Exhibit 4: Acoustic Leakage Detection

Acoustic Leakage Detection is a combination of leakage detection methods applied in the field to identify presence and the location of a leak using sound propagation as the main component.

The word acoustic in this instance refers to the detection of sound vibration that are transmitted along a pipe in the vicinity of the leak. In everyday life we hear water passing through the pipes when a toilet cistern refills, or when water is being drawn for a washing machine. Water escaping from a pipe creates a similar noise, which is transmitted along the pipe material and can be detected a short distance away.

It is possible for trained operators to manually listen to ancillaries (Values, hydrants, air escape points, domestic meters) and detect the presence of leaks.

More often, by attaching digital sensors to the network at various points and analysing the acoustic signals, the presence of a leak can be identifieds. Once a leak is identified further analysis can he used to identify more precisely the location of the leak.

Specialised equipment is able to 'correlate' the sounds to narrow down the location of the leak.

Leak detection often requires the technicians involved to progressively move around the network 'listening' for the sound of the leak.

The speed, distance and accuracy that a leak can be identified varies depending on several factors, including:

1. the size of the leak – typically larger leaks are easier to detect, but leaks forcing their way through an small orifice make more detectable noise than some larger openings.
2. The local water pressure – typically higher pressure water areas will make more noise as water escapes, but conversely can create more 'background noise' that masks the leak.
3. The density of houses in the area – more service connections can create 'artificial noise', as everyday usage can mask the sound of smaller leaks.
4. The pipe size and material - metal pipes transmit noise more easily and further than plastic pipes, and pipelines that change size and materials along their length are more difficult than a pipe of a consistent size and material.
5. The number of ancillaries on the pipe length – The more ancillaries the smaller the area can be segregated to pin point the leak.
6. General network layout – A network with a lot of localised bends, offtakes, size changes and T sections can reduce the chance of locating accurately.
7. Other considerations – Some factors will impact the success of acoustic leakage detection, such as time of day, operation of pumps or other equipment, even heavy traffic that can transmit vibration sounds to the pipe masking to some degree the ability of equipment to detect leaks.

The two most influential factors surrounding leakage detection accuracy is pipe material and proximity. If the pipe material is of a consistent linear type and the crew undertaking the detection service can get close, there is a greater chance of detection.