



Leakage Investigation Survey

30 March 2016

Client

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| Trans Britannia Properties, M90 Commerce Park, Lathalmond, Fife KY12 0SJ |
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Mains water meter information

| | | | | | | | | | | |
|---------------|---|--|-------|--|--------|---------------------|---------|--|-------------|--|
| Size (mm) | 15-28 | | 32-50 | | 75-100 | ✓ | 125-200 | | Above 200mm | |
| Serial number | 01W007697 (this is a sub-meter) | | | | | | | | | |
| Readings (1) | 151818.020 | | | | Time: | 10:18 30 March 2016 | | | | |
| Readings (2) | 151903.150 | | | | Time: | 14:00 30 March 2016 | | | | |
| Location | Meter located in large sized chamber set back in grassed area on left when approaching Scottish Vintage Bus Museum. Easily accessed by lifting up the small integral hatch. | | | | | | | | | |

Leakage Activities

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|-------------------|---------------|-------------|---|-------------------|--|--------------------------|-------|
| Acoustic sounding | ✓ | Correlation | ✓ | Ground microphone | | Environmental Inspection | ✓ |
| Other | | | | | | | |
| Pipe traced | n/a | CAT & Genny | | | | Distance | |
| Pipe correlated | Accelerometer | | ✓ | Hydrophones | | Distance | 1600m |

Background Survey Information

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| <p>Water consumption through the meter supplying M90 Commerce Park is significantly higher than it should be, suggesting leakage or other unidentified water consumption on the network around the park.</p> <p>Previous survey work confirmed a leak in the road opposite building 20, which was repaired in spring 2015.</p> <p>The site was originally a Ministry of Defence logistics centre for the base at Rosyth.</p> |
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Summary of Survey

Pipework & Metering

The water meter supplying Commerce Park is a sub-meter installed near the boundary of the Scottish Vintage Bus Museum. The sub-meter is subtracted from the main meter to give a net consumption and water bill for the SVBM.

Visible pipework around the areas of the park includes MDPE (Medium Density PolyEthylene or more commonly known as blue poly), black poly, copper and galvanised iron. The main network (previously a ring main but this was severed at the boundary on the return leg when the site was split with the Bus Museum) is constructed of 4" cast iron – calipered in a valve chamber at 126mm OD (Outside Diameter).

Main isolation line valves are very limited in number and are unlikely to have been operated for several decades. The newest isolation valve is located just upstream of the meter in the adjacent chamber.



Meter location in grassed area



Meter



Meter reading



4" cast iron in chamber near gate house

Leakage Survey Activities

All fire hydrants, air valves, isolation valves and rising mains were acoustically sounded for leak noise.

Using the original water construction drawing as a guide, all fittings on the ring main (mainly fire hydrants) were identified around the perimeter of the site and a correlation survey carried out.

Two areas of leakage were found whilst carrying out the survey on the park.

The two areas of leakage are:

1. Regency – plot 17 – Large leak
2. Regency – plot 19 – indications of a reasonable leak but this could be as a result of noise transferring from leak at plot 17
3. Windsor – plot 101 – reasonable leak

Detailed acoustic sounding and leak noise correlation was then carried out to pinpoint the exact area of leakage in all locations. All areas of suspected leakage were marked with blue spray paint.



Leak 1 location



Leak 1 – visible water running. Blue mark on wall



Leak 2 location between gate house and building 2



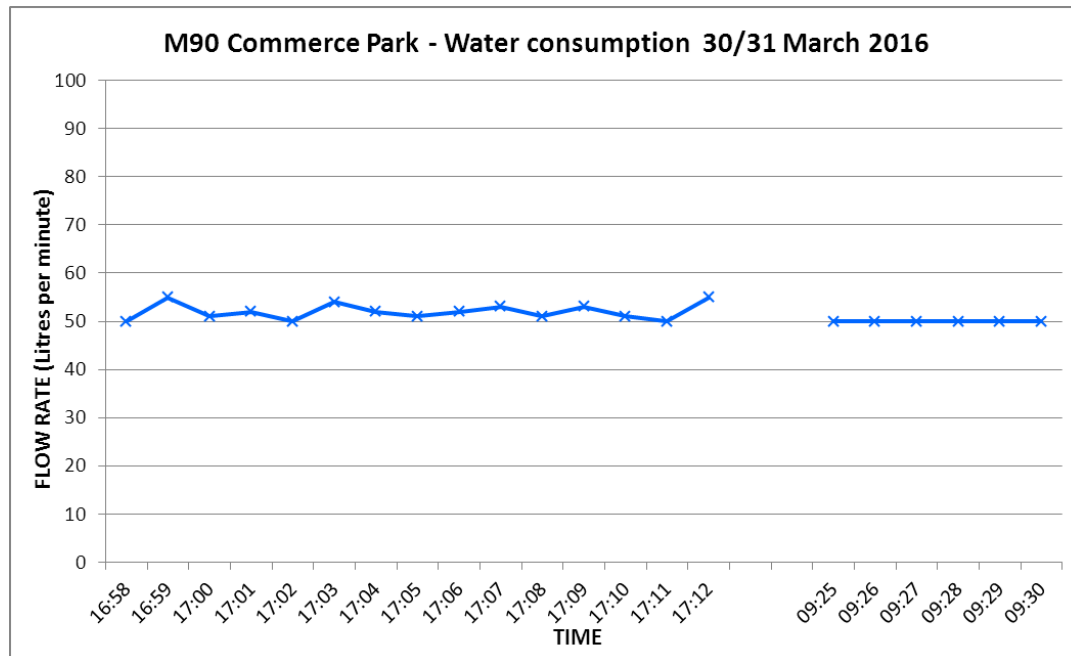
Leak 2



Repair information - calipered outside diameter of main 126mm

The water meter was read several times throughout the survey and found to be recording a minimum flow rate of **50 litres per minute** at all times. This equates to an excess daily consumption of **72 cubic metres per day**. The flow rate to the site overnight was calculated from meter readings at an average 52 litres per minute. An overnight flow of 52 litres per

minute equates 3.12m³ per hour (3,120 litres per hour) unaccounted water usage. This equates to an excess cost per day to site of £59.90 and over the course of one year, an excess cost of £21,864.96.



Summary & Recommendations

Summary:

1. All water connections and underground fittings (valves and fire hydrants) were acoustically sounded for leak noise and checked for visible leaks;
2. A full correlation survey was carried out along the route of the 4" water network;
3. Two below ground leaks were pinpointed:
 - a) Significant leak on 4" cast iron main in field running parallel to B915;
 - b) Leak on small diameter pipework between buildings 1 (gatehouse) and 2;

Recommendations:

1. Excavate, locate and repair all leaks with appropriate fittings;
2. Following the leak repairs, read meter and check flow rate to assess volume of any remaining leakage. Alternatively, consider installing a data logger on the meter due to the previous burst history of the site.

Survey carried out by

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| Engineer | H2O Building Services | Date | 30 & 31 March 2016 |
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