Appendix 2. Force mains and water mains, CASI methods (Feeney et al. 2009; Koo ja Ariaratnam, 2006; Costello et al. 2007).

Method	Pipe material					Mode of operation during inspection			Other information		
Name	Iron	Concrete / Cement		Plastic	Other	In use No excavation needed	In use Excavation needed	Out of use Excavation needed	Inspected properties	Accuracy	Comments
	DI / S	PCCP	AC	PVC/HDPE							
Acoustic emission testing		X					Crown of the pipe needs to be visible		PCCP's steel wire breakage	High	Sensors need contact to pipe
Acoustic leakage and I/I method	X	X	X	X	X	Can be used via valves			Leakage, I/I, air pockets	High	Valves need to be attached to pipe
	X	X	X	X	X		Crown of the pipe needs to be visible		Only for leakages and I/I	High	Sensors need contact to pipe
Autonomous, flowing sensors	X	X	X	X	X	X			Leakage, I/I, air pockets	Mediocre or high	Valves etc. need to be attached to pipe
Acoustic fiber optics		X				X			PCCP only	High	Permanent mounting
	X	X	X	X	X	X			Leakages and I/I	Unknown	Supposed to be efficient
Acoustic wall thickness measurement	X		(X)				Crown of the pipe needs to be visible		Remaining wall thickness	Piloted	Echologics has a method, which has been piloted
Broadband electromagnetic inspection	X							X	Remaining wall thickness	Low	Inline analyses; pipe must be dug up and emptied
CCTV	X	X	X	X	X			X	Inner wall, visual inspection	Low	Inline analyses; pipe must be dug up and emptied
Low frequency ultra sound inspection	X						X		External assessment on metal loss	Unknown	Crown of the pipe needs to be visible
Magnetic flux inspection	X							X	Wall thickness and deformation	Unknown	Inline analyses; pipe must be dug up and emptied
Remote Field Eddy Current (RFEC)	X					Attached to a "pig"	Attached to a "pig"	Towed with a rope or cable	Wall thickness, corrosion	High	Pipe must be dug up and emptied
Ultra sound inspection	X						X		External assessment on wall thickness	Low	Pipe must be dug up and emptied. Only point-to-point inspection
Ultra sound inspection with robot crawler	X							X	Inner assessment on wall thickness	Piloted	
Sonar	X	X	X	X	X			X	Inner assessment on deformation, fouling, and sediment	Mediocre or high	Pipe must be dug up
Laser scanning	X	X	X	X	X			X	Inner assessment on deformation, 3D modelling, and sediment	High	Pipe must be dug up and emptied
Sewer scanners	X	X	X	X	X			X	Inner assessment on deformation, and sediment	High	Pipe must be dug up and emptied
Ground penetrating radar (GPR)	X	X	X	X	X	X			Soil and structures around the pipe, wall thickness and structural integrity	Low	Above ground
Infra-red analysator	X	X	X	X	X	X			Leakages and I/I	Low	Above ground
Gamma-gamma-inspection	X	X	X	X	X	X			Soil and structures around the pipe	Low	Above ground
Magnetic tomography	X					X			Soil and structures around the pipe	Mediocre	Above ground