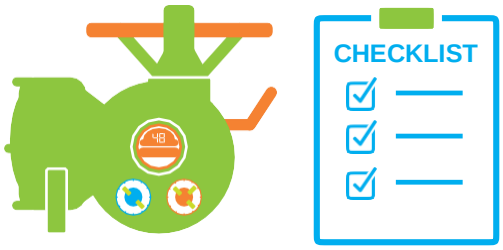
When using high-consequence valves or penstocks for a single isolation above 40%, ensure:

- You complete a structural and mechanical assessment
- An independent inspection and validation has been completed
- You receive sign off that penstock/high-consequence valves are the correct method of isolation for this activity

6.3 Actuated Valves

Actuated valves fitted to penstocks must be:

1. Tested and calibrated prior to use
2. Limited specifically for the individual penstock
3. Inspected annually
4. Used within specified date

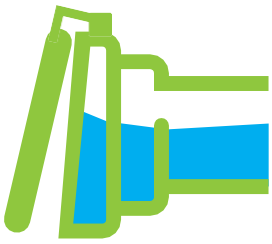


7.2 River Flaps

River flaps should only be used as part of an overall safe and secure isolation when combined with additional protective measures.

It's best to work in safe windows where the tidal flows don't reach the level of the river flap. To work outside of safe windows, you must prove that the flows will not present any danger to entrants.

Use modelling data to support your decision to work outside of safe windows or to help you identify additional measures of effective alternatives.

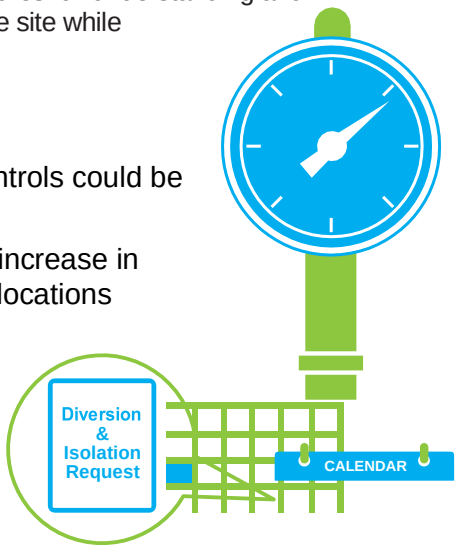


Note: Where Flaps have been specifically designed to be used as a point of isolation for the protection of people they may be considered as part of the overall safe system of works.

8. Flows and Water Pressure

Investigations and analysis must be done as part of planning for entry. This ensures full understanding and documentation of the flows and water pressure that could have an impact on the site while workers are in the confined space.
The investigations and analysis must include:

- the maximum hydraulic height the water could rise to
- the maximum static water pressures that structures and controls could be exerted to
- the quantities and dynamic pressures, such as unintended increase in flows, pressures and surges, which could affect the control locations



9. Diversion and Isolation Requests

A member of the Trunk Sewers/Strategic Pumping Team must send a Diversion and Isolation Request Form to the Isolation and Diversion Coordinator (IDC) at least two weeks before the work starts.
Both Diversion notices and approvals are a 14-day strict process to allow for authorisation, coordination and validation of works. Requests outside of this process will require justification and agreement from responsible ML5 manager or above to proceed.

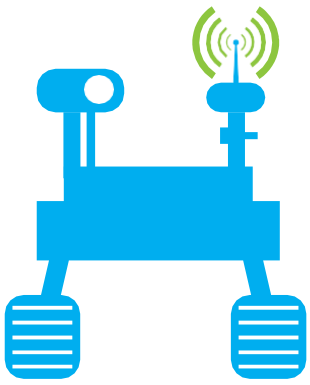
10. Modelling

The modelling team uses a series of high-tech modelling tools to provide us with information on the safety conditions surrounding the work area.
Before entry, ask the modelling team the following questions:

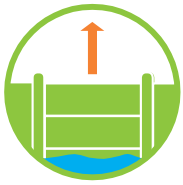
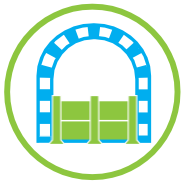
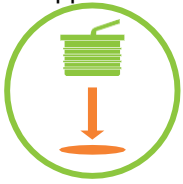
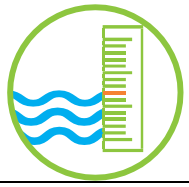
- Is there the potential for flooding? If so, how much time do you have?
- What are the consequences of isolation/control failure?
- Is tidal ingress going to impact the work?
- Where and when are the safe working windows?
- Are there any points that need to be critically monitored?
- Are there suitable diversions and are they effective?

11. Remote Equipment

Before deciding on confined space entry, you must always consider whether the job can be done by remote equipment such as Light Detection and Ranging (LiDAR) Technology.



12. Aide Memoire – Selection of isolation controls

Description	Type of control	Pros	Cons
Penstocks / Valves 	**Physical**	• Fully isolate to dry conditions • If actuated can be quick to open or close, and can be done remotely • Can be used to limit flows not just isolate	• Requires regular maintenance • Increased need for entry to asset • Need to investigate and understand condition • Increased risk of damage to penstock through actuation
Stop Logs / Cloughs 	**Physical**	• Specific design for the location • Can be relatively cost effective	• Need to be purposely designed for the span required along with appropriate supports where required • Will not provide a full seal
Temporary bulkheads 	**Physical**	• Specific design for the location	• Specific design for the location • Can take time and be difficult to fit, often requiring entry without physical isolations in place
River flaps / Flap valves 	**Physical**	• Stop back flow into a system, for example against a tidal outfall	• Need to investigate and understand condition • Can leak if seal not maintained or is obstructed by debris • Not always visible (tidal outfall) • Subject to harsh environmental conditions
Weir Boards 	**Physical**	• Can be left in position to control	• Requires some form of monitoring to identify when weir is close to overtopping
Temporary works solutions, bungs, stoppers etc 	**Physical**	• Specific design for the location and requirements • Known condition and safe operating levels	• Relatively new and unfounded technology (large inflatable stoppers) • Requires bespoke design
Flow monitoring 	**Non-physical**	• Can be inserted to monitor remotely at upstream locations • Once installed reduces confined spaces entry to monitor levels • Can be used as an advanced confirmation of predicted flows and for live data	• Requires entry to system to install – little fixed monitoring exists • Needs maintenance requiring confined space entry • Can become unreliable unless cleaned and maintained

Description	Type of control	Pros	Cons
Weather Forecast 	**Non-physical**	• Can be used to provide advanced understanding and warning	• Forecasts whilst generally good short range, can change unexpectedly, and rainfall can lead to a deluge in system in a relatively short period of time
Tide Times 	**Non-physical**	• Fairly reliable, tides change slowly, and timings are known	• Can result in a reduced working window

13. Glossary of Terms

IAB	Independent Authorising Body
WOCC	Wastewater Operations Control Centre
TRC	Technical Resource Coordinator
TWOSA	Thames Water Operational Safety Authorisation
C Permit	Thames Water Confined space permit to work
G Permit	Thames Water General Permit to work
HSP46	Thames Water Health and Safety Procedure 46 Safe and Secure Isolation Includes all activities such as isolations, flow diversions and main works
SHE4	Thames Water Safe Systems of Work form
SHE13	Thames Water Safety Toolbox Talk form
SHE21	Thames Water G permit and plant release