Attachment 1 Water

1. Overview

1.1 Objective

This attachment details how flow isolation / flow management (FIFM) for planned work on our water network is managed to control risks involving:

- hydraulic engulfment of people working on or near our assets
- the continuity and quality of supply to our customers
- the environment, and
- the water network itself

1.2 Scope

In Scope:

- FIFM of water system assets, including:
  - water pipes, tunnels, pumping stations, reservoirs
  - pumps and associated plant and equipment
  - valves, bulkheads, stop boards, penstocks etc.
  - approved plugs (eg Hydrastop). These can be used as a barrier if installed by trained and competent persons
- system related activities including:
  - operation of pumps, valves and reservoirs to maintain pressure and continuity for customers
  - monitoring system performance
  - water quality
  - discharge related environment controls

Not in Scope:

- isolation of non-hydraulic assets for project works, including:
  - mixers
  - chemical dosing units
  - security systems
  - cathodic protection systems.
- activities related to the project work itself including:
  - wash down / cleaning of reservoirs prior to return to service
  - operation of valves for asset commissioning
  - under pressure connections (UPCIC). These are to be addressed by the SWMS of constructor.
- project specific environmental controls relating to disinfection and FIFM, that are not specified in the Sydney Water Discharge Protocols

- Project and construction management, and coordination, specifically:
    - scheduling work with Networks / Civil Delivery, service providers and constructors (as per any system restrictions identified)
    - ensuring that delivery of the FIFM process matches the schedule of the overall project
    - coordinating the implementation of controls for any other safety and environmental hazards identified in the Project Safety Plan or equivalent (eg LOTO of mechanical, electrical, chemical etc) with implementation of the FIFMP

These *not in scope* items are the responsibility of the Project Manager for the work, or their nominated representative (who can be the person who has been nominated as the FIFM Plan Coordinator), and are managed via the Project Safety Plan, Environmental Management Plan, Inspection and Test Plan or equivalent, however these can to be included in the FIFM plan as a single line item hold point.

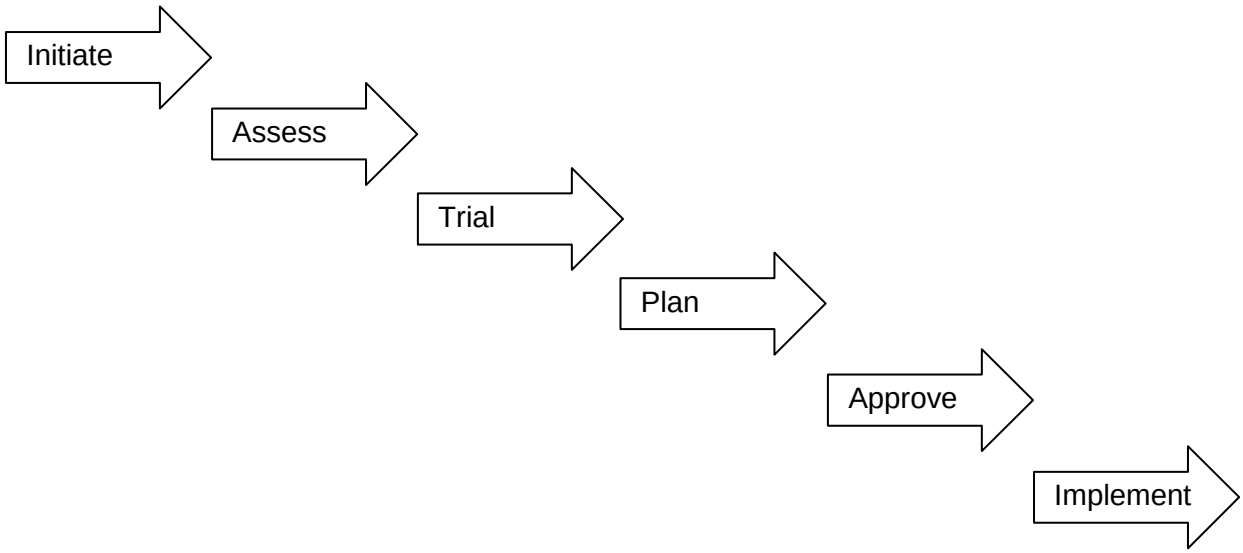
1.3 Summary

This procedure specifies:

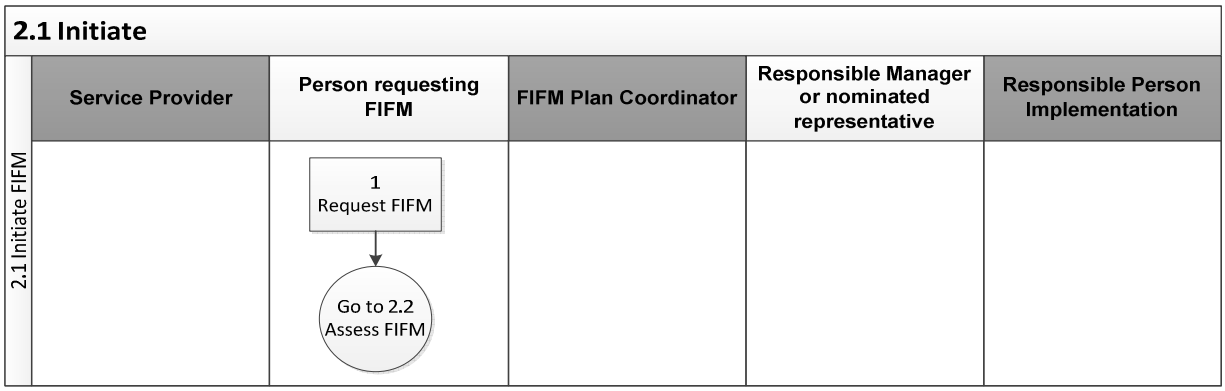
- procedure for initiating, assessing, trialling, planning, approving and implementing FIFM
- definitions
- roles and responsibilities
- milestones and timeframes

2. Procedure

This procedure has six phases

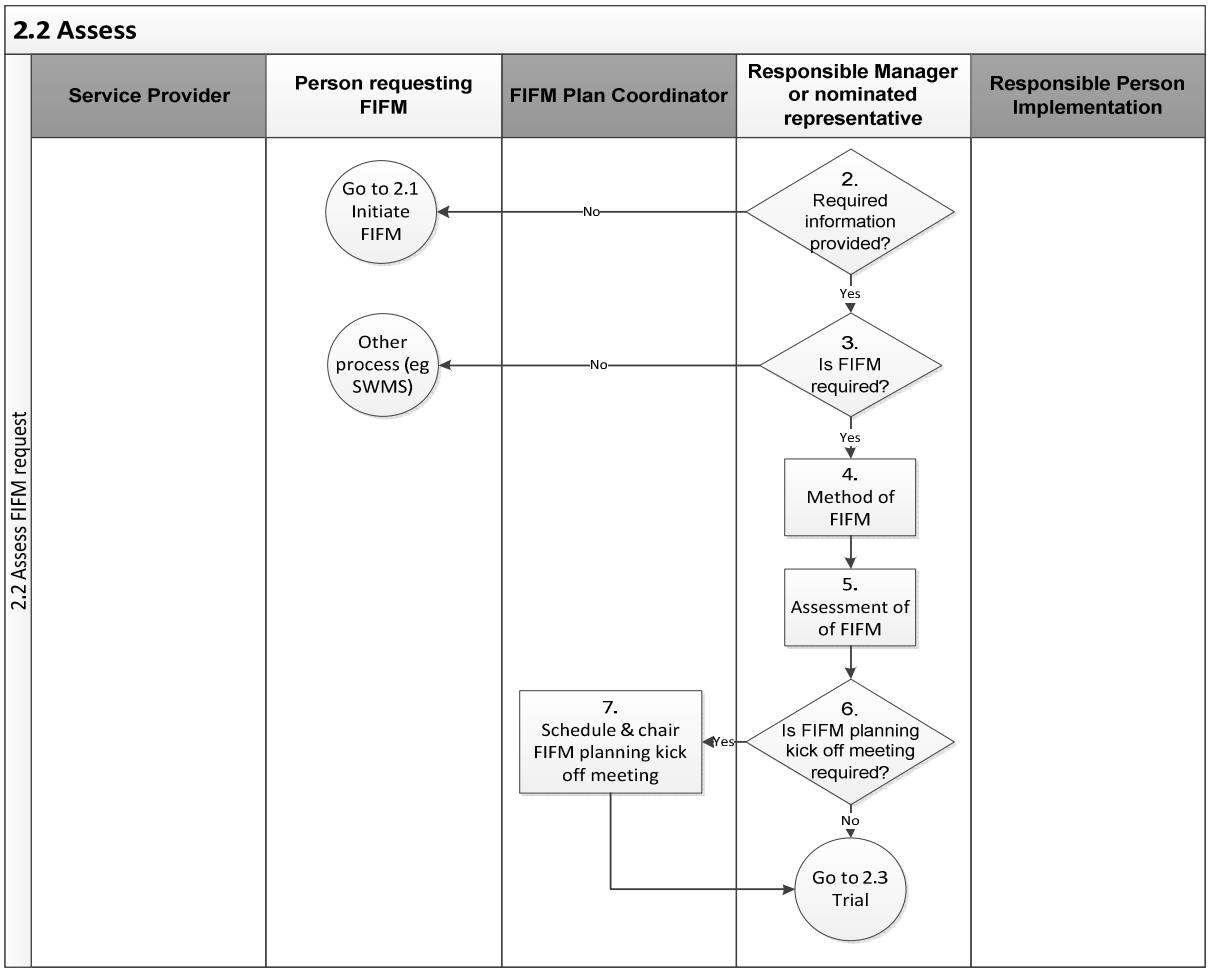


2.1 Initiate



Box	Description	Who	Explanation	Forms / Notes
1	Request FIFM	Person requesting FIFM.	Identify: ▪ proposed FIFM date, project start time and duration of project work ▪ assets involved, the work proposed and the location ▪ whether the work requires confined space entry or manned entry into a hydraulic asset ▪ site specific engulfment hazard and project based controls ▪ FIFM Plan Coordinator ▪ whether a FIFM planning kick off meeting is required ▪ project scope ▪ who is doing the work ▪ whether a trial is required to manage project delivery risks, and if so, the type of trial	Form A ≥ 250mm SWConnect work request < 250mm

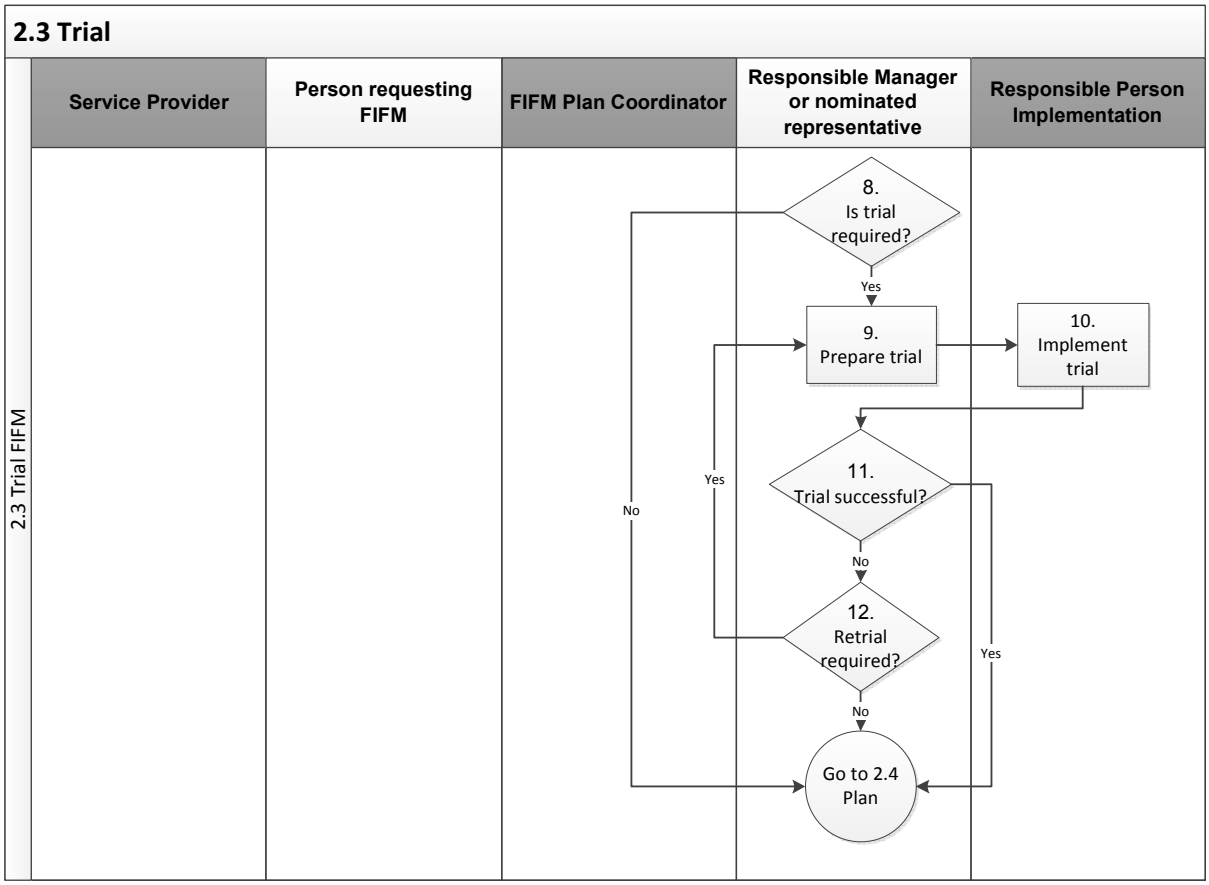
2.2 Assess



Box	Description	Who	Explanation	Forms / Notes
2	Required information provided?	Responsible Manager or nominated representative	▪ Review whether the required the information has been provided: o Date, start time, duration o FIFM plan coordinator o Scope of work and plans is adequate to determine the FIFM required	Form A ≥ 250mm SWConnect work request < 250mm
3	If FIFM required?	Responsible Manager or nominated representative	▪ Use Check List – Water FIFM to determine whether work can proceed via SWMS	Only applies to ≥ 250mm
4	Method of FIFM	Responsible Manager or nominated representative	▪ Use Check List – Water FIFM to assess whether the FIFM is **routine** or **complex**. ▪ All FIFM for assets less than 250mm is **routine** ▪ Use W1 to determine initial assessed method of FIFM (see Appendix 1)	Only applies to ≥ 250mm

5	Assessment of FIFM	Responsible Manager or nominated representative	▪ Specify special requirements for the requested isolation ▪ Lead time required to isolate asset ▪ whether a FIFM planning kick off meeting is required	Form A ≥ 250mm SWConnect work request < 250mm
6	Is FIFM planning kick off meeting required?	Person requesting FIFM Responsible Manager or nominated representative	▪ Based on either or both project and system risks, a FIFM planning kick meeting may be required to review scope of work, sequencing, proposed duration of work, system restrictions.	Form A
7	Schedule & chair FIFM planning kick off meeting	FIFM Plan Coordinator	▪ Arrange for relevant stakeholders to attend, chair the meeting, prepare and issue minutes and follow up actions	

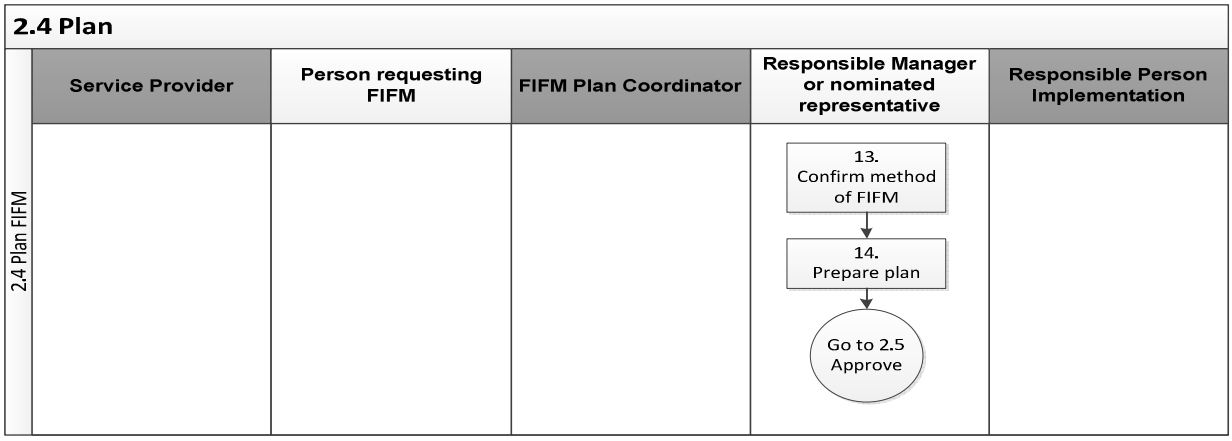
2.3 Trial



Box	Description	Who	Explanation	Forms / Notes
8	Is trial required?	Responsible Manager or nominated representative	▪ Trials for planned work are generally required, unless: o FIFM was recently performed o FIFM involves new assets o Person requesting FIFM determines it is not required, based on the project risk profile	Form A ≥ 250mm SWConnect work request < 250mm

Box	Description	Who	Explanation	Forms / Notes
9	Prepare trial	Responsible Manager or nominated representative	▪ Determine the FIFM activities required to perform the project works. ▪ Generally trials involve system de-pressurisation only, however full dewatering can be specified, based on the project risk profile (see Form A Part 2)	Routine: Form O Complex: Form E, F
10	Implement trial	Responsible Person Implementation	▪ Carry out trial as per Form and plans provided ▪ Assets other than those identified on the Form / Plans provided, can be operated to successfully complete isolation, at the discretion of the *Responsible Person Implementation* based on the additional system and customer impacts. This **MUST** be documented on the Form / Plans provided ▪ If isolation is not successful, faulty / broken / missing assets **MUST** be documented and corrective workorder (G3) raised or HYDRA error logged	Routine: Form O Complex: Form E, F
11	Trial successful?	Responsible Manager or nominated representative	▪ Review whether system was successfully isolated, and if so whether additional asset(s) were required ▪ If not successful, whether Responsible Person Implementation was able to identify the cause(s)	
12	Retrial required?	Responsible Manager or nominated representative	▪ Even if a trial has not been successful, sufficient field intelligence may have been obtained so that further trialling is not required	

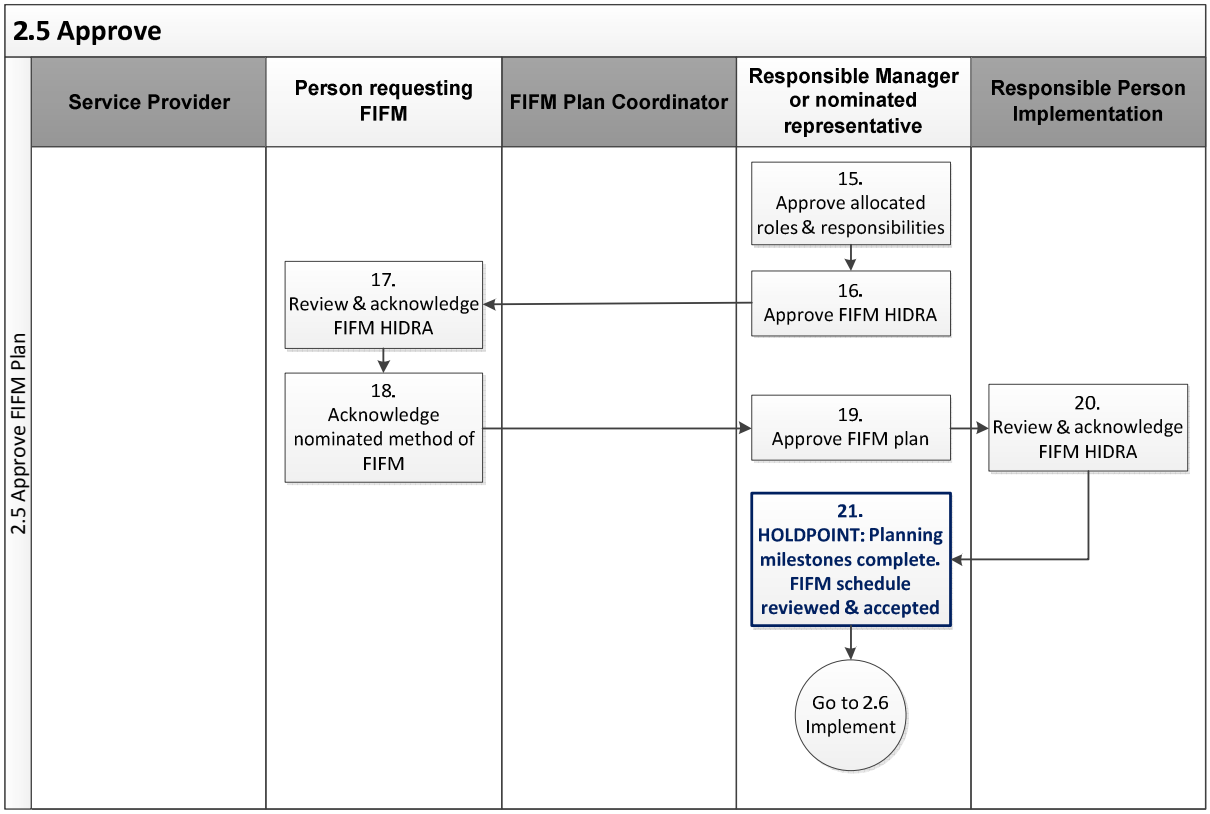
2.4 Plan



Box	Description	Who	Explanation	Forms / Notes
13	Confirm method of FIFM	Responsible Manager or nominated representative	▪ Use W1 to determine confirm assessed method of FIFM (see Appendix 1)	Complex: Form K:1 Routine: Form M
14	Prepare plan	Responsible Manager or	▪ Allocate roles & responsibilities	Complex: Form B
			▪ Develop FIFM HIDRA	Complex: Form C

Box	Description	Who	Explanation	Forms / Notes
		nominated representative	▪ For projects involving confined space work and double barrier isolation is not reasonably practicable, the reason why must be documented on Form C	Routine: Form M
			▪ Develop communication plan	Complex: Form D
			▪ Finalise FIFM schedule of activities ▪ Use Excel workbook to calculate safe distance of excavation from isolation valve (see Appendix 2)	Complex: Form H Routine: Plan(s)
			▪ Identify method of proving FIFM	Complex: Form H Routine: plan(s)
			▪ Develop Monitor plan (if required)	Complex: Form I
			▪ Finalise recommissioning schedule	Complex: Form J Routine: plan(s)
			▪ Signoff the FIFM schedule has been prepared & method of proving isolation identified	Complex: Form K:6 Routine: Form M

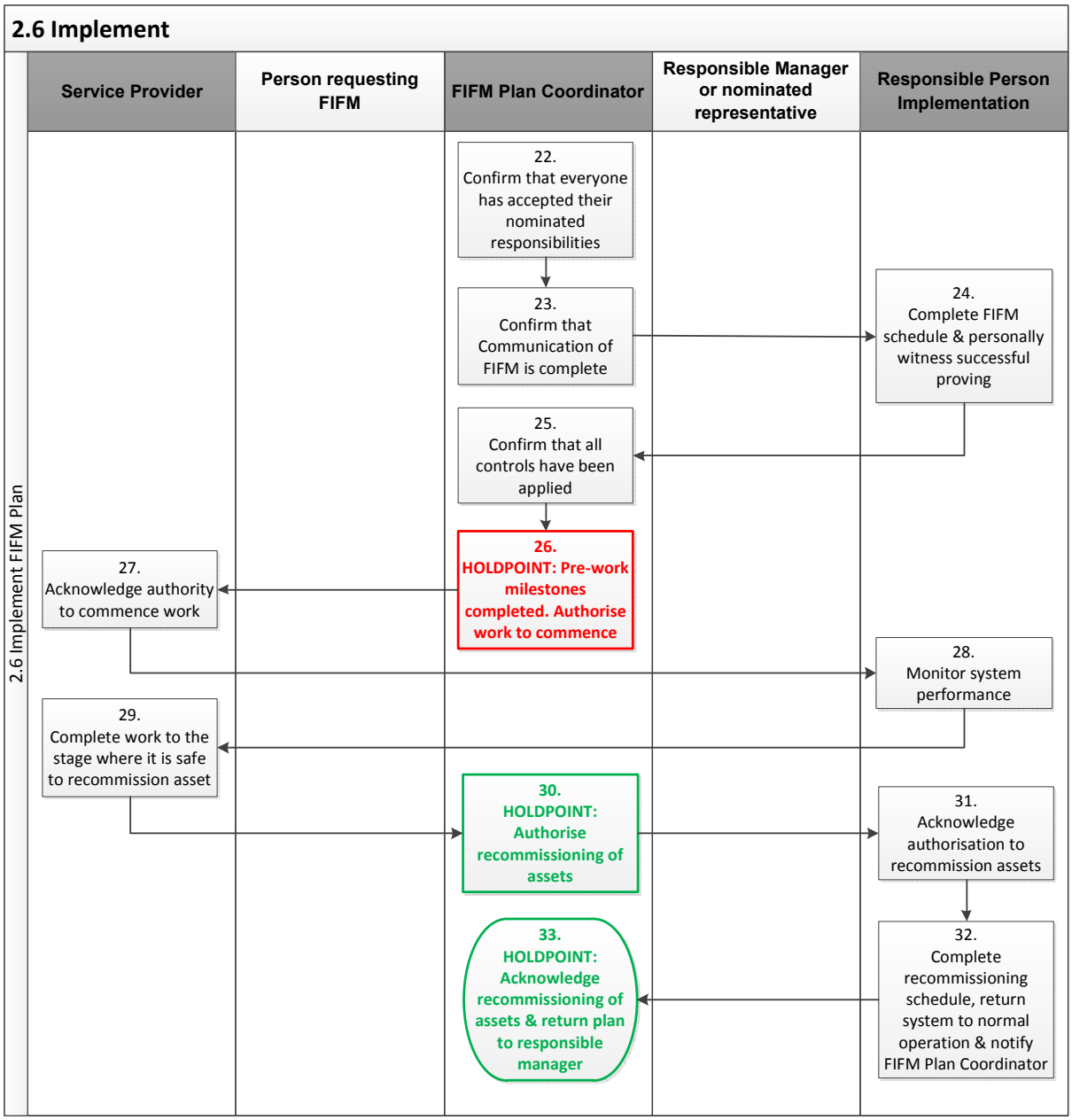
2.5 Approve



Box	Description	Who	Explanation	Forms / Notes
15	Approve allocated roles & responsibilities	Responsible Manager or nominated representative	▪ Approve roles and responsibilities as allocated on Form B	Complex only: Form K:2
16	Approve FIFM	Responsible	▪ Approve of FIFM HIDRA as per	Complex only: Form

Box	Description	Who	Explanation	Forms / Notes
	HIDRA	Manager or nominated representative	Form C	K:3
17	Review & acknowledge FIFM HIDRA	Person Requesting FIFM	▪ Review HIDRA and acknowledge that the controls specified are appropriate for the project work, site conditions and the overall project safety plan	Complex only: Form K:4
18	Acknowledge nominated method of FIFM	Person Requesting FIFM	▪ Acknowledge that the method of FIFM specified is appropriate for the project work, site conditions and the overall project safety plan	Complex only: Form K:5
19	Approve FIFM plan	Responsible Manager or nominated representative	▪ Approve the communication plan (if prepared), FIFM schedule, including method of proving success of FIFM, monitoring plan (if prepared) and re-commissioning schedule	Complex: Form K:7 Routine: Form M:1
20	Review & accept FIFM schedule	Responsible Person Implementation (from area that will complete FIFM schedule)	▪ Use local system knowledge & operational experience to confirm FIFM plan can be implemented as prepared ▪ Accept approved FIFM plan	Complex only: Form K:8
21	**HOLDPOINT: Planning milestones complete. FIFM schedule reviewed & accepted**	**FIFM Plan Coordinator**	▪ **Acknowledge that planning milestones are complete and that the FIFM plan is reviewed and accepted** ▪ **Specific FIFM date can now be requested**	**Complex only: Form K:9**

2.6 Implement



Box	Description	Who	Explanation	Forms / Notes
22	Confirm that everyone has accepted their nominated responsibilities	FIFM Plan Coordinator	▪ Confirm that persons identified on Form B have been informed and have accepted via signoff their nominated responsibilities	Complex only: Form K:10
23	Confirm that Communication of FIFM is complete	FIFM Plan Coordinator	▪ Confirm that the communications specified on Form D have been completed	Complex only: Form K:11
24	Complete FIFM schedule & personally witness successful proving	Responsible Person Implementation	▪ Complete FIFM schedule and personally witness the FIFM successfully proven	Complex: Form K:12 Routine: Form M:2
25	Confirm that all	Complex: FIFM	▪ Confirm that responsible people	Complex: Form K:13

	controls have been applied	Plan Coordinator Routine: Responsible Person Implementation		have signed all that controls have been applied, are still applicable, and there are no new hazards	Routine: Form M:3
26	**HOLDPOINT:Pre-work milestones completed. Authorise work to commence**	**FIFM Plan Coordinator**	▪	**Pre-work milestones completed. Project is authorised to commence**	**Complex: Form K:14** **Routine: Form M:4**
27	Acknowledge authority to commence work	Service Provider	▪	Acknowledge authorisation to commence project work	Complex: Form K:15 Routine: Form M:5
28	Monitor system performance	Responsible Person Implementation	▪	Monitor system performance as specified via Form I	Complex only: Form K:16
29	Complete work to the stage where it is safe to recommission asset	Service Provider	▪	Work has been completed to the stage where the asset is now safe to recommission	Complex: Form K:17 Routine: Form M:6
30	**HOLDPOINT: Authorise recommissioning of assets**	**FIFM Plan Coordinator**	▪	**Authorise that asset is now available for recommissioning**	**Complex: Form K:18** **Routine: Form M:7**
31	Acknowledge authorisation to recommission assets	Responsible Person Implementation	▪	Acknowledge authorisation that recommissioning of assets can commence	Complex: Form K:19 Routine: Form M:8
32	Complete recommissioning schedule, return system to normal operation & notify FIFM Plan Coordinator	Responsible Person Implementation	▪ ▪ ▪	Recommission asset as per schedule and plan(s) Return system to normal operation Notify FIFM Plan Coordinator when recommissioning complete	Complex: Form K:20 Routine: Form M:9
33	**HOLDPOINT: Acknowledge recommissioning of assets & return plan to responsible manager**	**FIFM Plan Coordinator**	▪ ▪	**Acknowledge recommissioning is complete** **Return completed plan to the Responsible Manager**	**Complex only: Form K:21`**

3. Definitions

Term	Definition
First Control	Closing single isolator 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: • Closing a valve or pen stock. • Inserting a stop board, spade, or plug. • Electrical isolation of a pump, as long as gravity feeds are also

Term	Definition
	isolated and there is no hydraulic pressure in the system. **And:** Tagging the isolators, open drain valve (eg hydrant, scour, Air valve). Prove isolation via one or more of: open bleed, scour valve, hydrant or air valve in the isolated section(s). These can be physical, mechanical and / or electrical and applies to water, wastewater and stormwater systems, and should be as close as practicable to the work site while meeting safe work distances.
Second Control	**Additional Barrier** - Close and tag second isolator, open drain valve and prove isolation between the first and additional barrier via one or more of: open bleed, scour valve, hydrant or air valve in the isolated section **or** **Lock out** - Lock the single isolator so it can't be operated, **or** **Prevent access -** Prevent access to the single isolator, so it can't be operated, eg: covering a stop valve with road plate or cold mix, **or** **Monitor leakage -** Visually monitor the open drains within the isolated sections for leakage, ensuring that adequate notice can be given to worksite, , **or** **Guard isolation -** Visually monitor the single isolation, and prevent it from being opened Note - these controls are equally effective
Entry into hydraulic asset	When a person's head or upper body is within the boundary of the asset. Inserting an arm is not entry.
Flow Management	A process of assessing and controlling flow in order to prevent engulfment or uncontrolled water pressure.
Flow Isolation / Flow Management Plan (FIFMP)	A set of documents outlining the scope of work, risks and controls, roles and forms as required to manage the safe working in, on or around a live hydraulic asset.
Flow Isolation	A process 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. This is not necessarily the same as shutdown of the hydraulic flow or stoppage of leakage.
Hydraulic asset	Any part of a water, wastewater or stormwater network that is normally conveying or storing fluid.
Hydraulic engulfment	To be swallowed up or immersed by water based liquid inside a hydraulic asset, which may result in drowning. 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.
Lock-Out and Tag-Out (LOTO)	A procedure to warn others about the status of plant and equipment, or that it is being worked on (see HS-049 Lockout / Tagout)
Project Manager for the work	A person, nominated in the Constructor's contract, who has the authority to the direct the Contractor, and if required, vary their work
Success of Isolation (Proving)	To confirm that the activities carried out in FIFMP has provided a work site that is safe from potential flooding. This must be recorded on Form H / Form M.

4 Roles & Responsibilities

RESPONSIBILITIES MATRIX

Asset Size	FIFM Type	Person requesting FIFM	FIFM Plan Coordinator	Responsible Manager or nominated representative	Responsible Person Implementation	Service Provider
Planned work						
< 250mm	Routine (W3, W4, W5)	Area responsible for project works eg • Delivery Management • Civil Delivery • Contractor • Thiess • Civil Contracts • Civil Projects • WSC	Area responsible for project works	Manager / Supervisor / Coordinator, Civil Delivery Team Leader / SDO, Networks	Production Employee, Civil Delivery Network Technician, Networks	Area responsible for project works
≥ 250mm	Routine (W3)			Team Leader / SDO, Networks		
	Complex (W3, W4, W5, W6)			Area Manager, Networks		
Reactive work						
All assets	Routine (W3) Complex (W3, W4, W5)	Production Employee, Civil Delivery Network Technician, Networks	Production Employee, Civil Delivery Network Technician, Networks	Production Employee, Civil Delivery Network Technician, Networks	Employee, Civil Delivery Network Technician, Networks	Civil Delivery / Civil Projects / MED / External contractor
	Complex (W2, W6)			Area Manager, Networks		

5. Timeframes

Below are the milestones and timeframes for this process. Failure to meet these decreases our ability to deliver FIFMPs to meet the specified isolation date.

5.1 Planned Work for assets 250mm & greater

Milestones	Responsible Area	Timeframes
Issue Form A	Person requesting FIFM	Minimum 3 months prior to the works
Return initial assessment to Person Requesting FIFM	Networks	Within 5 working days of receiving Form A
Carry out trial	Networks	Either three months prior to specified isolation date for the proposed works or within ten working days of pre-planning kick off meeting (whichever later)
Prepare FIFM plan	Networks	Within ten working days of successful trial. If a trial is not required, within ten working days of signoff of initial Assessment of Water FIFM
Approve routine FIFM plan	Networks	Within above period
Approve complex FIFM Plan	Relevant Network Area Manager	Within five working days of FIFMP preparation
Implement FIFM	FIFM Plan Coordinator	As per project MCP

5.2 Planned Work for assets less than 250mm

Projects involving assets less than 250mm generally have a lower risk profile in terms of customer and project impacts. Milestones, timeframes and tracking are managed by the local Civil Delivery planning or Operational Services teams.

5.3 Reactive Work

Milestones, timeframes and tracking for reactive work is as per the job prioritisation specified via FRM and the Civil Delivery SWMSs.

6. Attachments

Attachment number	Attachment name
Appendix 1	W1 Determining the appropriate method of FIFM
Appendix 2	Sample EXCEL workbook to calculate safe distance of excavation from isolation valve
Appendix 3	Guidelines to Prove the Success of Flow Isolation
Appendix 4	Guidelines to Assist in Undertaking HIDRA Assessment for Flow Isolation / Flow Management of Water Assets
Appendix 5	Guidelines to Monitor System Performance During Trials, Prior to Works and During Project Work
Appendix 6	Guidelines for Maintaining Water Quality Prior to Works, During Project Work and Recommissioning After Works

APPENDIX 1 – Determining the appropriate method of FIFM

W1 Flow Isolation Methodology

This how we determine the appropriate method of FIFM, using a risk approach, based on the hazards and controls for the system, site conditions, and the work being undertaken.

W2 Manned Entry

This method of FIFM is used for projects where person entry is required into a hydraulic asset that is normally full of water & is subject to hydraulic pressure.

Manned entry is as per the definition in *3. Definitions* and is only permitted into water assets of nominal diameter 750mm or greater. It does not include working in front of the open face of large diameter pipes or within deep excavations.

W3 Single Barrier Isolation – Routine

This method of FIFM is used for projects where confined space entry is not required, there are no significant site specific hazards present and the first barrier is adequately restrained. The hazard/risk assessment reveals low potential for asset dislodgment, barrier failure or sudden changes in flow discharges at the work site.

This procedure applies **only** where no manned entry into the asset is required

W4 Double Barrier Isolation

This method of FIFM is used for projects where either confined space entry is required or there are significant site specific hazards present and a second barrier preventing engulfment of the work site (applied to every hydraulic source) is identified as the second control.

This procedure applies **only** where no manned entry into the asset is required

W5 Single Barrier Isolation with second control other than additional barrier

This method of FIFM is used for projects where either confined space entry is required or there are significant site specific hazards present and a control other than a second barrier preventing engulfment of the work site (applied to every hydraulic source) is identified as the second control.

This procedure applies **only** where no manned entry into the asset is required.

PROCEDURE W6 Safe access to reservoirs by divers or boats

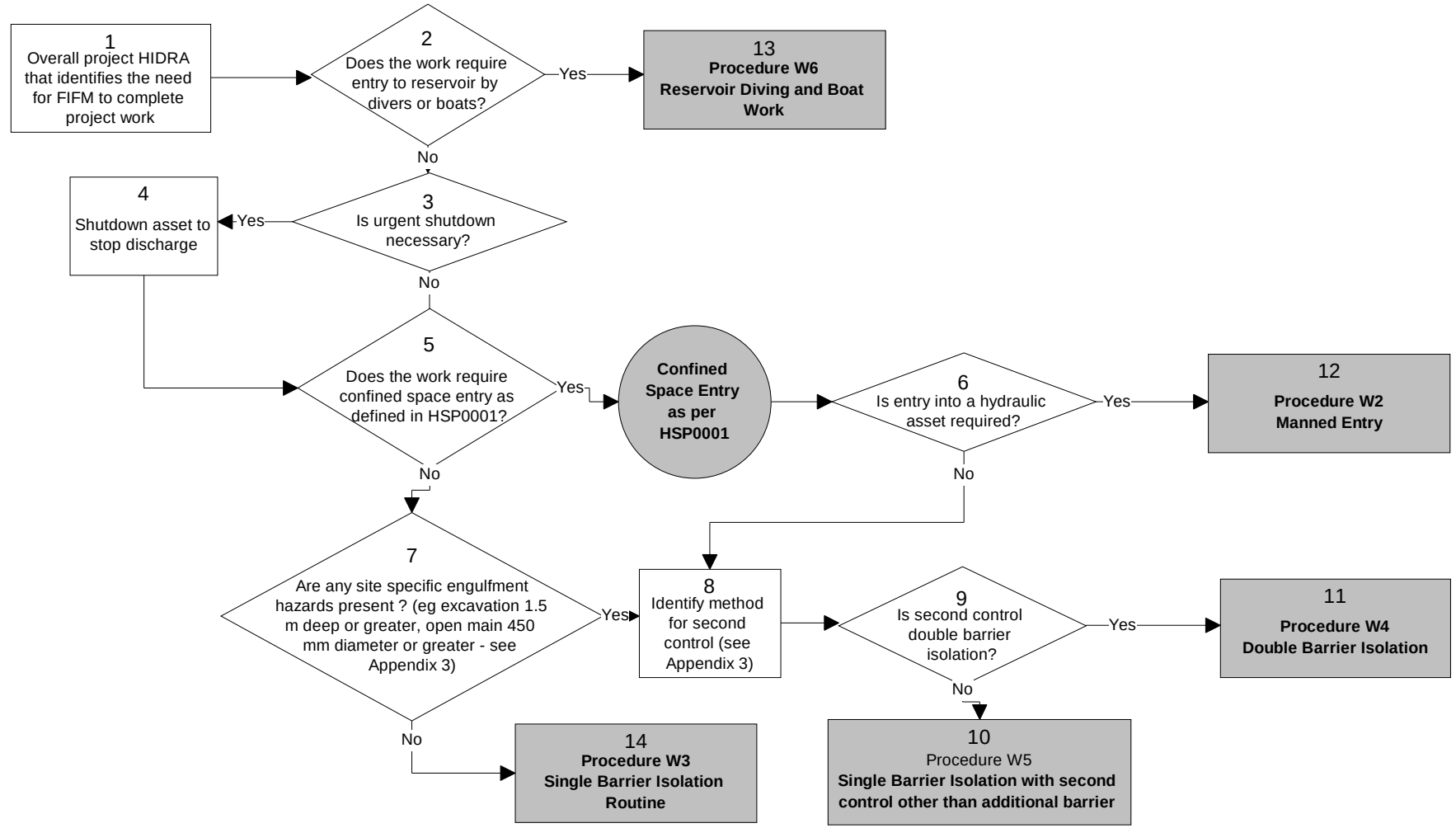
This method of FIFM is used for projects where entry to a reservoir by divers or boats is required (ie confined space entry) with flow isolation / flow management specified for first and second controls.

:

FLOW ISOLATION / FLOW MANAGEMENT METHODOLOGY - WATER

Read this flowchart in combination with the following pages

PROCEDURE W1

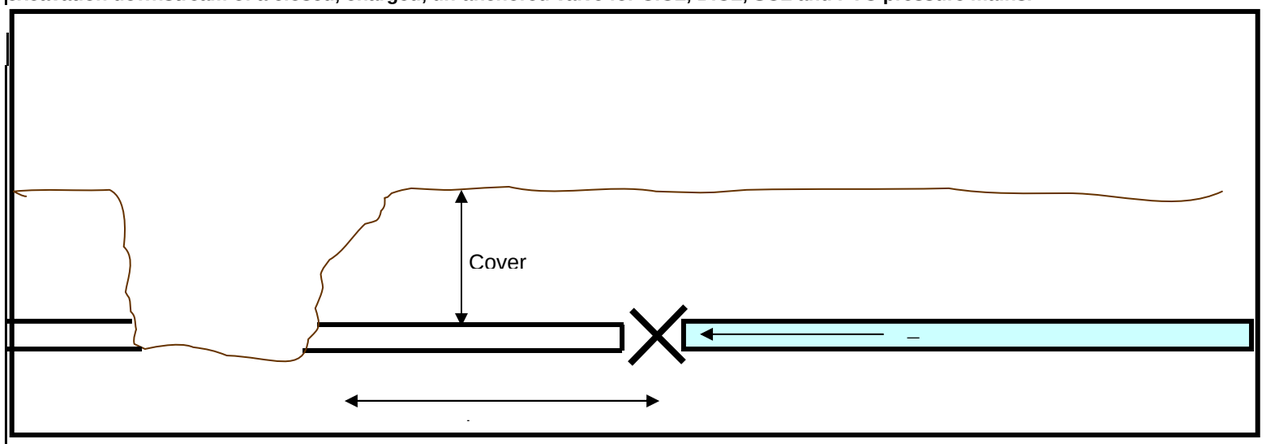


APPENDIX 2 - SAMPLE EXCEL WORKBOOK TO CALCULATE SAFE DISTANCE OF EXCAVATION FROM ISOLATION VALVE

(The Workbook can be downloaded from the table on Intranet page @ Home > For staff > Working safely > Managing safety risks

Safe Excavation Downstream of Charged Valves

This spreadsheet is used to calculate the approximate length of de-watered pipeline required to provide safe excavation downstream of a closed, charged, un-anchored valve for CICL, DICL, SCL and PVC pressure mains.



The calculations are based on the frictional resistance between the pipe and soil due to the weight of pipe and soil downstream of the closed valve. The calculations allow for additional resistance due to the bearing of the valve body against the soil. The calculations assume that the section of pipeline is unrestrained, that is, is flexible jointed (not fully welded or restrained rubber ring joint).

A Factor of Safety of 1.5 has been applied to the calculations in accordance with current industry practice to allow for variations in pipe weights (due to pressure class) and subjectiveness of site soil assessment.

References

1. Thrust Restraint Design For Ductile Iron Pipe , 6th Edition, 2006, DIPRA
2. Ductile Iron Pipeline Systems Design Manual, 5th Edition, 2008, TYCO Water

Spreadsheet Prepared by:	PHS	Sydney Water, AWT Engineering, Pipelines	Nov 2000	
Spreadsheet Checked by:	SN	Sydney Water, Design Services, Civil & Structural	Nov 2008	

Record of Amendments

Rev 1	Nov-00	PHS	Original issue
Rev 2	30/11/08	SN	Cover sheet and description added; Factor of Safety of 1.5 applied to calculations

APPENDIX 3 - GUIDELINES TO PROVE THE SUCCESS OF FLOW ISOLATION

The following is a guide as to some checks that may be adopted to confirm the success of a flow isolation prior to commencement of work. Some of these checks may also be included in the monitoring plan (Form I) and/or the Flow Isolation &/or Management Schedule and Method for Proving Successful FIFM (Form H)

1. Check hydrants, scour valves and air valves for discharge at nominated locations.

2. Take a pressure reading from within the isolated section.

3. If no fittings available within isolated section, install underpressure tapping prior to work, to prove depressurisation.

4. Loosen flange bolts to dewater (if no scour available), ensuring that the bolts are still secure, until minimal discharge.

5. Install pressure tapping point(s) either side of valve to be isolated to allow fitting of pressure gauge to prove positive closure.

APPENDIX 4 - Guidelines to Assist in Undertaking HIDRA Assessment for Flow Isolation / Flow Management of Water Assets

Assessment of risks is to be carried out as per SW Procedure HSP014 – HIDRA, with reference is to W1 Procedure. The following is a guide and only applies to the Flow Isolation activity and should not be considered to be a definitive list. The following table gives examples of hazards and impacts that may result in a Risk Rating of 1 or 2 when uncontrolled. The table also gives examples of suggested controls that may improve the residual risk to a more tolerable rating (3-6).

HIDRA FOR FLOW ISOLATION &/OR MANAGEMENT FOR WATERMAINS & PUMPING STATION FORM C

PROJECT TITLE / NAME	Context Of Assessment	Person(s) Conducting Assessment
Isolation of MAXIMO No.	Engulfment within WPS/work sites.	Person prepare FIFM: Area Team Reviewer: Date Of Assessment

	Very Likely	Likely	Unlikel	Very	Unlikel
CAT.	1	1	2	3	
SEVERE	1	2	3	4	
MODERATE	2	3	4	5	
MINOR	3	4	5	6	
INSIGNIF.	4	5	6	6	

Note: Put in N/A in signature column if items was not applicable to the job

Hazard	Impact		Risk Before Controls			Controls (List all controls – current & required – intended to support the development of safe systems of work)	Risk After Controls			Group Responsible to Implement Control	Sign Off – Controls applied	
What can harm you?	*What can happen?*	*How it can happen?*	Consequ-ence	Likelihood	Risk Rating		Consequ-ence	Likelihood	Risk Rating		Print Name	Signature
SAFETY – Mandatory FIFM hazards and recommended controls												
Engulfment/flood of worksite by water	Drowning of personnel	• Asset are operated (manual, remote, automatic) while works are in progress • Failure of Unanchored / unrestrained valves • Significant internal leaking of isolation valves • valves isolating the main are operated while works are in progress --- • Entrapment in excavation greater or equal to 1.5 m • Entrapment in openings pipe greater or equal to 450mm	Catastrophic	Very likely	**1**	• Execute isolation as per procedure prepared. • Method of proving successful isolation / dewatering identified • All isolation valves to be tagged by the person implemented isolation as per FIFM procedure. Only the person implemented isolation will operate valves as per HSP049 LOTO. • No work to commence until person implemented isolation proves isolation/dewatering as specified in FIFM procedure. --- Additional control such as insert blank flange, aquastop etc…	Catastrophic	Very Unlikely	**3**	Network Technician FIFM Plan Coordinator		
CUSTOMER – Site Specific hazards & controls												

Water Quality Failures	Internal contamination of pipework / pump unit	• Human/material contamination in pipework / and ingress of vermin through pipe openings • Ingress of ground water via AVs, scours etc • Water stagnant in isolated mains	Moderate	Likely	3	• Use approved (drinking water standard) products and materials • Ensure water quality testing conduct in accordance with WPIMS5174 (eg chlorine, turbidity, odour and taste) prior to returning the recharged main to supplying customers • Adequate controls included in project safety plan or equivalent to prevent human / material contamination in pipework & ingress of vermin through pipe openings • Maintain clean working area, and assess air valve pits and scour outlets / chamber within the shutdown section and remove any potential of sources of contamination (eg pit full of dirty water, mud etc). Also, implement preventive measures to prevent contaminants entering the depressurised main (eg sandbagging around scour outlet)	Moderate	Unlikely	4	FIFM Plan coordinator/ Network Technician		
Damage to SWC reputation	Loss of supply or Reduced system capacity to unacceptable levels	• Work not finish within allowed timeframe • Other work being carried out in the immediate area	Moderate	Very Likely	4	• Complete works within specified timeframe • Confirm alternate system arrangements (ie rezoning) via modelling and trials • OCR to HSS specifying changes to system operation • Ensure other planned work being performed in area does not impact on works • Cancel work and return system to normal operation if unmanageable unplanned loss of supply / low pressure to customers	Moderate	Very Unlikely	5	FIFM Plan coordinator & Network Technician		
ENVIRONMENTAL – Site Specific hazards & controls											
Change in weather condition	Bushfire or flooding occurs	Extreme weather condition	Moderate	Very Unlikely	4	• Check weather forecast pre-isolation • Check if work site is located within a designated bushfire prone area. In the event of TOBAN, cancel the FIFM and re-schedule	Moderate	Very Unlikely	5	FIFM Plan coordinator		
Damage to the environment	Erosion & chlorine	Dewatering main & recommissioning	Moderate	Unlikely	5	Follow discharge protocols, controlled use of hydrants & scours	Moderate	Very Unlikely	6	Network Technician		
Comments:												

HIDRA FOR FLOW ISOLATION / FLOW MANAGEMENT FOR RESERVOIRS

FORM C

PROJECT TITLE / NAME	Context of Assessment	Person(s) conducting assessment
Diver or boat inspection of water supply reservoir.	Risk of person drowning by being pinned against or knocked unconscious by striking internal column due to sudden change in flow from reservoir inlet or turbulence in the water surface that unsettles the boat. Risk of person drowning by being sucked into reservoir outlet.	***Date of assessment***

	Very Likely	Likely	Unlikely	very Unlikely
CAT.	1	1	2	3
EVERE	1	2	3	4
MODERATE	2	3	4	5
MINOR	3	4	5	6
INSIGNIF.	4	5	6	6

Hazard	Impact		Risk Before Controls			Controls (List all controls – current & required – intended to support the development of safe systems of work)	Risk After Controls			Group Responsible to Implement Control	Sign Off – Controls applied	
What can harm you?	*What can happen?*	*How it can happen?*	Consequ-ence	Likelihood	Risk Rating		Consequ-ence	Likelihood	Risk Rating		Print Name	Signature
Diver entry into reservoir	Drowning, Electrocution, Injury, Disorientation	Entrapment, reduced visibility, contact with live mechanical and electrical equipment, snags, failed isolation, chlorine odour	Catastrophic	Unlikely	2	• Follow Diver Safety Procedure HSP – 076 • Follow Safe Work Method Statement for diver entry • Ensure control are in place to mitigate hazards shown on the site specific condition identification form for diver entry • Ensure Safe Electrical Isolation of Mixer, Cathodic Protection & IICATS Telemetry System • Open maintenance access hatches of the reservoir prior to diver entry to provide light and ventilation	Moderate	Very unlikely	5	FIFM Plan Coordinator		
Change in water level during diver entry	Rapid increase or decrease in water level	Main break downstream of reservoir.	Moderate	Unlikely	4	• Follow Diver Safety Procedure HSP – 076 • Follow Safe Work Method Statement for diver entry • Ensure control are in place to mitigate hazards shown on the site specific condition identification form for diver entry • The inspection will be conducted under flow management only. Inspectors are to maintain an exclusion zone at all outlets • Develop LOTO process and specify in isolation procedure • Execute isolation as per procedure prepared.	Moderate	Very unlikely	5	FIFM Plan Coordinator Network Technician		
Change in water level during diver entry	Change in water level during diver inspection	Normal depletion of the reservoir	Mod	Unlikely	4	• Follow Diver Safety HSP – 076 • Follow Safe Work Method Statement for diver entry • Ensure control are in place to mitigate hazards shown on the site specific condition identification form for diver entry	Mod	Very Unlikely	5	FIFM Plan Coordinator		

Hazard	Impact		Risk Before Controls			Controls (List all controls – current & required – intended to support the development of safe systems of work)	Risk After Controls			Group Responsible to Implement Control	Sign Off – Controls applied	
What can harm you?	*What can happen?*	*How it can happen?*	Consequ-ence	Likelihood	Risk Rating		Consequ-ence	Likelihood	Risk Rating		Print Name	Signature
Water inlets/outlets	Drowning or injury from water pressure, suction or entrapment	Poor communication with dive control position; failed asset isolation; diver disorientation	Catastrophic	Unlikely	2	• Follow Diver Safety HSP – 076 • Follow Safe Work Method Statement for diver entry • Ensure controls are in place to mitigate hazards shown on the site specific condition identification form for diver entry. • The inspection will be conducted under flow management only. Inspectors are to maintain an exclusion zone at all outlets	Catastrophic	Very Unlikely	3	FIFM Plan Coordinator		
						• Execute isolation as per procedure prepared.				Network Technician		
Water Quality Failures	Contamination of reservoir	Divers	Moderate	Likely	3	Use 1 % sodium hypochlorite NaOCl solution to wash down divers feet and other equipment	Moderate	Very unlikely	5	FIFM Plan Coordinator		
Damage to SWC reputation	Loss of supply	Reduced system capacity to unacceptable levels	Moderate	Very Likely	4	• Complete works within specified timeframe	Moderate	Very unlikely	5	FIFM Plan Coordinator		
						• Issue OCR to SOC to ensure reservoir is filled to appropriate level prior to isolation				Operational Services		
Comments:												

APPENDIX 5 - GUIDELINES TO MONITOR SYSTEM PERFORMANCE DURING TRIALS, PRIOR TO WORKS AND DURING PROJECT WORK

The following is a guide as to some checks that may be adopted to monitor system performance during trials, prior to commencement of work and while work is being carried out. Some of these checks may also be included in the monitoring plan (Form I) and/or the Flow Isolation &/or Management Schedule and Method for Proving Successful FIFM (Form H).

1. Identify any critical customers that will be impacted by the isolation. Apply contingency plans if available or prepare isolation specific contingency plan if required.

2. If trials are required, specify as part of Form E if any actions other than depressurisation is required (ie partial / full dewatering of assets and duration of proving and period for monitoring trial). Identify if the trial needs to be conducted at a specific time of day or specific day.

3. Identify critical monitoring points within the system surrounding the assets to be isolated and other affected systems. This may include existing IICATS gauges (ensure that these can be polled remotely) or temporary gauges to be installed as part of the isolation works.

4. Specify expected system pressures at these locations prior to the isolation and expected pressures during the isolation. Include acceptable limits (ie minimum / maximum pressure) and actions if system performance is outside these limits (eg contact Water Networks, operate DVs, cancel work etc).

5. Include method of recording actual pressure (ie sections in Forms E, H, I or separate data sheet developed for the works). Include actions for field staff in the event of unacceptable limits for pressure (ie contact Water Network, check specific SVs, do not proceed with work if issues cannot be resolved).

6. Specify actions for SOC (ie via alarms specified for the isolation). These may include direct notification to field crew of low suction alarms, abnormal depletion of reservoirs, abnormal flows or any asset issues impacting the isolation.

7. See Form E, Form H and Form I examples below.

TRIAL FLOW ISOLATION / FLOW MANAGEMENT (FIFM) and RE-COMMISSIONING SCHEDULE FORM E

PROJECT TITLE / NAME: **CN123456 isolate 600mm Schofields Rd Rouse Hill - RMS Rd upgrade** **MAXIMO No ……..**

Plan Prepared by: Contact Number:

SCHEDULE OF ACTIVITIES FOR TRIAL

Start time of trial: _____

Sequence	Asset No	Activity	RESPONSIBLE PERSON	Activity Completed
Pre-trial notifications				
1.		Nil	Network Technician	**Y / N**
Pre-trial activities				
2.		Notify SOC that WP0XXX will be unavailable for duration of trial	Network Technician	**Y / N**
Trial FIFM activities				
3.	H01 & H02 - plan 1	Install stand pipe and flush dirty water before install portable PRV & set PRV to 40m pressure		
4.	SV01 - Plan 2	Close the SV	Network Technician	**Y / N**
5.	SV02 - Plan 3	Close the SV	Network Technician	**Y / N**
6.	DV01 - Plan 4	Ensure DV is closed	Network Technician	**Y / N**

If **"No"** has been marked for any of the above identify additional activities to complete trial FIFM and detail these activities below, review these with relevant Operations Area prior to implementation if required, or return system to normal operation

If the trial still can't be completed, notify FIFM Plan Coordinator, and recommission assets using the sequence over the page.

				Y / N
Method for proving trial FIFM is successful?				
1.	Sc01, AV01, or Hyd01 - Plan 2	Use Scour valves, Hydrant or air valves to confirm isolation	Network Technician	**Y / N**
Finish time of trial: _____				

If the method is successful and the responsible manager has approved on Form K that FIFM can continue, there is no need to recommission. Proceed to Form H.
Recommission if the responsible manager has not approved FIFM to continue after the trial, or if the trial FIFM is unsuccessful.

SCHEDULE OF ACTIVITIES FOR RECOMMISSIONING

Start time of recommissioning: _____

Sequence	Asset No	Activity	RESPONSIBLE PERSON	Activity Completed
2.	Sc0, ,AV01, or Hyd01-Plan 2	Close Scour valves & air valves if it were opened and remove Standpipe and PRV	Network Technician	Y / N
3.	SV01 - Plan 2	Open the SV	Network Technician	Y / N
4.	SV02 - Plan 3	Open the SV	Network Technician	Y / N
5.	DV01 - Plan 4	Leave DV closed	Network Technician	Y / N
6.		Ring call centre and advise system is back to normal operation.	Network Technician	Y / N

Finish time of recommissioning: _____

Person responsible for conducting trial: (Print name):_____ (Signature) _____Date:_____

☐ **YES** The above activities have been carried out and the trial flow isolation / flow management & re-commissioning was successful as per plan.

☐ **NO** Trial flow isolation / flow management was not successful for the following reasons

The trial flow isolation / flow management & re-commissioning was not successful because:		
Asset No	Problem	Action required

FLOW ISOLATION / FLOW MANAGEMENT (FIFM) SCHEDULE AND METHOD FOR PROVING SUCCESSFUL FIFM FORM H

PAGE: _____ **OF:** _____

PROJECT TITLE / NAME: **CN128555PW isolate 450mm Schofields Rd, Rouse Hill - RMS Rd upgrade** **MAXIMO No:**

Prepared by: _____ Thang Ha_____Contact Number: _____8849 6661_____

Start time of FIFM:_____

Sequence	Asset No	Activity	AREA RESPONSIBLE	Responsible Person	Activity Completed
Pre-FIFM notifications					
1.		Confirm with person prepared FIFM that OCR have been created	Resource scheduling SDO		Y / N
		Notify Water Quality Scientist of scheduled work date at minimum of 5 working days prior to commencement of work	Resource scheduling SDO		
Pre-FIFM Activities					
2.		Contact SOC & ensure the OCR has been implemented	Network Technician		Y / N
3.		Ring call centre to notify them of the isolation	Network Technician		
FIFM Activities					
4.	Hyd01 & Hyd02 - plan 1	Install stand pipe and flush dirty water before install portable PRV & set PRV to 40m pressure	Network Technician		Y / N
5.	SV01 - Plan 2	Close the SV	Network Technician		Y / N
6.	SV02 - Plan 3	Close the SV	Network Technician		Y / N
7.	DV01 - Plan 4	Ensure DV is closed	Network Technician		Y / N
					Y / N

If **"No"** has been marked for any of the above, stop work and notify Responsible Manager or nominated rep (Water) or FIFM Plan Coordinator (other systems) to identify further activities to complete FIFM and detail these below. If FIFM still can't be completed, notify FIFM Plan Coordinator to cancel work, and recommission assets using Form J.

					Y / N
					Y / N

Method for proving FIFM is successful? Each of the following steps must be personally witnessed by the Responsible Person Implementation as nominated on Form B

8.	Sc01 AV01, or Hyd01 - Plan 2	Use Scour valves, Hydrant or air valves to dewater & confirm isolation	Network Technician		Y / N
					Y / N

Finish time of FIFM:_____

If **"No"** has been marked for any of the above, notify FIFM Plan Coordinator to cancel work, and recommission assets using Form J.
If **"Yes"** handover assets to FIFM Plan Coordinator via signoff on Form K.

FLOW ISOLATION / FLOW MANAGEMENT (FIFM) MONITORING PLAN

FORM I

PAGE _____ **OF** _____

PROJECT TITLE / NAME:

MAXIMO No:

Monitoring Activity	FREQUENCY	GROUP RESPONSIBLE	Actioning Officer	Activity Completed
Monitoring isolation asset(s)				
Ensure no significant flow from scour valve. Any changes observed should notify FIFM plan coordinator/rep to get workers to cease work immediately.	Through out the isolation/ While staff is working within the pit	Network Technician		Y / N
Ensure the air bleed valve is sucking air. Any changes observed should notify FIFM plan coordinator/rep to get workers to cease work immediately.	Through out the isolation	Network Technician		Y / N
HYD01 – Ensure there is no significant flow coming out of the hydrant. Any changes observed should notify FIFM plan co-ordinator/rep to get workers to cease work.	Through out the isolation/ While staff is working within the pit	Network Technician		Y / N
Monitoring system performance				
Please monitor the pressure from WG2512 via SOC or handheld electronic tablet. Ensure pressure stays below 50mH. If required, adjust DV opening ratio to reduce the pressure. (Need to ensure the IICATS gauge mentioned can be polled)	Note pressure every 15 minutes during the shutdown	Network Technician		Y / N
Call Contact Centre and Schedules to check whether any complaints have been received from surrounding area	30 minutes after handover to FIFM coordinator and during peak periods	Network Technician		Y / N

APPENDIX 6 - GUIDELINES FOR MAINTAINING WATER QUALITY PRIOR TO WORKS, DURING PROJECT WORK AND RECOMMISSIONING AFTER WORKS

The following is a guide for activities that are to be adopted to maintain water quality prior to commencement of work, while work is being carried out and recommissioning after works. These checks are to be included in Form C (FIFM HIDRA) and Form J (FIFM Recommissioning Schedule).

1. Specify that field crew are to assess air valve pits and scour outlets / chambers within the shutdown section and remove any potential of sources of contamination (eg pit full of dirty water, mud etc). Also, implement preventive measures to prevent contaminants entering the depressurised main (eg sandbagging around scour outlets).
2. Specify that Service Provider / contractor has included in their project safety plan or equivalent controls to prevent human / material contamination in pipework & ingress of vermin through pipe openings.
3. Where applicable, monitor customer impacts during the project works (eg via Dirty Water Alert Notification system and/or additional operational water quality monitoring).
4. For all watermains 375mm and greater, include a hold point in the recommissioning procedure specifying that water quality testing is to be completed by a Networks Water Quality Scientist or nominated standby person in accordance with WPIMS5174 (eg chlorine, turbidity, odour and taste) prior to returning the recharged main to supplying customers. This may also apply to any watermain less than 375mm that are assessed as having an elevated level of water quality risk such as: submarine or single feed watermains, or areas with a history of issues (see heat map analysis of Dirty Water complaints in Maximo). Based on the past ten years of dirty water complaints in Maximo, the top twelve zones are:
    a. Bringelly Road
    b. Penrith North
    c. Erskine Park El
    d. Erskine Park
    e. Cranebrook El
    f. Emu Plains
    g. Mt Riverview
    h. Catalina
    i. Blackheath
    j. Carnes Hill
    k. Preston
    l. Allawah
5. For reservoirs that have been dewatered and/or relined, include a hold point in the recommissioning procedure confirming that the reservoir was cleaned and disinfected prior to relining.
6. For reservoirs that have been either dewatered or isolated for greater than 48 hours, include a hold point in the recommissioning procedure specifying that water quality testing is to be completed by a Networks Water Quality Scientist or nominated standby person in accordance with WPIMS5261 (eg chlorine, turbidity, odour, taste and/or organics) prior to returning the reservoir to supplying customers.

See Appendix 3 for sample Form C - CUSTOMER – hazards & recommended controls and sample Form J below.

FIFM RECOMMISSIONING SCHEDULE

FORM J

PAGE _____ **OF** _____

PROJECT TITLE / NAME: **MAXIMO No:**

FIFM plan coordinator or nominated representative has signed off on form K that asset is now available for recommissioning ☐ **YES**

Then proceed as per the schedule below.

Schedule of activities to return the system to normal operation

Sequence	Asset No	Activity	GROUP RESPONSIBLE	Actioning Officer	Activity Completed
1.	Sc0, ,AV01, or Hyd01-Plan 2	Flush dirty water & close Scour & air valves if it were opened	Network Technician		Y / N
2.	SV01 - Plan 2	Open the SV	Network Technician		Y / N
3.	SV02 - Plan 3	Open the SV	Network Technician		
4.	DV01 - Plan 4	Leave DV closed	Network Technician		Y / N
5.		Notify SOC that system have been returned to normal operation.	Network Technician		Y / N

☐ **YES** The above activities have been carried out and the flow isolation / flow management re-commissioning was successful as per the plan.

☐ **NO** Flow isolation / flow management recommissioning was not successful for the following reasons:

The flow isolation / flow management re-commissioning was not successful because:		
Asset No	**Problem**	**Action required**