

HSP0070 Flow Isolation and / or Flow Management (FIFM)

1. Overview

This procedure is part of the Risk Management section of Sydney Water's Health and Safety Management System (HSMS).

1.1 Objective

This procedure sets the minimum controls for planning and implementing flow isolation / flow management (FIFM) to ensure the safety of people exposed to the risk of hydraulic engulfment.

1.2 Scope

This procedure applies to people who manage or work with Sydney Water's hydraulic assets where flow could cause engulfment to a person working in, on or near the asset.

This procedure does not apply if there is no risk of hydraulic engulfment, or to assets that aren't relevant to controlling this risk, such as: mixers, chemical dosing units, scrapers, and cathodic protection. Refer to *HSG0567 Guide for Safe Isolation of Assets or Equipment* for these.

1.3 Summary

People requesting FIFM must follow the attachment relevant to the hydraulic system they are working with.

A FIFM plan coordinator must be nominated. They must not allow FIFM to be implemented until:

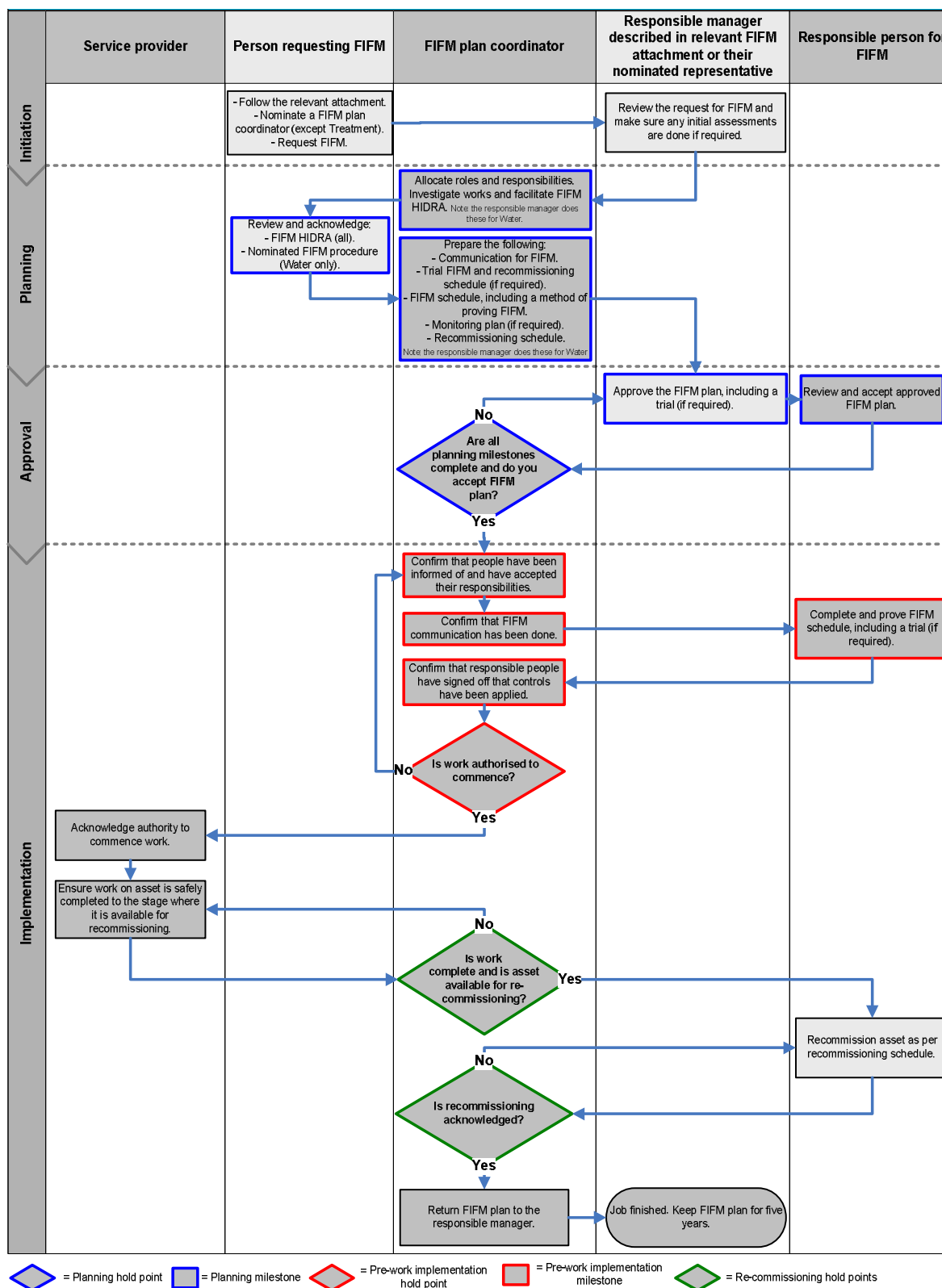
- for all systems (except Water where this will be the responsible manager's nominated representative):
 - they have allocated roles and responsibilities for the FIFM
 - they have facilitated FIFM HIDRA
 - they have prepared a FIFM plan, including a trial FIFM schedule (if required)
 - they, or for Water the person requesting FIFM, acknowledge the FIFM HIDRA.
- the responsible manager or their nominated representative has approved the FIFM plan, including a trial (if required).
- the responsible person for FIFM has accepted the FIFM plan.

The FIFM plan coordinator must not let work commence on the asset until confirming that:

- persons have accepted their responsibilities
- FIFM communication has been done
- the responsible person for FIFM has completed and proven the FIFM schedule
- all controls have been signed off, are still applicable and there are no new hazards

The FIFM plan coordinator must not allow a responsible person for FIFM to recommission an asset until the service provider has signed off that they have safely completed the work.

2. Procedure



Note: these are functional roles. The same person may do more than one role depending on the complexity of the work, eg the service provider and the person requesting FIFM and / or, the responsible person for FIFM, could be the same person. For reactive work, it could be possible for the same person to do all five roles.

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2.1 Initiating FIFM

2.1.1 Business area hazard identification and risk assessment (HIDRA)

Business area managers must make sure that this procedure is followed if hydraulic engulfment hazards are identified in their business HIDRA.

2.1.2 Follow the relevant flow isolation / flow management (FIFM) attachment

The person requesting FIFM must initiate FIFM by following the attachment relevant to the hydraulic system they are working with, if the work involves entering or opening an asset that conveys or stores flow, as follows:

- Water (potable and recycled networks) including reservoir diving and boat work: see Attachment 1.
- Wastewater: see Attachment 2.
- Treatment: see Attachment 3.
- Stormwater: see Attachment 4.

2.1.3 Nominate a FIFM plan coordinator and submit a request for FIFM

A FIFM plan coordinator must be nominated by the person described in the relevant attachment. The FIFM plan coordinator can be the same or a different person as the project manager for the overall job that the FIFM is part of.

The person requesting FIFM must submit a formal request for FIFM to the responsible manager (or their nominated representative) described in the relevant attachment, for planned work, or by other means described in the attachment, for reactive work.

The responsible manager (or their nominated representative) must review the request for FIFM and make sure any initial assessments are done if required, such as a preliminary FIFM HIDRA or determining if special conditions exist.

2.2 Planning FIFM

2.2.1 Developing the FIFM plan

The FIFM plan coordinator must allocate roles and responsibilities and facilitate FIFM HIDRA for Wastewater, Treatment and Stormwater FIFM.

The responsible manager or their nominated representative will do these for Water FIFM, before handing over to the nominated FIFM plan coordinator to implement the plan.

The person requesting FIFM must review and acknowledge the FIFM HIDRA and the chosen FIFM procedure, for Water FIFM. The FIFM plan coordinator must be satisfied that key FIFM HIDRA participants have reviewed and acknowledge the HIDRA, for FIFM on other systems.

The FIFM plan coordinator, and responsible manager or their nominate representative for Water, must then prepare and / or coordinate the following, making sure it is consistent with the deliverables of the overall job.

- Communication for FIFM.
- The FIFM schedule (see section 2.2.2 for details) including a method of proving FIFM.
- A monitoring plan (if required).
- The recommissioning schedule.
- A trial FIFM plan (if required).

People affected by the plan must be consulted, and all people with responsibilities in the plan must provide information for the plan that is accurate to the best of their knowledge.

2.2.2 FIFM schedule

The FIFM schedule must use the following control method (s), where relevant:

- Double isolation as described in *HSP0001 Confined Space Safety*, for confined space work with a risk of engulfment. If this is not reasonably practicable, the reason why must be documented.
- Single isolation with an additional control as described in Table 1 and / or flow management with flow monitoring, as described in Table 2, for:
 - confined space work with a risk of engulfment, where double isolation is not reasonably practicable
 - non - confined space work with a risk of engulfment.

Re-scope the work if none of these methods can be achieved.

Isolation must be restrained so that it can't move, such as anchoring a valve or calculating the safe distance of ground cover between the valve and the work area.

The FIFM schedule must include a method for proving the success of FIFM.

Table 1: Single isolation with an additional control

Control	Description
Single Isolation	<p>Closing one barrier between the work area and the live flow, on every hydraulic source into the work site. It can be achieved by one of the following:</p> <ul style="list-style-type: none">• Closing a valve or penstock.• Inserting a stop board, spade, or plug.• Electrical isolation of a pump, as long as gravity feeds are also isolated and there is no hydraulic pressure in the system. <p>And:</p> <p>An open bleed or drain, such as a scour valve, or hydrant in the isolated section (where available).</p> <p>Tagging the closed barrier and open drain valve, as per <i>HSP0049 Lock Out Tag Out</i>.</p>
With one of the following additional controls where applicable:	
Double isolation	For non-confined space work with a risk of engulfment, another isolation as described above, on the same hydraulic source, but with the open bleed, drain or hydrant in the section between the two isolations.
Lock out	Lock the single barrier as per <i>HSP0049 Lock Out Tag Out</i> , so it can't be operated.
Prevent access	Prevent access to the single barrier so it can't be operated, eg covering a stop valve in the street.
Monitor the isolation	Visually monitor the open drains from the single isolation for leakage, ensuring enough notice can be given to the service provider for evacuation.
Guard the isolation	Visually monitor the single barrier, and prevent it from being opened.

Table 2: Flow management with flow monitoring

Control	Description
Flow management	<p>Working in low flow conditions, such as:</p> <ul style="list-style-type: none">• outside of peak wastewater system demand times• no rainfall in the stormwater catchment during and for a defined period before work• temporary damming and / or by-passing flow around the work area• pumping down wet wells before entry to a wastewater main.

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Flow monitoring	<p>Monitoring changes in flow conditions, such as:</p> <ul style="list-style-type: none"> • levels in wet wells and tanks • flow and rainfall in stormwater / wastewater catchments • tidal flow <p>And alerting the service provider for evacuation if flow conditions do or are forecast to worsen.</p>
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2.3 Approval of the FIFM plan

The responsible manager must review the FIFM plan. If it is acceptable they can approve it, including a trial (if required).

A responsible person for FIFM from the area that will complete and prove the FIFM schedule, must review and accept it before it can be implemented.

Hold point: the FIFM plan coordinator must not accept the FIFM plan and allow it to be implemented until all planning milestones are complete.

2.4 Implementing the FIFM plan

2.4.1 Confirm responsibilities and communication

The FIFM plan coordinator must confirm that people have been informed of and have accepted their responsibilities and that communication of FIFM has been done, before the FIFM schedule commences.

2.4.2 Complete and prove FIFM schedule

The responsible person for FIFM must complete and prove the FIFM schedule. They must stop isolation and report to their manager and / or FIFM plan coordinator if there are any discrepancies between the FIFM plan and the actual work conditions.

2.4.3 Confirm controls

The FIFM plan coordinator must confirm that responsible people have signed off that controls have been applied, are still applicable at the start of the job, and that there are no new hazards.

The FIFM plan coordinator must confirm that FIFM has been proven whereby flow has stopped or has been controlled to the worksite, thereby controlling the risk of hydraulic engulfment. Confirmation is achieved by the FIFM plan coordinator formally agreeing with the responsible person for FIFM that the FIFM plan has been effective.

Hold point: the FIFM plan coordinator must not authorise work to commence until responsibilities and communication are confirmed, the FIFM schedule has been completed, and controls are confirmed.

2.4.4 Acknowledge authority to commence work and safely complete work

The service provider must acknowledge authority to commence work on the asset, prior to starting.

The must ensure work is safely completed to the stage where the asset is available for recommissioning and sign off when this is done, before handing over to the FIFM plan coordinator for recommissioning.

2.4.5 Recommissioning schedule

Hold point: the FIFM plan coordinator must not permit recommissioning until work on the asset is completed to the stage where it is available for recommissioning.

This must not be before the responsible person for entry completes the entry permit, if the work is in a confined space.

The responsible person for FIFM must complete the re-commissioning schedule.

Hold point: the FIFM plan coordinator must not return the FIFM plan to the responsible manager until they acknowledge that recommissioning is complete.

2.5 Emergency response plan

Business area managers responsible for the project work must make sure that the person requesting FIFM has an emergency response plan should isolation or flow management fail.

2.6 Inspection, testing and monitoring

Business area managers responsible for the project work must make sure that inspection, testing and monitoring is done according to *HSP-010 Inspection, testing and monitoring*, to demonstrate compliance with their area's responsibilities in the FIFM plan.

Any non-conformances must be addressed by corrective action.

2.7 Information, instruction and training

Business area managers responsible for the project work must make sure that people with responsibilities in the FIFM plan, or their nominated representatives:

- have received approved Sydney Water training and are competent to do the role
- receive and understand information and instruction relevant to their roles.

2.8 Records

The responsible manager described in the relevant product process must keep signed off copies of the FIFM plan for five years.

3. Context

3.1 Definitions

Term	Definition
Double barrier isolation	<p>Two barriers between the work area and the live hydraulic system, applied to every hydraulic source into the work site.</p> <p>They can be physical, mechanical and / or electrical and apply to water, wastewater, treatment and stormwater systems.</p> <p>It can be achieved by:</p> <ul style="list-style-type: none">• closing two valves• closing a valve and inserting a stop board or spade• closing a valve and electrical isolation of a pump, as long as gravity feeds are also isolated and there is no hydraulic pressure in the system• closing a valve and removing another valve, spool piece or expansion joint in a pipe leading to and as close as practicable to the work site, and blanking or capping the open end of the pipe.
Entry into hydraulic asset	<p>When a person's head or upper body is within the boundary of the asset. Inserting an arm is not entry.</p>
Flow Isolation	<p>A barrier to prevent hydraulic flow into the work area so that it is safe for work to commence, applied to every hydraulic source into the work site.</p> <p>It should be as close as practicable to the work site while still meeting safe work distances. Examples include:</p> <ul style="list-style-type: none">• physical - stop boards, cofferdams, blanking or capping the end of a pipe, removing a valve, spool piece or length of pipe• mechanical - closed and securely anchored valves, and locking / tagging these out• electrical - disabling all energy sources to a pump, and locking / tagging these out. <p>This is not necessarily the same as shutdown of the flow or stopping leakage.</p>
Flow management	<p>A process of assessing and controlling flow in order to prevent engulfment or uncontrolled water pressure. It includes estimating flooding and evacuation time, by considering:</p> <ul style="list-style-type: none">• system integrity and demand• pressure head• flow rate• rainfall reports and forecasts• tidal flow.
Flow isolation / flow management plan (FIFM plan)	<p>The relevant forms for: initiating, planning, approving and implementing FIFM. They include::</p> <ul style="list-style-type: none">• Request for FIFM• Key roles and responsibilities• FIFM HIDRA• Communication for FIFM• Trial FIFM and recommissioning schedule• Asset operational status• Wet well levels log• FIFM schedule and method of proving successful FIFM• FIFM monitoring• Recommissioning schedule

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	<ul style="list-style-type: none"> • Milestone and hold point checklist • HIDRA and authority to work for planned work on water assets less than 250 mm diameter.
Flow isolation / flow management plan (FIFM plan) coordinator	<p>The person preparing the FIFM plan and / or coordinating the FIFM plan preparation and / or implementation, such as:</p> <ul style="list-style-type: none"> • Civil Delivery Team Leader, for reactive and some planned work • Civil Delivery Supervisor, Maintenance Team Manager, or Treatment Operations Production Officer, for some planned work • ASD Project Manager, or a contractor for contract work • Water Services Coordinator for developer work.
Flow monitoring	<p>Monitoring changes in flow conditions, such as:</p> <ul style="list-style-type: none"> • levels in wet wells and tanks • flow and rainfall in stormwater / wastewater catchments • tidal flow. <p>And, alerting the service provider for evacuation if flow conditions worsen.</p>
Guarding the isolation	A way of making sure there is no unauthorised re-commissioning, putting persons at risk of engulfment. This may be achieved by visually watching the isolation and preventing it from being opened.
Hold point	The point where work cannot progress until approval or verification of certain isolation / flow management activities.
<i>HSP0049 Lock Out / Tag Out</i>	A procedure to warn others about the status of plant and equipment, or that it is being worked on.
Hydraulic asset	<p>Any part of a water, wastewater, treatment or stormwater network that is normally conveying or storing water based fluid. Examples include:</p> <ul style="list-style-type: none"> • water or sewer pipes and associated structures including maintenance holes, valve chambers and reservoirs. • stormwater canals • pumping station wet wells • treatment plant chambers, channels or tanks. <p>Potentially an excavation with open or exposed pipes.</p>
Hydraulic engulfment	<p>To be swallowed up or immersed by water based liquid inside a hydraulic asset, which may result in drowning.</p> <p>Divers in reservoirs are at risk if the flow creates a situation where the SCUBA could run out or fail, eg being sucked into an outlet.</p>
Monitor for leakage	A way of making sure there is no unauthorised re-commissioning putting people at risk of engulfment. This may be achieved by monitoring flow through scours, hydrants or other proving / dewatering points such as drillings or loosened flanges.
Nominated representative	<p>A person competent in FIFM nominated to do tasks, but not delegated responsibility, for one or more of the following people when it is not practicable for them to be on site:</p> <ul style="list-style-type: none"> • the person requesting FIFM • the FIFM plan coordinator • the responsible manager. <p>The person and their role must be documented in the FIMP plan, and they must be fully briefed in their role.</p>
Person requesting FIFM	<p>The person managing the work for which flow isolation / flow management is required, for example:</p> <ul style="list-style-type: none"> • Team Manager Maintenance • Team Leader Civil Delivery for Sydney Water work

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	<ul style="list-style-type: none"> • Project manager for contract work • Water Service Coordinators for developer work.
Project safety plan	A plan for how safety will be managed throughout a project. Refer to the <i>Contractor Safety Management System</i> .
Proving isolation	To confirm that the FIFM has stopped or controlled flow to the worksite, and controlled the risk of hydraulic engulfment. This must be recorded on the FIFM schedule and method of proving successful FIFM form.
Reasonably practicable	<p>That which is, or was at a particular time, reasonably able to be done to ensure health and safety, taking into account and weighing up all relevant matters, including:</p> <ul style="list-style-type: none"> a) the likelihood of the hazard or risk occurring b) the degree of harm that might result from the hazard or risk c) what the person concerned knows, or ought reasonably to know, about the hazard or risk, and ways of eliminating or minimising the risk d) the availability and suitability of ways to eliminate or minimise the risk e) after assessing points a) to d), the cost of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk. <p><i>Source: Interpretive Guideline – Model Work Health and Safety Act: The Meaning of Reasonably Practicable.</i></p> <p>Examples of when it may not be reasonably practicable to apply double isolation is if the second isolation will create a higher negative impact on:</p> <ul style="list-style-type: none"> • other safety hazards • customers • the environment • complying with the Sydney Water Operating Licence. <p><i>See QMAF0018 Risk Criteria for guidance.</i></p>
Responsible person for FIFM.	The person who does the physical, mechanical or electrical isolation and recommissioning.
Responsible manager described in the relevant attachment.	<p>The person with the authority to approve FIFM plans depending on their level of risk, complexity or urgency, for example:</p> <ul style="list-style-type: none"> • planned work on water mains > 250 mm diameter: Water Networks Area Manager • reactive work, or planned work on water mains < 250 mm: Team Manager Civil Delivery.
Restrained valve (anchored valve)	<p>A valve that can't move in response to pressure, for example:</p> <ul style="list-style-type: none"> • valve suitably anchored (anchor block) • valve in a continuous pipeline, i.e no pipe or fitting removed • valve with pipe held by soil friction • valve with pipe held by soil friction off a bend, tee, etc.
Single barrier isolation	<p>A single barrier between the work site and the live hydraulic system, applied to every hydraulic source into the work site.</p> <p>It can be physical, mechanical and / or electrical and applies to water, wastewater and stormwater systems. It should be as close as practicable to the work site while meeting safe work distances.</p>
Specific requirements for FIFM	Attachments 1 to 5. These are documented processes setting out the procedures to establish and maintain safe isolation, flow management, dewatering / recharging and recommissioning of live hydraulic assets.
Service provider	The construction, operation or maintenance crew who require FIFM to work in, on or near the asset without getting engulfed.

3.2 Responsibilities

Position	Responsibility	
Business area manager.	As described in section 2.	
Person requesting FIFM.		
FIFM plan coordinator.		
Responsible manager (or their nominated representative) described in the relevant attachment.		
Responsible person for FIFM.		
Service provider.		

3.3 References

Document type	Title
Legislation	<i>Work Health & Safety Regulation 2011</i>
Policies and procedures	<i>HSP0001 Confined Space Safety.</i>
	<i>HSP0014 HIDRA.</i>
	<i>HSP-010 Inspection, Testing and Monitoring.</i>
	<i>HSP0049 Lock Out /Tag Out.</i>
Guides	<i>HSG0567 Guide for Safe Isolation of Assets or Equipment.</i>

3.4 Attachments

Attachment	Title
1	Water
2	Wastewater
3	Treatment
4	Stormwater

4. Document control

Procedure title: Flow Isolation and / or Flow Management					
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