Table 4: Long list of methods identified through benchmarking and literature review

Stage/Method	Brief Description	High-Level Assessment	Considered for Shortlist
Containment			
Inflatable Dams	Rubber structures that can be used as a barrier to prevent water flow. Require inflation.	Effective in limiting the flow of water. However, they are very similar to Watergates, which are currently used by Sydney Water. Additionally, Watergates do not require inflation.	No
Skimmer Vessels	Boats that collect floating debris via conveyor belts or nets. Require ancillary equipment for offloading, disposal, and transportation over land.	Good potential for clean-up of floatable waste. However, they are expensive and not easily portable.	No
Pneumatic Plugs (AU-1)	Pneumatic plugs that can be used to block stormwater pipes to prevent contamination of the stormwater system.	Good potential to limit contamination of stormwater systems. However, deployment may be difficult and there must be no flow in the stormwater pipe when being deployed. Sydney Water has experience with similar plugs but does not currently use them due to safety concerns.	No
Stormwater Mats (AU-3)	Semi-permeable mats that prevent the flow of solids into stormwater systems.	Good potential to limit contamination of stormwater systems.	Yes
Earth Berms (UK-2)	The method of creating earth berms (e.g. using shovels, Bobcats, etc.) to divert and pool sewage overflows.	Well-constructed and positioned earth berms have potential to effectively divert and contain flows. However, their construction can be difficult and time-consuming. Similar results could be achieved with simpler containment methods (e.g. sandbags).	No
Hay Bales/Coir Logs (AU-2, AU-3)	Alternatives to sandbags. Used as a barrier to contain sewage overflows.	Both hay bales and coir logs can effectively be used to contain sewage overflows. However, they are practically very similar to sandbags used by Sydney Water and provide no notable advantage.	No
Silt Curtains	Similar to a containment boom. Silt curtains, however, typically are much deeper. Curtains can extend close to the bottom of the waterbody. Modular units can be connected to form longer lengths. Units are typically 15 – 20 m in length.	Can effectively contain surface flows. Had been used effectively by Sydney Water in the past.	Yes

Stage/Method	Brief Description	High-Level Assessment	Considered for Shortlist
Ponding using Excavators + Tarpaulin (AU-3)	Very similar to earth berms as a containment method, discussed above. Ponds are constructed and lined with tarpaulin to contain sewage overflow.	As with earth berms, ponding may provide effective containment. However, their construction can be difficult and time-consuming. Similar results could be achieved with simpler containment methods (e.g. sandbags).	No
Pipe Wrap at Overflow Point (UK-1)	Containment of sewage overflow by wrapping overflowing damaged pipe at the source of the overflow.	Wrapping while sewage overflow is ongoing would be an unacceptable WHS risk due to contact with sewage.	No
Steel Mesh (NZ)	Steel-mesh cover that prevents the flow of solids into stormwater systems.	Good potential to limit contamination of stormwater systems. However, they are practically very similar to stormwater mats, which are more portable and considered a better option.	No
Stream Drying (NZ, AU-1, AU-2)	Stream drying is the process of completely removing contaminated water from a stream through both pumping and natural processes like evaporation, before refilling the stream with uncontaminated water.	Not recommended by the NZ water utility spoken to during benchmarking. While they may be useful in some circumstances, it is not recommended as a primary method of containment.	No
Pumping			
Nil	There are no new pumping methods identified as part of this study.		
Flushing			
Dechlorination Mats (NZ, AU-3)	Dechlorination mats are flat bags with pockets for dechlorination tablets. These are placed downstream of the potable water stream and upstream of the contaminated waterbody.	Potential to provide improved mixing of sodium ascorbate (or other dechlorination chemicals) and improved dechlorination.	Yes
IBC Dosing (NZ)	Very similar to the drip method used by Sydney Water. The intermediate bulk container (IBC) method involves batching a solution with a high concentration of sodium thiosulphate (or can be alternative dechlorinating agents) and discharging it directly into the stream.	Very similar to the drip method used by Sydney Water. Bulkier than existing drip method.	No
Dechlorination Tablets in Silt Bags (AU-1, AU-2)	Similar to the dechlorination mats. Dechlorination tablets are placed in the semi-permeable silt bags to provide dechlorination.	Very similar to the dechlorination mats, that appear to be more effective.	No
Recycled Water Flushing Truck (UK-2)	A vacuum/flushing truck that recycles contaminated overflow for flushing purposes. While this water is filtered, it is not disinfected.	As the recycled water is not treated / disinfected, it is considered a WHS risk, thus not considered further.	No

Stage/Method	Brief Description	High-Level Assessment	Considered for Shortlist
Aeration			
Surface Aeration			
Venturi System	Pump-as-aerator setup with a Venturi attachment to improve aeration.	Field trials by others have shown Venturi systems can improve DO in hypoxic and anoxic waterways in the Murray-Darling River system. Potential use in response to sewage overflows. Low efficiency but high oxygen transfer.	Yes
Water Fountains	Aeration via pumping and spraying low DO water to allow for air entrainment, providing localised areas of increased DO.	Potential for use in response to sewage overflows. Must be low spray drift to eliminate WHS risk.	Yes
Paddle Wheels	Aeration is provided as the top 20 cm of water is splashed by rotating paddles on a floating pontoon, allowing oxygen to be entrained.	Potential for use in response to sewage overflows. However, more recommended as a preventative measure for stratification-driven hypoxia. More effective alternatives available for response to sewage overflows, such as Venturi and low-spray fountain aerators. Significant splashing poses a WHS risk, thus not considered further.	No
Surface Bubble Aerators	Bubbles are injected into the contaminated water to provide aeration.	Potential for use in response to sewage overflows Have found use in response to hypoxia in the Murray-Darling River system.	Yes
Surface High Speed Aerators	Provide aeration simply through mechanical mixing by disturbing surface waters and allowing for air entrainment.	Potential for use in response to sewage overflows. Commonly used in wastewater treatment for aeration.	Yes
Subsurface Aeration			
Solar Bubble-Plume Diffusers	Designed to prevent stratification and aerate the hypolimnion (lower layer of water) by maintaining a vertical flow pattern which allows water from depths to be oxygenated via exposure to the surface.	More suited as a preventative measure against stratification driven hypoxia. Field trials by others in the Murray-Darling River system showed the solar bubble-plume diffusers did not effectively increase DO in hypoxic waterways, thus not considered further.	No

Stage/Method	Brief Description	High-Level Assessment	Considered for Shortlist
Aeration			
Suburface Aeration			
Nanobubbles (Ultra-Fine)	Ultra-fine bubble aerators produce <1µm bubbles with very large surface area to volume ratios to provide aeration.	Field trials by others showed promise, improving DO in hypoxic waterways. However, this was achieved over days.	Yes
Microbubbles	Microbubble aerators produce 10-100µm bubbles with large surface area to volume ratios.	Very similar to ultra-fine bubble aeration.	Yes
Fine Bubbles	Fine bubble aerators use slits/ pores ≤2mm. The bar aerators used by Sydney Water are in this category.	The bar aerators used by Sydney Water are fine bubble aerators. However, Sydney Water has expressed interest in smaller, easier to use units. Small, portable options available on market. High standard aeration efficiency (SAE) values.	Yes
Mega Aerator	This aerator produces milli-bubbles (less than 1mm but greater than 1µm) and is designed for large bodies of water, as well as smaller polluted bodies of water with low DO levels. Various models exist with oxygen transfer rates ranging from 6.3 to 127 kgO_2/h.	A large milli-bubble aerator that may potentially be able to improve DO in sewage affected waterways. Appears to have recently been discontinued, thus not considered further.	No
Propellers/ Aspirators	Downward-facing propellers work by aspirating air and propelling oxygenated surface waters to oxygenate deeper levels and undo stratification of waterbodies.	Good oxygen transfer rates and mixing. However, downward facing propellers will likely disturb sediments. Not considered further due to risks in shallow waterways.	No
Chemical Aeration			
Calcium Peroxide	A slow-acting (weeks to months) calcium salt that is used in aquaculture to maintain oxygen levels. It works through offsetting sediment oxygen demand, as the salt dissolves and reacts slowly, accumulating on the surface of sediment.	Due to its slow-acting nature and no immediate DO increase to the water phase, it is not considered effective for addressing sewage overflow-driven DO depletion. Also, efficacy, regulatory approvals, cost and safety require further research, thus not considered further.	No
Sodium Percarbonate	A fast-acting (minutes to hours) chemical that produces peroxide, which decomposes to form oxygen.	Has potential to improve DO for emergency aeration. However, potential significant environmental risks are associated with the use of sodium percarbonate, thus not considered further.	No