RESEARCH REPORT

THE IMPACT OF INCORRECTLY SIZED BULK WATER METERS ON WATER CONSUMPTION AND MUNICIPAL REVENUE

A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

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DECLARATION

I hereby declare that this Research Report is my own unaided work. It is being submitted for the Degree of Master of Science in Engineering at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

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ABSTRACT

South Africa is a water-scarce country, characterised by lower-than-average rainfall and high water consumption rates, with Non-Revenue Water increasing despite water conservation efforts. Literature shows that bulk water meters are often incorrectly sized, increasing Apparent Losses from metering inaccuracies, resulting in revenue loss and negating the municipality's water conservation and water demand management initiatives.

This study investigates the impact of incorrectly sized bulk water meters (sized 40mm – 150mm installed at non-residential and multi-residential facilities) on municipal revenue by analysing flow logging data and metered consumption characteristics of 42 users. The methodology combines flow logging to analyse actual water consumption characteristics, assessment of meter operating flow ranges for optimal sizing, calculation of weighted accuracy for Apparent Loss estimation, and literature review on meter sizing and alternatives to consider regarding fire demand requirements.

Highlights from this study are (a) the consumer profiling findings underscore the importance of aligning meter size with consumer water use patterns: consumption below the meter's starting flow is observed at 50% of the stands analysed in the dataset, indicating over-sized meters; (b) 57% of the stands had on-site leakage, occurring at low flow rates where meters are most inaccurate; (c) two examples demonstrate the impact of incorporating fire demand, resulting in meter size changes from a 15mm to 100mm, and a 25mm to 150mm, respectively; (d) resizing meters for 35 stands is estimated to result in an additional municipal revenue gain of R636,876.92 within one year. Overall, the study highlights the importance of accurate meter sizing for reducing Non-Revenue Water, improving revenue generation, and enhancing water conservation efforts.

Keywords: Bulk Meter sizing and inaccuracies, Apparent Losses, Municipal Revenue

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ACRONYMS

AADD	Average Annual Daily Demand
AL	Apparent Losses
CGIS	Corporate Geo-Informatics
CoJ	City of Johannesburg Metropolitan Municipality
CSIR	Council for Scientific and Industrial Research
DHS	Department of Human Settlements
DMA	District Metered Area
FAR	Floor Area Ratio
hrs	Hours
ID	Identifier
IWA	International Water Association
JW	Johannesburg Water (SoC) Ltd, a water utility wholly owned by CoJ
kL	Kilolitres
L	Litres
m	Metre

m^2	Square metre
m^3	Cubic metre
min	Minute
mm	Millimetre
MNF	Minimum Night Flow
NRW	Non-Revenue Water
OIML	International Organization of Legal Metrology
PHD	Peak Hour Demand
Q	Flow Rate in m^3/hr or kL/hr
Q_{start}	Starting Flow
Q_1 or Q_{min}	Minimum Flow
Q_2 or Q_t	Transitional Flow
Q_3 or Q_n	Permanent/Continuous Flow
Q_4 or Q_{max}	Maximum Peak/Overload Flow
R^2	Coefficient of Determination
ROI	Return on Investment
RUL	Remaining Useful Life

SANS	South African National Standard
SIV	System Input Volume
S/N	Serial Number
UFR	Unmeasured-Flow Reducer
WC/WDM	Water Conservation and Water Demand Management
WDS	Water Distribution System
WRI	Water Resources Institute
WRC	Water Research Commission
WRF	Water Research Foundation
WRG	Water Resources Group

TERMS AND DEFINITIONS

The terminology used in this study are defined as follows:

IWA water balance: A standardised framework used to account for how treated water entering a system is distributed, thereby providing an evaluation of the performance of a water distribution system.

Apparent losses: The loss of water due to unauthorised consumption, metering inaccuracies, and data handling errors. The water is consumed by the end-user but is not paid for due to the above-mentioned issues. Therefore, it forms part of Non-Revenue Water.

Inferential water meter: A type of mechanical meter that does not measure the volume of water passing through the meter directly but infers the volumetric flow rate from the velocity of the water. These include Woltmann (turbine) type meters, which apply to this study.

Combination (Compound) water meter: A type of mechanical water meter that consists of two water meters of different diameters — a main meter and a by-pass meter, which, combined, measure a specified wide range of flow. Typically, the main meter is a bulk meter, and the by-pass meter is a domestic meter. So, for example, a combination water meter could be 50mm/20mm in size. This type of meter is applicable to this study.

Water meter class: Based on a water meter's measurement accuracy, it is assigned a metrological class. Defined by SANS 1529, these range from A to D, with A being the least accurate and D the most accurate. The meter classes indicate how effectively the meter can accurately measure at lower flow rates, i.e., a Class D meter measures lower flow rates more accurately than a Class C meter and so forth. Class A meters may not be used for trade purposes. The OIML R49 standard defines water meters differently and specifies two meter classes – class 1 and class 2.

Meter accuracy envelope: Meter specifications define an accuracy band within which the meter's accuracy curve is expected to reside at the various specified flow ranges. It graphically represents the meter's performance across the flow ranges.

Error limits: The maximum permissible deviation of the metered flow rate from the actual flow rate passing through the meter. The permissible error limits vary between the different meter classes and are often seen on the meter accuracy envelopes indicating, for example, the 5% and 2% error limits for new meters, and 8% and 3.5% for used (in-use) meters.

Flow rate (Q): The rate of consumption (volume) passing through the meter, measured in m^3/hr or kL/hr. Meters are designed to operate over a range of flow rates which are specified in the meter's datasheet supplied by the meter's manufacturer. The flow rate ranges indicated are starting (Q_{start}), minimum (Q_1 or Q_{min}), transitional (Q_2 or Q_t), permanent (Q_3 or Q_n), and maximum (Q_4 or Q_{max}). A water meter is designed to operate at Q_3/Q_n and should never exceed Q_4/Q_{max} over a sustained period of time, as the meter will sustain permanent damage.

Weighted accuracy: A calculated measure of a water meter's performance across different flow ranges, taking into account the specific error limits for these ranges and the respective flow distribution, i.e., each flow range's error limit is multiplied by the proportion of the flow distribution within that range. The sum of these weighted errors across all ranges gives an overall measure of the meter's performance.

Water meter error: The discrepancy, expressed as a percentage, between the meter's recorded volume and the true amount of water flowing at a specific flow rate. Inexact measurements can result from various factors, including improper meter size, meter age, improper installation, and wear and tear due to usage.

Consumption profile: The relationship between the time period of day and the water consumption flow rate. This is usually obtained through flow logging.

Pulse-based flow logging: A method used to measure and record the flow through a mechanical water meter by attaching a pulse sensor to the meter, which translates the physical rotation of the turbine/impeller into quantifiable data points. It is important to discern if the pulse values are from a set resolution i.e., a pulse could be generated at regular intervals (e.g., every 15 minutes), or a pulse could be generated when there is a specified consumption (e.g., 1 litre) through the meter. The latter provides a more accurate representation of actual water consumption and is the method used for this study.

Minimum Night Flow (MNF): A parameter used for indicating leaks and other losses in a distribution system by identifying the minimum flow rate that occurs during a specific period of low water demand, usually during the late night or early morning hours. In this study, the night period is defined between 23:00 – 04:00. This study will apply this concept to individual metered connections and not to a district metered area (DMA) within the network.

Rising block tariff: A structure for water billing that uses progressive pricing i.e., the cost per unit of water increases with higher consumption. Municipalities employ this strategy to promote water conservation, ensure fair pricing, and generate revenue for water services and infrastructure improvements.

CHAPTER 1

1 INTRODUCTION

Water is central to human existence and livelihood, but sadly, based on new data from the World Resources Institute's (WRI) Aqueduct Water Risk Atlas (2023), at least 50% of the world's population live under highly water-stressed conditions for at least one month per year. With the drastic increase of negative climate change impacts coupled with population growth and expansion of industrial activities, the importance of water governance and policies becomes increasingly critical with time. **Figure 1-1** displays a comprehensive world map that assesses the level of water risk. The map shows a range of risk indicators from physical quantity (too much or too little water) to quality (water that is unfit for use) to regulatory and reputational indicators (potential changes in regulations and public disputes related to water issues). Higher values indicate higher water risk.

South Africa is a water-scarce country because the mean annual precipitation is roughly 40% less than the annual world average rainfall (DWS, 2015). Africa was ranked 22nd in the 2019 national water stress rankings, with a baseline water stress of "***Extremely High (>80%)***" (World Resources Institute, 2023). As a result, South Africa experiences recurring droughts and municipal water shortages. Although the terms "water-scarce" and "water-stress" are often used to describe South Africa's water situation, it was estimated in a 2012 Water Research Commission (WRC) study (Institute for Security Studies, 2018) that the country uses 235 litres/capita/day more water than the global average of 175 litres/capita/day.

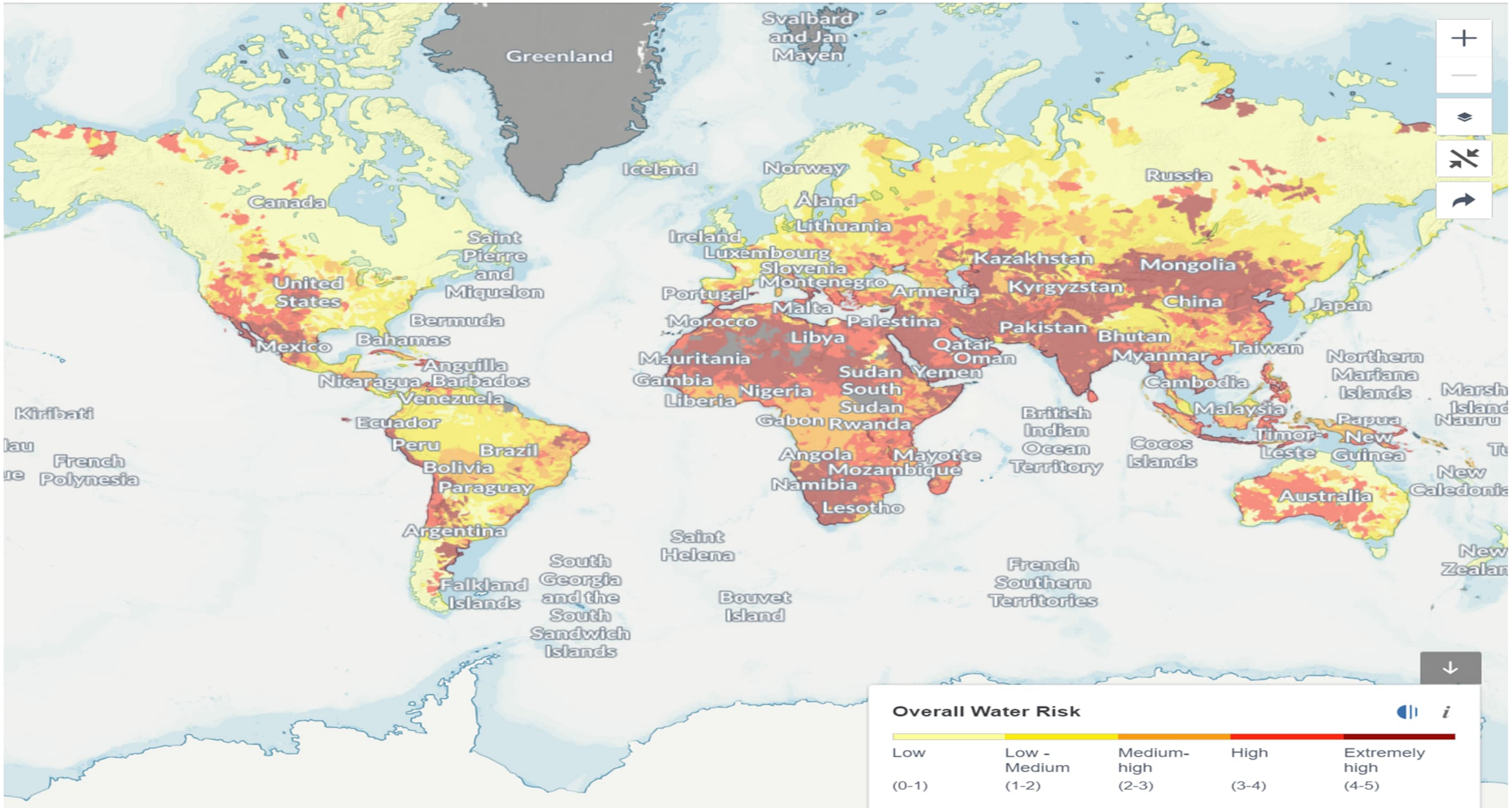

Figure 1-1: Global overall water risk (World Resources Institute, 2023)

One of the main factors contributing to the high consumption is the high level of Non-Revenue Water (NRW) in South Africa. A 2019 article by the 2030 Water Resources Group (2030 WRG) — hosted by the World Bank Group — indicated that approximately 41% of the water provided by Municipalities fails to generate revenue. Although the exact quantities vary among different service providers, it is estimated that municipal systems experience physical losses of about 35%, significantly higher than the global best practice standard of approximately 15% (Raletjena, et al., 2019). The revised National Water Resources Strategy of South Africa (DWS, 2022) was recently (26 July 2022) published for comment, and one of the key areas for improvement is NRW. The WRC has supported several projects in this respect, and based on WRC technical reports published over the last two decades (e.g. WRC reports T300/07 (Seago & McKenzie, 2007), TT522/12 (McKenzie, et al., 2012) , TT595/14 (McKenzie, 2014)) and Department of Water and Sanitation (DWS) technical reports (e.g. WP11084 (DWS, 2017), the national water balance shows an increase in water losses and NRW despite efforts to implement Water Conservation and Water Demand Management (WC/WDM) initiatives (DWS, 2022).

Recurring revenue generated from water metering is of vital importance to Municipalities. Many studies have been conducted on meter inaccuracies (e.g., (Ferrante, et al., 2023; Moahloli, et al., 2019; Couvelis & van Zyl, 2012; Criminisi, et al., 2009; Arregui, et al., 2005), with many relating the loss in meter accuracy to meter age (chronological or volumetric) and the effects thereof. Non-residential and multi-residential consumers often have bulk water meters installed (sized 40mm – 150mm in diameter) instead of typical domestic-sized meters (15mm or 25mm). Unfortunately, bulk water meters are often incorrectly sized, consequently causing metering inaccuracies, resulting in both revenue loss and negating the Municipality's water conservation and water demand management initiatives. The IWA provides an approach that is applied worldwide for determining and analysing water losses in water distribution systems (Lambert & Hirner, 2000). This standard water balance is shown in **Figure 1-2**. One of the components of NRW is

Apparent Losses (AL), which encompass water meter inaccuracies that can be attributed to various factors such as meter age, incorrect installation, meter class, meter type, and meter sizing. It is therefore anticipated that reducing bulk water meter inaccuracies will result in an increase in revenue generation.

In terms of the Water Services Act (Act 108 of 1997), one of the primary mandates of Water Boards in South Africa is to provide Municipalities with bulk potable water services, for which the Municipalities are charged and expected to pay. The bulk water purchased is referred to as System Input Volume (SIV) in water balance calculations. The recurring revenue generated from monitoring water meter consumption is one of the main revenue streams for Municipalities. Inadequate revenue collection from the end-users, therefore, affects a Municipality's cash flow and, as a result, impacts service delivery and customer confidence. In the South African context, a modified IWA water balance can be found, which includes free basic water that is subsidised by the Government and represented as revenue water (Seago & McKenzie, 2007).

<table>
<tr><td rowspan="9">System Input Volume</td><td rowspan="4">Authorized Consumption</td><td rowspan="2">Billed Authorized Consumption</td><td>Billed Metered Consumption</td><td rowspan="2">Revenue Water</td></tr>
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Figure 1-2: Standard IWA water balance

1.1 Consumer Water Metering

The South African National Standard (SANS) 1529 suite of standards, which is referenced within South Africa's Legal Metrology Act (Republic of South Africa, 2014), defines the characteristics and requirements for all metering devices used for trade purposes: Parts 1, 3, 4 and 9 are of specific relevance.

Water meters may be classified based on the technology used to quantify flow or volume, i.e., mechanical, electromagnetic, and ultrasonic. The first difference is that mechanical water meters have moving parts while electromagnetic and ultrasonic meters do not have moving parts. Secondly, mechanical meters do not require an electric power input, whereas both electromagnetic and ultrasonic meters do; this can either be wired or battery-powered. While electromagnetic and ultrasonic meters have some advantages which set them apart from mechanical meters, they are more expensive. Mechanical meters, which comprise a significant percentage of meters used in municipal water distribution systems, can be classified into volumetric, inferential, and combination meters. The above water meter classifications are illustrated in **Figure 1-3** (Van Zyl, 2011).

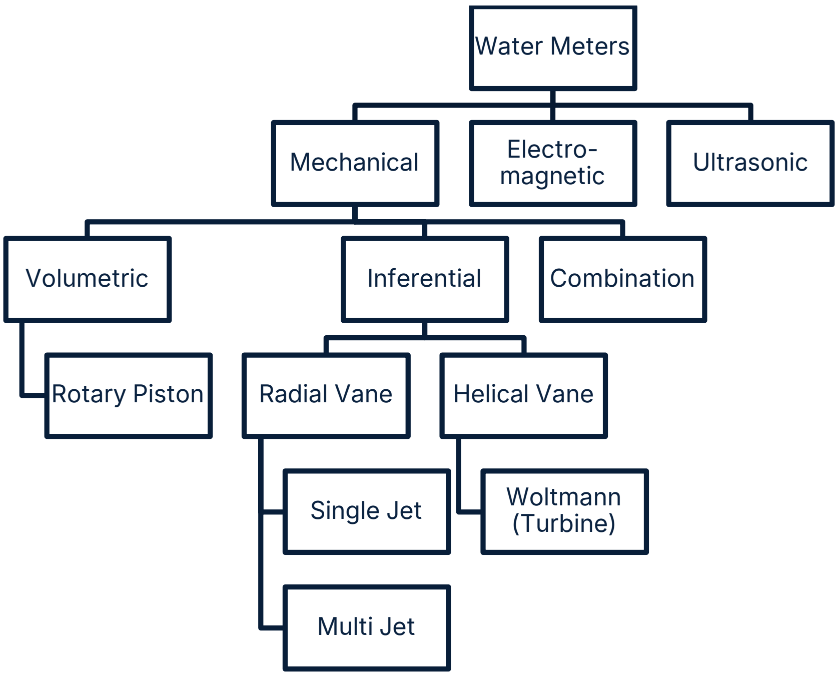

Figure 1-3: Classification of most commonly used water meters (Van Zyl, 2011)

The selection of the appropriate type and size of water meter is crucial for ensuring accurate water usage measurement, cost-efficiency, compatibility with the installation environment, and compliance with regulations. This decision impacts the long-term effectiveness and efficiency of municipal water management systems. Different types of water meters have varying levels of accuracy and are suitable for different flow rates (Van Zyl, 2011). Mechanical meters, for instance, are often less accurate at low flow rates compared to electromagnetic and ultrasonic meters. Meter specifications typically include an accuracy envelope, which defines a band within which the meter's accuracy curve is expected to reside at the various specified flow ranges. This is sometimes also referred to as an error curve. Typical accuracy curves for a new mechanical meter, electromagnetic meter, and ultrasonic meter are illustrated in **Figure 1-4**, **Figure 1-5** and **Figure 1-6** respectively. It is important to recognise that the meter's accuracy is not uniform across all flow rates.

Based on a water meter's measurement accuracy, it is assigned a metrological class. These range from A to D, with A being the least accurate and D the most accurate. The classes differ based on the allowed differences in flow rates, i.e., the acceptable variation for the transitional and minimum flow rates (lower zone) in relation to the permanent flow rate (upper zone). The error in accuracy for new mechanical meters ranges from 5% to 2%, whereas errors for electromagnetic and ultrasonic meters range between 0.5% to 0.1% and 1% to 0.25% respectively (Van Zyl, 2011), making the latter two types significantly more accurate than a mechanical meter. It should further be noted that these ranges differ between new and used meters. The error in accuracy increases for used (in-use) mechanical meters and ranges from 8% to 3.5%.

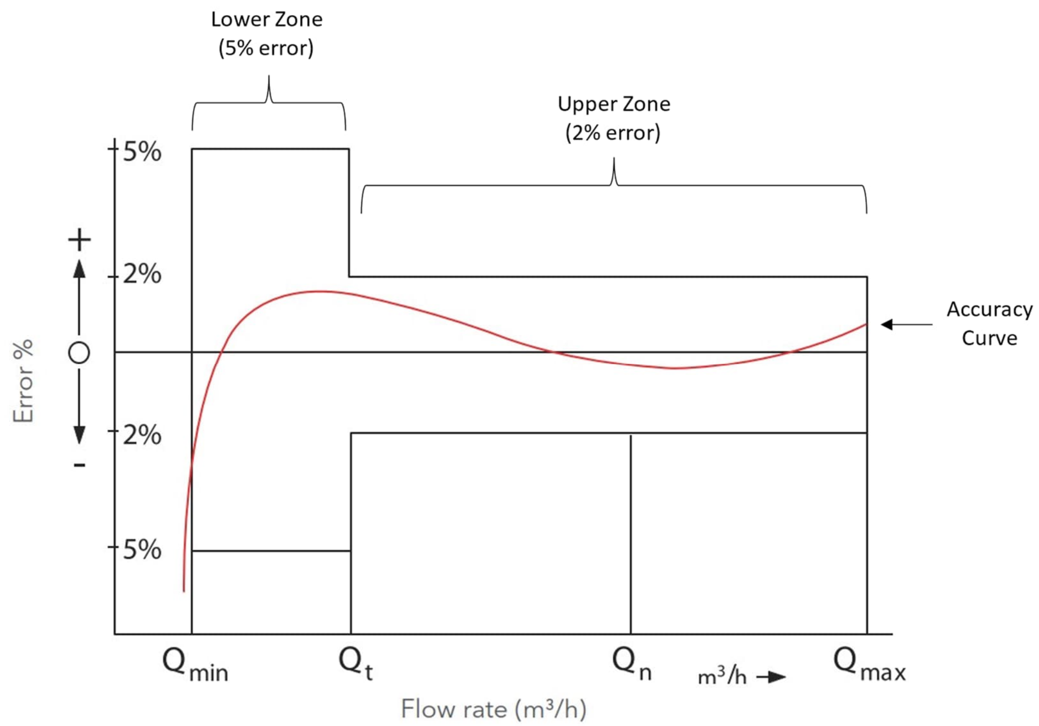

Figure 1-4: Typical accuracy curve and error limits for a mechanical water meter (Sensus, 2020)

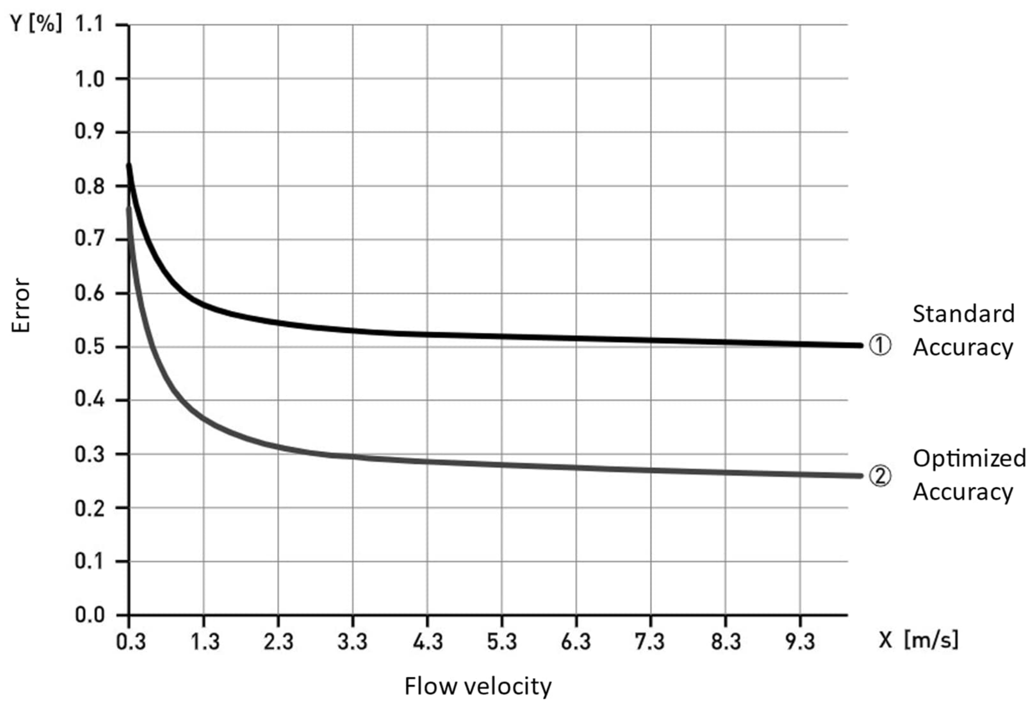

Figure 1-5: Typical accuracy curve and error limits for an electromagnetic meter (Krohne, 2021)

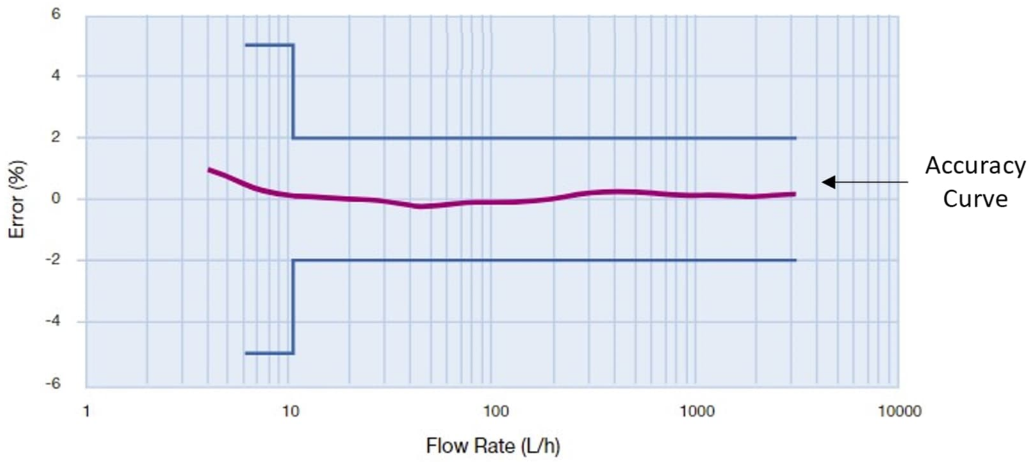

Figure 1-6: Typical accuracy curve and error limits for an ultrasonic meter (Itron, 2021)

1.2 Legislation and Standards

Because water meters measure water consumption and consumers are billed based on this measurement, metering is subject to strict legislation. In South Africa, various legislation and standards affect consumer water metering, and these include the following:

- **National Water Act (Act No. 36 of 1998):** This Act provides the legal framework for the management of South Africa's water resources, including the allocation of water licenses and the regulation of water use.
- **Water Services Act (Act No. 108 of 1997):** This Act legislates the provision of water services, including the supply of water to consumers. It also sets out the responsibilities of Water Services Authorities (WSA), which are responsible for providing water services.
- **Local Municipality: Municipal Systems Act (Act No. 32 of 2000):** This Act provides the legal framework for the functioning of Municipalities, including their responsibilities and duties

concerning the provision of basic services such as water and sanitation to consumers.

- **Trade Metrology Act (Act No. 77 of 1973):** This Act provides the legal framework that regulates the accuracy of measurements in trade and commerce, including the metering of water supplied to consumers.
- **South African National Standard (SANS) 1529:** This Standard specifies the requirements for the design, manufacture, installation, and testing of water meters for residential, commercial, and industrial applications. Parts 1, 3, 4 and 9 are of specific relevance.
- **Municipal by-laws:** Municipalities in South Africa may have their own by-laws relating to the installation and use of water meters. These by-laws may include requirements for the type of water meter to be installed, the frequency of meter readings, and the responsibilities of property owners for maintaining their meters.
- **Consumer Protection Act (Act No. 68 of 2008):** This Act provides for the protection of consumers' rights, including their right to receive accurate information about the goods and services they purchase, as well as their right to fair and honest dealing.

Overall, these legislation and standards aim to ensure that consumers in South Africa receive reliable and accurate water metering services and are protected from unfair practices.

1.3 Justification for Research

1.3.1 Problem Statement

Non-residential and multi-residential water consumers often have larger-sized meters (bulk meters) due to their higher anticipated water demand for day-to-day water requirements and the additional necessity to comply with relevant fire demand requirements (Ncube, 2019).

As a result, single bulk meters are often incorrectly sized, resulting in metering inaccuracies. Many of these bulk meters are sized for fire flow requirements (i.e., to cater for fire events) that have a very low probability of occurring (Ncube, 2019). However, the risk of a fire is minimised due to constant checking of compliance with health and safety regulations; the South African National Building Regulations, specifically SANS 10400: Part T (Fire Protection), provide detailed requirements for fire protection with a focus on minimising the risk of fire. The incorporation of fire flow when sizing a bulk meter is done at the cost of accurately measuring daily consumption for the duration of the meter's useful life. Furthermore, typically, when existing bulk meters are replaced due to routine maintenance or faults resulting in leaks, they are replaced size-for-size, or old combination meters are replaced with a single bulk meter matching the size of the old (bulk) meter. Usually, little consideration is given to whether the new meter's performance is suitable to accurately measure the consumer's daily consumption. This is an important oversight considering that due to more efficient water use technologies (e.g., low flush toilets and shower heads) and lifestyle changes, consumption patterns and quantities continue to change in favour of less quantities. Therefore, if lower flows are observed, AL may increase due to metering inaccuracies, which result in revenue loss for the Municipality.

1.3.2 Research Questions

This research is envisioned to address the following questions for a sample of bulk water meters within the City of Johannesburg:

- What percentage of consumption has a flow rate below the meter's starting flow rate?
- What is the extent of meter under-registration of on-site leakages?

- Based on actual consumption, what would be the optimal bulk meter size?
- What would be the alternatives to consider when fire demand requirements need to be incorporated in water consumption estimates during the sizing of bulk meters?

1.3.3 Research Objectives

The study investigates the impact of incorrectly sized water meters of multi-residential and business users on municipal revenue. The focus will be on bulk-sized water meters, i.e., meters ranging in diameter from 40mm to 150mm.

The objectives of this research are, therefore, as follows:

1. Use logged data from a verified and validated dataset of installed bulk meters to generate consumption profiles and determine on-site leakage for some multi-residential and business consumers of potable water.
2. To size the installed bulk multi-residential and business meters in the dataset using reliable estimates of demands.
3. To size the installed bulk multi-residential and business meters in the dataset for fire demand.
4. To determine the impact of the incorrectly sized bulk multi-residential and business meters on water consumption and municipal revenue.

1.3.4 Hypothesis

The hypothesis on which the aim is anchored is that a significant percentage of bulk water meters (sized 40mm to 150mm) are over-sized due to the requirement to incorporate peak demand and fire flow, and this results in under-registration of flows and, consequently, significant loss of revenue to the utility/Municipality. Because these meters still register some consumption, they are not flagged on the billing system and are assumed to be in good working condition.

1.3.5 Research Exclusions

The following list provides an overview of the exclusions in this study i.e., what is not part of this research study:

- Domestic-sized water meters, i.e., 15-25mm meters, and bulk-sized water meters larger than 150mm do not form part of the installed and logged bulk meters dataset
- Class A water meters
- Electromagnetic flow (EMF) and Ultrasonic water meters
- Logging and analysis of pressures at nodes
- Analysis of consumer historic consumption or billing data
- Consideration of on-site activities influencing consumption patterns
- Comparing different meter manufacturer datasheets and characteristics, even though the bulk meters that were logged range across various makes, models, and sizes.

1.3.6 Ethical Considerations

The data used in this research study is a subset of unanalysed data from Ncube's (2019) Ph.D. research for which an "Access to information for purposes of use in research" agreement was signed between Johannesburg Water (SoC) Ltd (JW) and the University of the Witwatersrand, Johannesburg, in 2017. This data was approved for use in research and, therefore, did not require a separate request for permission for use as the data was used within the context of the original agreement.

In addition to the above-mentioned, the following is noted:

- An ethical waiver was obtained (see Appendix B)

- No survey or questionnaire was undertaken
- Data used contains no personal/confidential information

1.3.7 Measuring Accuracy and Meter Functionality

There are different water meter types, but mechanical meters are predominantly used within reticulation networks (Ncube, 2019; Van Zyl, 2011), being cost-effective and easy to install and maintain. Static meters — i.e., electromagnetic and ultrasonic meters — are only installed in select cases, for example, on very large diameter pipes or where exceptionally high accuracy is required. Mechanical meters include Volumetric, Inferential, and Combination meters, each with its benefits and drawbacks. Although this research study only considers mechanical meters, it is valuable to understand the functionality of static meters in contrast to mechanical meters.

Water meters exhibit varying levels of accuracy across their measuring range for different flow rates, as illustrated by the error curves in **Figure 1-4, Figure 1-5**, and **Figure 1-6**. As a result, specific flow rates define the meter's measuring range and corresponding accuracy. These flow rates are referred to as follows: the starting flow rate (Q_{start}), the minimum flow rate (Q_1 or Q_{min}), the transitional flow rate (Q_2 or Q_t), the permanent/continuous flow rate (Q_3 or Q_n), and the overload flow rate (Q_4 or Q_{max}); the actual flow rates for each of these are typically found on the meter manufacturer's specification sheets.

The starting flow rate is the lowest rate at which a water meter is designed to start accurately registering flow within the error limits defined by the manufacturer. If the flow rate falls below this specified value (i.e., less than (<) Q_{start}) the meter may not detect the flow and, hence, will not record it, or the flow may be recorded but with significantly reduced accuracy. In terms of low flow ranges, the static meters far outperform the mechanical meters due to the latter's inherent start-up friction (Arregui, et al., 2020). Mechanical meters, which operate with pistons, discs or turbine rotors, require a certain amount of force to activate these parts. At low flows, a portion of this force is expended in overcoming the friction of tightly engineered parts.

Consequently, there might be a delay in the meter's response to sudden water flow, especially in turbine, multi-jet, or propeller meters, where some water may flow through without being measured. Over time, as mechanical meters undergo wear and tear, water can bypass the worn components. This wear results in some water not being recorded, which explains why ageing mechanical meters typically under-record.

The permanent flow rate, also often termed continuous or nominal flow rate, represents the meter's intended design flow rate at which it can accurately measure consumption. For mechanical meters, this flow rate also implies "without experiencing significant deterioration" as would be expected when the meter operates within the overload flow rate range, in which case, the meter sustains permanent damage in a somewhat short period of time.

Every water meter is optimized for accuracy within a certain range of flow, influenced by the mechanism and its associated characteristics. Van Zyl (2011) offers a concise overview of water meter types, along with insights on their practical applications and installation considerations. Mechanical meters, across the various types, are each specialized for different flow ranges. Displacement meters, for instance, are most effective at low to medium flows, while turbine meters excel at higher flows. Compound meters merge two measuring chambers to handle a broader range of flows, though this integration results in a slight reduction in accuracy at the transition point. In contrast, static meters are consistent over all flow ranges in the range the meter size covers. The selection of a water meter for a required duty is complex, and careful consideration should be given to the meter type that would best fit the purpose. Mechanical meters function very differently from electromagnetic and ultrasonic meters.

With specific reference to mechanical meters, if water meters are larger than necessary, they will primarily function at flow rates below the transitional level, causing them to under-register a significant portion of the water passing through compared to correctly sized meters. Conversely, if meters are smaller than needed, they will primarily operate above the meter's permanent flow rate and may even exceed the overload flow rate. Initially, over-sizing might result in better accuracy, but it will lead to faster wear and tear over time (Arregui, et al., 2005). Under-sizing of bulk meters is not as common as oversizing, as was seen in the various studies highlighted earlier (Ncube, 2019; Couvelis & van Zyl, 2012; Van Zyl, 2011; Wilson, 2003). Therefore, if a meter is oversized, it will have a notable measuring error from day one of installation that will only increase over the duration of the meter's remaining useful life (RUL). Moreover, meter accuracy declines faster at low flow rates as the meter ages (Davis, 2005; Arregui, et al., 2003), which further exacerbates the meter reading inaccuracy. As such, it is no surprise that one of the main factors affecting a water meter's ability to register consumption accurately is the consumer's daily consumption pattern. The more closely a water meter is matched to a consumer's usage pattern, the more water will be correctly accounted for and billed.

1.4 Document Outline

The document consists of the following five chapters:

Chapter 1 is an introductory chapter that establishes the context of the research topic and provides background into water supply and consumer water metering. It further discusses the justification for the research, together with the objectives and scope of the study.

Chapter 2 is a detailed literature review relevant to the research topic, considering both local and international literature. This review commences with an examination of Apparent Losses, followed by a discussion on water meter selection, emphasizing accuracy and meter functionality. Additionally, it explores methodologies for water demand estimation, delves into on-site leakage issues, and addresses the consequences of under-registration. The chapter concludes by discussing considerations related to water demand for firefighting purposes.

Chapter 3 outlines the systematic approach used in the research. It presents a comprehensive account of the methods and templates developed and employed throughout the research process to generate, analyse, and evaluate the logging data.

Chapter 4 provides an analysis of the data and the results obtained. It includes consumption profiles, on-site leakage identification, and meter sizing and considers meter reading accuracy.

Chapter 5 summarises the research findings and offers answers to the research questions. It also provides recommendations for future research.

CHAPTER 2

2 LITERATURE REVIEW

Chapter 1 provided a brief background on consumer water metering in South Africa and the applicable legislation and standards. It further offered the terms and definitions required to ensure the readability of this research document.

To fully comprehend the implications of improperly sized water meters on recording water usage and how this can impact a Municipality's revenue, it is crucial to have a clear understanding of the principles of water metering and its relationship with Apparent Losses.

This chapter provides insights from literature on Apparent Losses caused by metering inaccuracies, meter sizing, on-site leakage, and how fire demand requirements can affect meter sizing.

2.1 Apparent Losses

As previously shown in **Figure 1-2**, Apparent Losses consist of two main components: unauthorized consumption and meter inaccuracies and data handling errors; hence water meter under-registration (being a meter inaccuracy) falls under Apparent Losses.

A significant body of research has been undertaken on Apparent Losses in terms of metering inaccuracies, but most studies have focused on domestic-sized meters (Ncube & Taigbenu, 2019; Moahloli, et al., 2019; Arrequi, et al., 2018; du Plessis & Hoffman, 2015). However, it is noted by many that a greater focus should be placed on bulk-sized meters due to the anticipated higher volumes of consumption. Even if a meter's inaccuracy is insignificant, when the volume through the meter is substantial, it will undeniably result in significant revenue losses. Unfortunately, it is often the case that bulk meters are over-sized in South Africa and other countries (Van Zyl, 2011; Couvelis, 2012). In the book titled: "Introduction to Integrated Water Meter Management", Van Zyl (2011) noted that although the water meters installed in a network are predominantly domestic-sized, bulk consumers consume the most water.

The valuation of Apparent Losses typically considers the retail rate charged to customers, resulting in a larger negative financial impact compared to the valuation of losses that are based on production costs. Areas where consumers typically consume larger volumes of water, and where higher payment rates are observed (for example suburban areas), will have the most significant financial impact. This is because when utilising increasing block tariffs, the value attributed to Apparent Losses will likely correspond to the highest block rate paid by the consumer (Couvelis & van Zyl, 2012). Couvelis & van Zyl (2012) investigated the extent of meter under-registration in South Africa and, through meter audits, found that the Apparent Losses of consumers with bulk meters were around 18% and 19% within the Ekurhuleni and Tshwane Municipalities, respectively. The study did not assign a potential monetary cost to these losses, but it would undoubtedly have a significant impact on the revenue generated by Municipalities. Research in the past has pointed out that inaccuracies in water meters, especially at low flow rates, contribute notably to Non-Revenue Water loss in water systems (Shields, et al., 2012). Stuck water meters, or those that fail to record consumption at any flow range, are usually easily identifiable through assessing monthly meter readings used for billing. However, meters with gradual accuracy degradation or under-registration at low flow rates, are not that easily identifiable.

The study by Ncube (2019) focussed only on Apparent Losses for consumers with domestic-sized meters but identified the need to investigate bulk meter consumers, particularly multi-residential, and the use of the weighted meter accuracy method for bulk meter selection. Van Zyl (2011) emphasised the economic benefits that accurate metering within distribution systems can have on water suppliers. The impact of large-scale water meter replacement on water consumption, utility revenue generation, and payback periods were highlighted in a study by Brinkley et al. (2020). Although the Brinkley et al. (2020) study focussed on the replacement of mechanical meters with technical faults from a revenue and return on investment (ROI) perspective, the study indicated that bulk-sized water meters should be prioritised for replacement over single-stand residential meters. Couvelis & Van Zyl (2012) also noted the significant impact that bulk consumers can have on Apparent Losses, indicating that an effective programme aimed at reducing these losses should initially target these consumers to achieve the fastest results with minimal effort.

Assessing the replacement of a single oversized bulk meter in isolation might seem insignificant; however, the reduction in Non-Revenue Water can be substantial when considering it on a more extensive Municipal-wide basis. Considering a case study of a bulk meter replacement pilot project undertaken in Sao Paulo, Brazil, in 1997 (Wilson, 2003), it was found that of the 354 bulk meters identified for replacement, 70% were oversized, less than 2% were under-sized, and roughly 28% were correctly sized, but inaccurately recording consumption. Eighty-three of the cases had a payback period of less than one month, and the average payback period was two months. Based on the results of the pilot study, a large bulk meter replacement programme was rolled out, and as of January 2002, the results confirmed the findings from the pilot project. As a result of the success of the programme, 26 711 meters have since been replaced, and 85% of these bulk meters were found to have been oversized prior to replacement. Couvelis & Van Zyl (2012) reviewed various bulk consumer reports from multiple Municipalities and found that there is a widespread issue with bulk meters being incorrectly sized or poorly maintained. This review highlighted that in Municipalities like Tshwane and Ekurhuleni, Apparent Losses attributed to these bulk meters were about 20%. This finding is particularly alarming given that bulk users represent a disproportionately large fraction of overall water consumption and, by extension, play a significant role in the financial income of these Municipalities. Their review highlights the need to ensure bulk meters are accurately sized, properly installed, and maintained in good condition.

Water meters, and mechanical meters especially, inadvertently have measuring inaccuracies. A recent WRC-funded study (Ncube, et al., 2022) determined that the average accuracy of water meters in South Africa is 95.5%. An initial apparent loss error of 4.5% translates to a significant monetary loss, and the error will be further exacerbated by several factors, including incorrect meter sizing, meter age, and wear and tear from usage. For a mechanical water meter, after processing large volumes of consumption/flow (e.g., between 8 000-10 000 kL according to Ncube and Taigbenu (2015) for South Africa), its measurements will inevitably start to deviate from their original manufacturing tolerances, impacting accuracy. This wear can be exacerbated by factors affecting the meter's moving parts, such as mineral deposits, sediment build-up, corrosion, tuberculation, and the chemical composition of the water.

It is common practice to size water meters, especially mechanical bulk water meters, with the same diameter as the pipes they are installed on, often resulting in oversizing (Wilson, 2003). This practice, not unique to South Africa but observed elsewhere (American Water Works Association, 2012), significantly contributes to Apparent Losses in general. Metering functionality, measuring accuracy, and water demand estimation are elaborated on in more detail in the upcoming section.

2.2 Water Meter Selection / Estimating Demand

2.2.1 Water Demand Estimation Methodologies

Estimated water demand varies significantly across different types of properties e.g., residential, multi-residential and industrial. This variation is primarily due to differences in water usage patterns, occupancy, and the specific activities conducted within these properties. Ideally, the approach to estimating water demand for different land use types should involve a combination of statistical analysis, historical data, and considerations of various factors specific to each land use type. Even in regions where water shortage is often not a problem, understanding trends and drivers in water use is still crucial for managing water resources effectively.

Domestic consumers typically have more predictable consumption characteristics than those of non-domestic consumers (Arregui de la Cruz, 2016). Although each individual consumer's consumption pattern will vary, typical domestic user consumption profiles exist, often derived through statistical analysis, that can be used as approximations without introducing an unacceptable level of uncertainty. Non-domestic consumers' consumption, on the other hand, varies significantly even for consumers in the same land use type and cannot easily be approximated except through statistical means (Van Zyl, et al., 2017), and as such would also require consideration on an individual basis.

In a research study by Davis (2005), who only considered domestic-sized meters, the percentage of flow within three defined flow ranges was estimated for each of the four climatic seasons within the Metropolitan Domestic Water Improvement District, Northwest of Tucson, Arizona. Davis categorised these flow ranges as low (0 – 0.95 L/min), medium (0.95 – 7.57 L/min), and high (7.57 – 56.78 L/min). The study estimated that the annual weighted average time spent in the low flow range was 10.87%, a range where meters are known to exhibit the least accuracy. Notably, while water usage by residential consumers showed seasonal variation, the low flow range demonstrated the least variability among the three defined flow ranges.

In a water distribution system (WDS), the flow rate is subject to constant variation due to changing water needs. These needs vary at various end-uses, which are 'specific points where water is drawn from the WDS'. In homes, such end-uses encompass facilities such as faucets, toilets, showers, bathtubs, washing machines and dishwashers. Activation of each of these end-uses will trigger a flow in the WDS. When multiple end-uses are engaged at the same time, which may represent a peak demand scenario, this leads to a significantly higher flow rate. The consideration of peak water demand is crucial in the planning and analysis of WDS, particularly when it requires the determination of the necessary capacity for various water supply pipelines and other related infrastructure. Different methodologies, derived from standards, design guidelines, and research reports, are available for estimating peak water demand at property level (e.g., (van Zyl, et al., 2008; Van Zyl, et al., 2017). Hydraulic water modelling, a critical tool in WDS management, analyses head losses, system pressures, flow velocities, and demands to recommend optimised pipe sizes for reliable water supply and system integrity. Selecting a meter size to match the communication/service pipe size and, depending on the water meter type used, has varying degrees of consequences to a meter's functionality.

2.2.1.1 Fixture Value Approach

The fixture value method is a technique for estimating peak flow for pipe sizing, particularly for the communication pipes connecting the property to the network (Mazumdar, et al., 2013). This approach involves assessing the likely peak demand by calculating the likelihood of simultaneous use of different water-consuming fixtures. Therefore, this method and the resulting demand versus fixture-value curves/tables for different building types ultimately calculate the worst-case instantaneous peak demand that could occur for a specific water customer. This often leads to oversizing of both service lines and water meters.

The sizing of water pipes in South Africa is done per SANS 10252-1 (water supply and drainage for buildings), which guides estimating demand based on the total number and type of fixtures. When selecting and sizing a new water meter for installation, it is a common approach to match the theoretical water demand with the performance specification of water meters (Johnson, 2001).

Similarly, although developed with the aim to standardize plumbing regulations within the United States of America, and has later become a worldwide basis for code development, the Hunter's Curve has been used to estimate peak water use in buildings by applying a fixture unit to all types of plumbing fixtures (Mazumdar, et al., 2013). The Hunter's Curve was originally developed in 1940 by using and solving the binomial probability function for three of the most commonly used fixtures at the time (flush valves, flush tanks, and bathtubs). It is understandable that the use of these curves in more modern times results in oversized pipes and meters, but as correctly stated by Mazumdar et al. (2013), this does not indicate that Hunter's fundamental research and approach was incorrect — This rather highlights how the world has changed. With greater emphasis on water conservation and the world experiencing greater water stresses, technology and designs have adapted to incorporate low-flow plumbing fixtures instead of high-flow rate fixtures as were the norm. The M22 Manual for Water Supply Practices titled: "Sizing Water Service Lines and Meters" by the American Water Works Association (3rd Edition, 2014) indicates that practising engineers started raising concerns in the 1970s about the oversizing of pipes. The current manual incorporates a four-year effort by the customer metering and practices committee and provides various updated curve and fixture values, all showing a significant reduction in the estimated demand compared to the original 1940s Hunter's Curve. Research studies have been undertaken in recent years with the aim of updating the Hunter's Curve for use in the 21st Century (Mayer, et al., 2020; Mazumdar, et al., 2013). Following the study by the Water Research Foundation (WRF) that measured actual peak flows (Mayer, et al., 2020), the WRF notes that all design curves that are currently used in practice, including those in the M22 manual, predict flows that are likely to be higher than actual peak water demands.

2.2.1.2 Consumer Demand (AADD)

Another method for estimating peak flows for pipe sizing is to estimate the Average Annual Daily Demand (AADD) and apply a peak factor afterwards. While this method ideally uses historical consumption data or flow logging, such data for this purpose might not always be accessible or practical to obtain.

AADDs in South Africa are typically estimated using guidelines from "The Neighbourhood Planning and Design Guide" (DHS, 2019), commonly referred to as the ***Red Book***. This document will be referred to as the ***Red Book*** throughout this research report. A few studies have shown that stand size remains the dominant parameter influencing South Africa's Average AADD (van Zyl, et al., 2008; Van Zyl, et al., 2017; Griffioen & van Zyl, 2014). Non-domestic water demand, however, is less predictable. The aforementioned studies show that the AADD guideline in the 2nd edition of the ***Red Book*** (CSIR, 2005) was not adequate and needed to be revised. These studies, therefore, proposed alternative guidelines to those presented in the CSIR ***Red Book*** (2005). An updated ***Red Book*** was subsequently published (DHS, 2019), and the previous AADD graph has been replaced by more detailed tables to better guide the estimation of AADD.

Both spatial and temporal factors influence variations in water demand. Spatial variations arise primarily due to differences in climatic variables across various regions, affecting the quantity of water required. Whereas temporal variations are driven by changes in climate over time, leading to daily, weekly, and seasonal cyclic patterns in water usage. Although there are variations to consider, some patterns related to daily water consumption develop. These patterns may be different in different areas. Still, the characteristics of a pattern remain and therefore aid in characterising daily water consumption trends across different socio-demographic groups and varying climatic regions (Bich-Ngoc, et al., 2022).

Residential consumers are more predictable because people tend to have periodic activities, which translate into their water-using schedules. Compared to other times of the day, water demand tends to be more frequent in the morning when people wake up, and when they typically arrive home after work, and in the evenings before going to sleep. Due to this predictability, diurnal and weekly patterns can be established. A typical residential diurnal water demand pattern, adapted from a project in New Zealand (Heinrich, 2007), is shown in **Figure 2-1**.

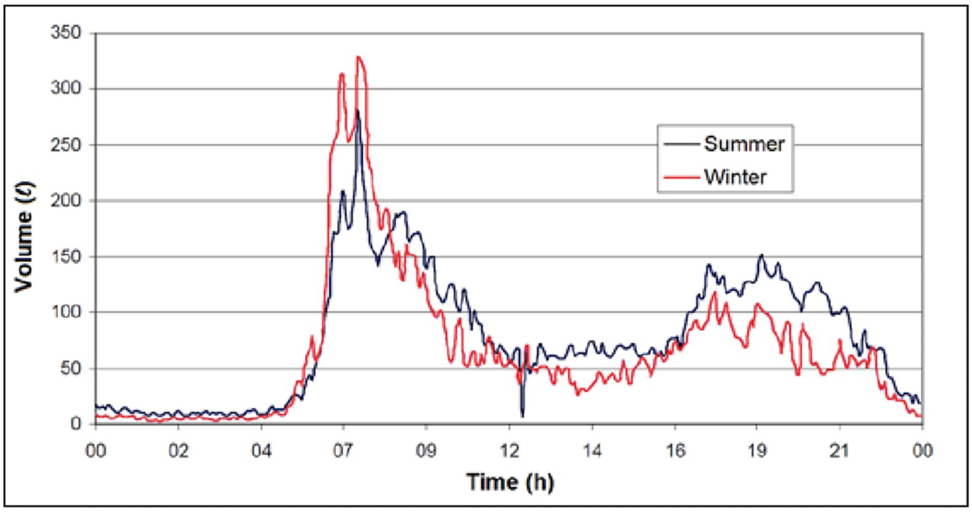

Figure 2-1: Typical residential diurnal water demand pattern (Heinrich, 2007)

Similarly, the ***Red Book*** provides typical diurnal patterns for various asset types, as a ratio of the demand over the 24-hour period; Figure J.16 from the ***Red Book*** represents Table J.14 in graph format and is illustrated in **Figure 2-2**.

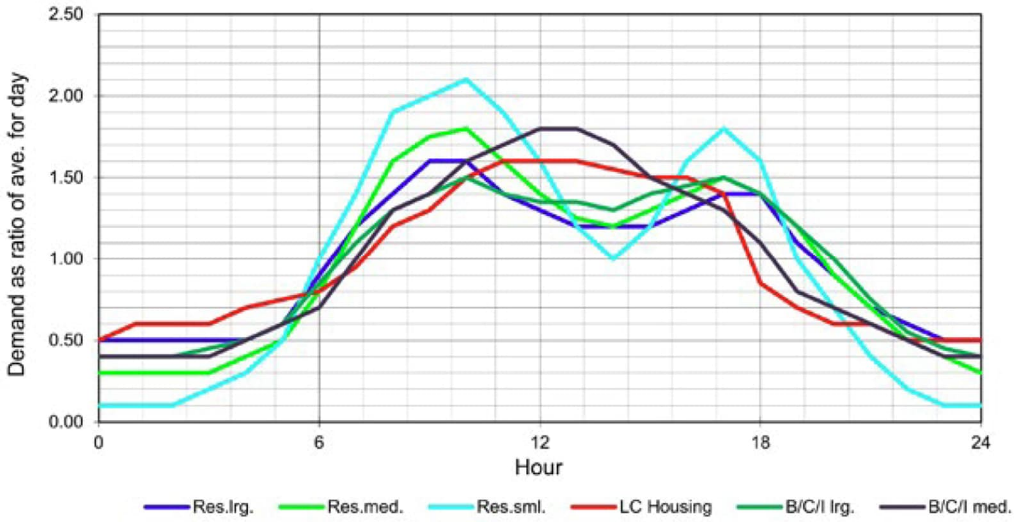

Figure 2-2: Typical diurnal patterns represented as a ratio of demand (DHS, 2019)

If consumer daily demands (AADD) are estimated, be it per capita per day or per asset per day, it is important to use local or national guidelines as they would ideally account for historical information specific to the city or country, and are tailored to the unique environmental, cultural, and infrastructural needs of their respective regions. Once the total AADD has been estimated, the peak factors need to be applied. **Table 2-1** provides the peaking factor ranges reported across various literature using data from different countries (Beal & Stewart, 2014).When considering water meter sizing, it is important to note that the use of Average Annual Daily Demand (AADD) is not entirely appropriate. AADD provides an average measure of water demand over time, rather than the instantaneous flows that water meters are designed to handle. Instantaneous flows reflect peak demand periods, which are critical for accurate meter sizing, therefore making the fixture value method more suitable.

Table 2-1: Peaking factor ranges reported in literature

Peaking factor range	Location	Source
Peak day		
1.0 to 1.5	Data used from various cities in South Africa, France, USA	Van Zyl et al. (2008, 2011)
1.1 to 1.7	North West England, UK	Surendran et al. (2005)
1.4 to 2.0	Ireland	Twort et al. (1994)
1.5 to 2.0	Victoria, Australia	WSAA (2002)
1.5 to 2.3	Queensland, Australia	DERM (2010)
1.8 to 2.9	Various cities, UK	Twort et al. (1994)
Peak hour		
1.0 to 1.5	Data used from various cities in South Africa, France, USA	Van Zyl et al (2008, 2011)
1.2 to 1.8	Boston, USA	Shvartser et al. (1993)
2 to 5	Various cities, Australia	WSAA (2002)
3.6 to 5.0	Queensland, Australia	DERM (2010)

2.3 On-Site Leakage

When it comes to leakage on consumer properties, Municipalities view it as consumption rather than loss because it happens downstream of the water meter. In terms of the IWA water balance, it is therefore classified as revenue water and not water losses (Farley & Trow, 2005). Typically, these are leaks from toilet cisterns, taps, fittings, and pipes. This, being classified as revenue water, provides little incentive for Municipalities to address the issue. Nonetheless, on-site leakage, especially low-intensity leaks, tends to happen at low flow rates, causing water meters to under-register and leading to Apparent Losses that are quite significant (Couvelis & van Zyl, 2012). As such, there is circumstantially incentive for Municipalities to address the issue of on-site leaks as it directly affects NRW.

On-site leakage is not unique to South Africa, and many investigational studies have been conducted globally to assess on-site leakage rates of residential consumers (including multi-residential) and non-residential consumers. Couvelis and van Zyl (2012) considered suburban properties in Cape Town, Mangaung, and Johannesburg and compared them to the findings of other local and international studies (refer to **Figure 2-3**). A prominent finding from their study is that most on-site leakage occurs at low flow rates, and as the leakage rate goes up, the number of properties with leakage decreases rapidly i.e., the properties where large on-site leaks were observed were less than those with low flow leaks. After conducting audits on bulk consumer meters, Couvelis & van Zyl (2012) determined that significant improvements are necessary to ensure meters are appropriately sized, properly installed, and well-maintained.

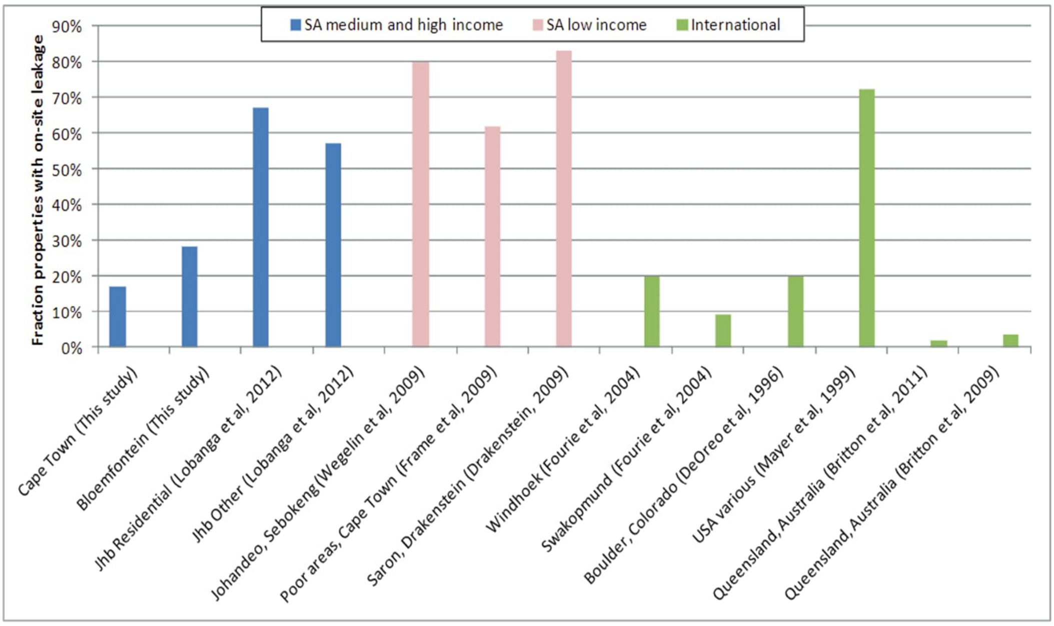

Figure 2-3: Comparison of on-site leakage studies locally and internationally (Couvelis & van Zyl, 2012)

In a study by Lugoma et al (2012), 182 properties within high-income suburbs in Johannesburg, South Africa, were investigated, all with new water meters. It was found that 64% of the properties investigated had on-site leakages, which accounted, on average, for 25% of the measured consumption for both residential and non-residential consumers. From the frequency distribution graphs provided, there were no on-site leakages below 10 L/hr and 25 L/hr for residential and non-residential customers respectively. However, this is most likely due to the higher starting flows for the water meters and their inability to record such low flows. Lugoma et al (2012) agreed by noting that due to the trends identified, it is probable that the majority of the properties where no on-site leakage was found may have low-intensity leaks that cannot be registered by the meters. Apparent Losses were estimated to be 5% of the total water delivered to each stand with on-site leakage.

Ncube & Taigbenu (2016) investigated 408 randomly selected properties in Johannesburg, South Africa, and similarly to the findings from Lugoma, et al (2012), found on-site leakages at 63% of the properties. Their methodology included the logging of meters, which contained both domestic and bulk-sized meters, making it possible to analyse consumption characteristics. Their study also supports the high proportion of residential consumption occurring at low flow rates and has indicative findings that the bulk meters sampled were mostly oversized.

To reduce Apparent Losses due to low flows travelling through meters, an unmeasured flow reducer (UFR) can be installed. This is elaborated on in the following section.

2.4 Water Demand for Firefighting

In South Africa, there are two standards that relate to water demand for firefighting, namely SANS 10090 (Community Protection Against Fire) and SANS 10252 (Water Supply and Drainage for Buildings). The ***Red Book*** provides guidelines that assist with decision-making. In brief, it is generally expected that the water distribution network, fire hydrant, or fire hose reel maintain specified quantities in both flow (L/min) and pressure head (m).

However, when comparing the three documents, they are not consistent and, in some instances, the ***Red Book***, albeit a guideline, is in violation of the standards. These notable distinctions are elaborated on in a paper by Mac Bean & Ilemobade (2019). Two prominent findings in their analysis were that almost all the fire incidents recorded during the period of 1 January 2006 to 30 September 2017 had recorded fire flowrates less than the lowest minimum from both SANS 10090 (1 200 L/min) and the ***Red Book*** (900 L/min). Secondly, it was found that 75% of fire incidents were extinguished using less than 6.6 kL of water, indicating that one of the City of Johannesburg's conventional pumping tankers with a capacity of 6.9kL would have been sufficient to extinguish 75% of fires in the City. Other studies analysing the fire flow employed within municipalities have shown similar results in that the fire flows were notably lower than the specifications in SANS 10090 (refer to **Figure 2-4**).

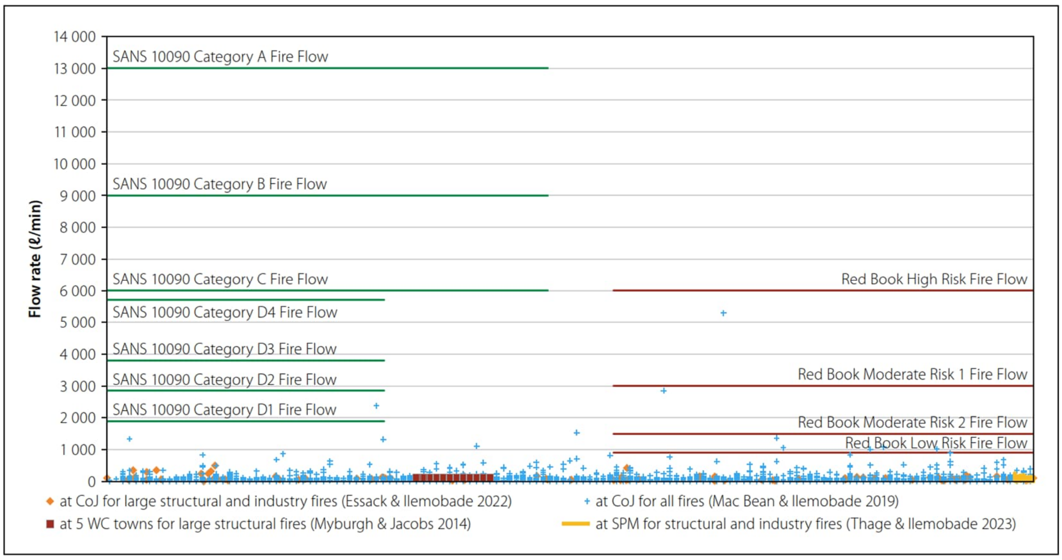

Figure 2-4: Fire flow rates observed from four studies (Ilemobade, 2023)

As noted by municipal staff, bulk meters are often oversized to take into consideration fire flow demand (Ncube, 2019; Ncube & Taigbenu, 2016). This results in sizing the water meter to accommodate for a potentially once off event with, considering the strict legislation with regards to firefighting, a low probability of occurring. In essence, the daily accurate measuring of consumption is sacrificed in favour of accommodating fire flow within the meter's permanent flow rate range (Q_3 or Q_n).

Widespread recommendations for addressing the oversizing of water meters — as a result of the inclusion of fire demand — include the use of on-site storage tanks, the use of combination water meters, or establishing a separate feed for fire flow. While the ramifications of oversizing bulk meters have been discussed, it is important to note that these alternative solutions to meet fire flow demand have various factors to consider that can contribute to Apparent Losses. Further details on these factors are elaborated on below.

2.4.1 On-Site Storage

An alternative to accommodate the demand for firefighting is to have on-site storage tanks. Two configurations are considered for installing a storage tank: either installed downstream of the meter or connected within the internal reticulation of the stand. A configuration where the tank is filled up once is not considered, as it would result in water remaining unused for extended periods, possibly months or even years, posing health risks. Therefore, it is assumed that the water in these tanks will be regularly utilised, ensuring a continuous turnover and maintaining water quality.

Where intermittent water supply (IWS) is prevalent, consumer on-site water tanks are often installed, which attempt to balance supply and demand. IWS is an unfortunate but common management practice in developing countries, defined by the IWA as situations where a piped water service does not provide water continuously to customers — either less than 24 hours a day or not every day of the week. Many papers suggest that a water tank installed downstream of the meter to balance supply and demand (or for firefighting purposes) may cause under-registration of water meters (Ferrante, et al., 2023). In a study by Criminisi et al. (2009), it was indicated that the additional Apparent Losses for users in the study with private water tanks, with meters ranging from 0 to 45 years of age and usually fed with a float valve, was between 15% and 40%. Meters were also found to over-read due to air flowing through the meters during filling of the empty supply pipe.

Excluding fire demand from the meter sizing calculation may result in some consumers having domestic-sized meters that adequately meet their daily consumption needs, instead of a bulk meter. When considering continuous water supply systems, although only applicable to domestic-sized water meters, to counter the inaccuracies resulting from Apparent Losses, an Unmeasured-Flow Reducer or UFR valve may be installed. This device, a differential non-return valve, works on the premise that, for a given value, the flow through the valve is only allowed when the upstream pressure exceeds the downstream pressure. As a result, if the demand is lower than the minimum measurable flow of the water meter, it will not be permitted. The extensive research conducted both within South Africa and globally (Couvelis & van Zyl, 2012; Mutikanga, et al., 2011; Fantozzai, et al., 2009; Yaniv, 2009) underscores that UFRs have the potential to significantly diminish Apparent Losses stemming from meter under-registration. This is particularly evident in scenarios where there is prevalent on-site leakage or when consumers channel water into storage tanks on their premises.

2.4.2 Combination Meters

As explained in Chapter 1, a combination water meter consists of two water meters (a main meter and a bypass meter) designed to accurately measure a wide range of flow rates, from very low to very high, making it ideal for multi-residential and non-domestic consumers. The practical problem with combination meters has less to do with the actual meter, and more to do with how the meter readings are recorded and billed. Due to there being two meters, one of the disadvantages is that the meter readers need to take two sets of meter readings (Van Zyl, 2011). The consumption readings from both meters, each meter also having its own serial number, are combined to provide a comprehensive measure of total water consumption. To ensure accurate billing to the consumer, it is vitally important that meter readers understand how to read and record consumption data from both the meters, and that the Municipality's billing system can accommodate the two readings for a single consumer. If only one of the two meters is read or if the two readings are not combined, it will result in meter inaccuracies and an increase in Non-Revenue Water.

2.4.3 Separate Fire Feeds

Another alternative to accommodating fire flow demand is to provide a stand with two separate metered water connections: one dedicated for normal use, and the other exclusively for fire demand. At face value, the potential drawbacks to this might not be evident, but there are a few potential challenges to consider. Assuming that the meter recording normal use is in working order, the meter on the fire feed will show no consumption. For this meter to not be flagged on the billing system as faulty, potentially stuck or bypassed, the meter needs to be flagged on the billing system as a fire feed meter. Otherwise, it might be identified as faulty and replaced unnecessarily or assumed that there should be consumption and interim readings incorrectly levied against the account. In his investigations, Ncube (2019) uncovered instances where properties with a history of at least ten meter changes had fire meters replaced (multiple times a year) due to being “stuck”.

Assuming that the meter is flagged on the system as a fire feed and would not be subject to unnecessary replacement, the connection needs to remain operational and should still be checked monthly to ensure that any consumption through the meter is recorded and billed. For example, the isolation valve should be checked regularly to ensure it remains in working order, and the water in the pipe segments should be flushed regularly to avoid any harmful bacteria, sediment buildup, or corrosion within the pipe segment. As such, even though the two separate feeds provide redundancy, ensuring that both feeds remain reliable is important.

2.5 Concluding Remarks

This chapter outlined previous research on consumer water metering, focusing on Apparent Losses, meter selection, on-site leakage, and water demand for firefighting. Apparent Losses, which encompass unauthorised consumption and meter inaccuracies, are deemed significant. While substantial research has been devoted to domestic-sized meters, it is necessary to heighten attention on bulk meters due to their substantial water consumption. Oversizing of bulk meters is frequently observed, not just in South Africa but globally. Metering inaccuracies contribute significantly to Non-Revenue Water loss, particularly at lower flow rates.

Water meter selection is critical to the accurate billing for water use, with mechanical meters being the prevailing choice within many municipal networks due to their low cost (in relation to electromagnetic and ultrasonic meters) and ease of installation. Different meter types exhibit varying degrees of accuracy across diverse flow rates, necessitating correct sizing to prevent over- or under-registration of water consumption. Estimating demands for sizing communication/service pipes and water meters may often lead to oversized meters, a problem in both developing and developed countries, often because the consumer's actual consumption profile does not match the estimated flows.

On-site leakage is commonly perceived as consumption rather than loss; however, it can give rise to substantial Apparent Losses, especially in instances where low-intensity leaks manifest at low flow rates. The inclusion of water demand for firefighting often results in the selection of oversized meters, negatively affecting accurate daily consumption measurement. Strategies such as implementing on-site storage tanks, utilising combination meters, or establishing distinct fire feeds are contemplated as measures to mitigate the oversizing of bulk meters.

The following chapter outlines the methodology developed and provides insight into the origin and verification of the data that was used in this research study, as well as the processes followed to calculate the various outputs.

CHAPTER 3

3 METHODOLOGY

In this section, the methodology developed for addressing the research objectives and questions, stated in Chapter 1, will be outlined.

The aim of this research study was to investigate the impact of incorrectly sized bulk water meters on water consumption and municipal revenue. As such, the focus was on gathering reliable consumption data for bulk water meter consumers and conducting comprehensive consumption and consumer profiling analyses. A careful and systematic approach was developed to uncover the necessary qualifier implications of incorrect meter sizing on municipal revenue from resulting Apparent Losses.

The best way to determine an accurate consumption profile is by analysing actual consumption characteristics, obtained through flow logging (in contrast, meter readings will only provide limited insight on usage patterns as it is a snapshot in time). The flow rates at which pulses were generated were evaluated against the meter's operating flow ranges and used to evaluate an appropriate meter size. The percentage of consumption within the low flow range was determined, where meter under-registration is prominent in mechanical meters. The resulting Apparent Losses were estimated by calculating the weighted accuracy based on the flow profile and meter size. On-site leakages were identified through consumption registering during hours when no usage was expected, typically late in the evening and early hours of the morning.

A review of literature was required to further assess optimal meter sizing and alternatives to consider with regards fire demand requirements.

3.1 Data Collection

The data used in this research study was a subset of unanalysed data from Ncube's (2019) Ph.D. research titled: Decision Enhancement for the Management of Apparent Losses. The following provides background into the data collection with specific emphasis on the consumer samples applicable to, and analysed in, this research study.

Ncube's (2019) data consisted of both domestic and bulk-sized meters installed throughout the City of Johannesburg's area of jurisdiction and stored within Johannesburg Water's (JW) billing system. The sample consisted of consumption categories ranging from business, single residential, utilities, and multi-residential. Included in the information gathered was the meter installation date, stand area (m^2), number of units on the stand, and average annual daily demand (AADD). The AADD originated from the ***Swift*** system, a computer program designed for conducting statistical analyses of data in municipal databases (GLS, 2023). The ***Swift*** system's purpose is to offer valuable insights into monthly water meter readings along with land use and stand information, extracted and manipulated from Municipal Treasury Databases, that can aid in the effective management of municipal infrastructure.

For the purposes of conducting consumer profiling, the flow logging period was a minimum of seven days, to allow for both weekday and weekend usage patterns (Ncube, 2019). Meter flow logging for the bulk meter dataset was implemented between May 2014 and November 2014. It is generally the norm for mechanical bulk meters to be manufactured with a pulse output, and therefore, meter-specific reed switches or pulse readers were fitted to the selected bulk meters and connected to a data logger.

The bulk meter dataset originally consisted of 102 meters, but due to various reasons — such as unfavourable site conditions, meters not registering any flow, or data loggers being problematic — the final number of successfully logged meters reduced to 46. It is these 46 bulk meters that made up the dataset used for analysis in this research study, as presented in **Table 3-1**.

Table 3-1: Summary of bulk meters per customer category employed in this study

Meter Size (mm)	**Business**	**Multi-Residential**	**Total**
40	2	6	**8**
50	6	3	**9**
80	1	2	**3**
100	7	17	**24**
150	-	2	**2**
Total	**16**	**30**	**46**

The raw data logging files for the bulk meters in the dataset were received in the form of individual Microsoft Excel (*.xlsx) files. A standardised file naming convention was implemented by Ncube (2019) and, this ensured consistent organisation and easy identification of the meter logging files. The files were named using a combination of meaningful identifiers that reflected the content of each file. The naming convention followed was <meter serial number>, <meter make and type>, <meter size>, <meter's permanent flow rate>, and <consumer category>. The file content itself only consisted of the date-time entry and the corresponding flow (m^3/h) measured (see **Figure 3-1** and **Figure 3-2**). The meticulous naming of the raw data logging files increased the confidence in the accuracy of the file names in relation to their content.

	A	B	C
1	Meas. point	Curve 1 (m³/h)All values	
2	2014/05/21 15:31	7.46	
3	2014/05/21 15:32	10.78	
4	2014/05/21 15:33	10.71	
5	2014/05/21 15:33	10.27	
6	2014/05/21 15:34	8.96	
7	2014/05/21 15:35	9.42	
8	2014/05/21 15:35	9.29	
9	2014/05/21 15:36	8.67	
10	2014/05/21 15:37	8.62	
11	2014/05/21 15:37	8.73	
12	2014/05/21 15:38	8.19	

Figure 3-1: Example of raw meter logging data for single bulk meter

	A	B	C
1	Meas. point	Curve 1 (m³/h)All values	Curve 2 (m³/h)All values
2	2014/09/29 15:29	0.42	
3	2014/09/29 15:29	0.41	
4	2014/09/29 15:30	0.42	
5	2014/09/29 15:30	0.41	
6	2014/09/29 15:30	0.42	
7	2014/09/29 15:30	0.42	
8	2014/09/29 15:30	0.43	
9	2014/09/29 15:30	0.42	
10	2014/09/29 15:30		4.09
11	2014/09/29 15:30	0.41	
12	2014/09/29 15:31	0.34	

Figure 3-2: Example of raw logging data for combination meter

3.2 Data Verification

The entries in Ncube's (2019) original consumer dataset included domestic and bulk-sized meters, but only the bulk meter entries for which the logging files were received were extracted. Given that the raw data logging files had a thorough naming convention, it was possible to run a DIRLIST command. The DIRLIST command is a computer command that lists all the files within a specific directory, providing a comprehensive overview of file names and formats. This command was executed to generate a text file, offering a detailed list of all the logging files stored in the directory. This generated list was then imported into Microsoft Excel. Within Excel, a MATCH function was employed, set to exact matching criteria, to identify which meter serial numbers (S/N) corresponded with the logging files listed.

Data verification is a vital process ensuring the accuracy and integrity of the investigated data. By matching the serial numbers with the logging files, it was possible to verify that the data extracted was accurate and corresponded correctly to the specific meters in the dataset. This verification process helped prevent errors and ensured that the dataset used in this research study was reliable and based on precise information. Only 42 of the 46 meters' S/Ns, for which raw logging files were received, could be successfully matched to the consumer dataset files, and extracted. An attempt was made to manually find the remaining four meters that did not have a match, but no corresponding entry could be identified. The verified dataset is presented in **Table 3-2**.

Table 3-2: Summary of verified bulk meters per customer category employed in this study

Meter Size (mm)	**Business**	**Multi-Residential**	**Missing Records**	**Total Verified**
40	1	6	1	**7**
50	6	3	-	**9**
80	1	2	-	**3**
100	6	15	3	**21**
150	-	2	-	**2**
Total	**14**	**28**	**4**	**42**

The 42 matching entries were extracted for further evaluation.

3.3 Data Validation

After meticulously matching and extracting the 42 entries for further evaluation, the next step was the crucial process of validation. Data validation involves examining the collected data in terms of quality and accuracy before proceeding with data processing and analysis. This process ensured the data's accuracy and verified its completeness and usability for the intended use in this research study.

The selection of verified meters from the dataset, as per **Table 3-2**, consisted of three different manufacturers and seven different meter types. The details in this respect are summarised in **Table 3-3**. In structuring the dataset for this study, a deliberate decision was made to assign a meter alias to each dataset entry. Introducing a meter alias has facilitated the creation of a unique identifier for each entry, significantly enhancing the ease of tracking and referencing specific meters throughout the research process. This approach ensured that each dataset entry remained distinct and easily traceable, supporting efficient data management and integrity without compromising the confidentiality of the exact meter details.

Table 3-3: Summary of verified bulk meters per make, type, alias, and size

Meter Make	**Meter Type**	**Meter Alias**	**Meter Sizes (mm)**	**Total**
Make A	Type 1	AI-F	40; 100	**4**
Make B	Type 2	EK-H	40; 50; 100; 150	**6**
Make C	Type 3	S-M	40; 50	**3**
Make C	Type 4*	S-MT*	100	**1**
Make C	Type 5	S-W1	40; 50; 80; 100	**26**
Make C	Type 6	S-W2	150	**1**
Make C	Type 7	S-W3	100	**1**
Total				**42**

Combination meter

The datasheet for each meter in the dataset was sourced from the relevant manufacturer, and care was taken to ensure that the version of the datasheet obtained corresponded with the meter in the dataset. The period during which each meter was existing on site, the meter installation date, and the meter type were used to determine the correct corresponding datasheet. The performance data for each meter type is provided in **Tables 3-4 to 3-10**. Not all meter types were available across the entire size range considered in this study (40mm – 150mm). In cases where a particular size of a meter type was unavailable, a dash was recorded to signify the absence of that specific meter size for the given meter type.

Table 3-4: Meter performance data for Make A meters (Type 1)

Flow Ranges (m^3/h)	**40mm#**	**50mm**	**80mm**	**100mm#**	**150mm**
Q_{start}	0.022	0.032	0.035	0.07	0.09
Q_1 / Q_{min}	0.1	0.079	0.1575	0.25	0.254
Q_2 / Q_t	0.16	0.127	0.252	0.4	0.406
Q_3 / Q_n	16	25	63	100	160
Q_4 / Q_{max}	20	31.25	78.75	125	200

#Size present in the dataset

Table 3-5: Meter performance data for Make B meters (Type 2)

Flow Ranges (m^3/h)	**40mm#**	**50mm#**	**80mm**	**100mm#**	**150mm#**
Q_{start}	0.15	0.16	0.22	0.25	0.9
Q_1 / Q_{min}	0.35	0.35	0.5	0.6	1.8
Q_2 / Q_t	1	1	2	2	4
Q_3 / Q_n	50	50	120	180	450
Q_4 / Q_{max}	90	90	200	250	600

#Size present in the dataset

Table 3-6: Meter performance data for Make C meters (Type 3)

Flow Ranges (m^3/h)	40mm#	50mm#	80mm	100mm	150mm
Q_{start}	0.05	0.05	0.1	0.11	0.3
Q_1 / Q_{min}	0.2	0.15	0.2	0.3	0.8
Q_2 / Q_t	0.32	0.4	0.51	0.81	1.6
Q_3 / Q_n	40	50	120	230	450
Q_4 / Q_{max}	60	90	200	300	600

#Size present in the dataset

Table 3-7: Meter performance data for Make C meters (Type 4*)

Flow Ranges (m^3/h)	40mm	50mm	80mm	100mm#	150mm
Q_{start}	-	Unspecified	Unspecified	Unspecified	-
Q_1 / Q_{min}	-	0.006	0.006	0.006	-
Q_2 / Q_t	-	0.012	0.012	0.012	-
Q_3 / Q_n	-	50	120	180	-
Q_4 / Q_{max}	-	90	200	280	-

*Combination Meter; #Size present in the dataset

Table 3-8: Meter performance data for Make C meters (Type 5)

Flow Ranges (m^3/h)	40mm#	50mm#	80mm#	100mm#	150mm
Q_{start}	0.15	0.15	0.25	0.25	1
Q_1 / Q_{min}	0.3	0.3	0.5	0.8	1.8
Q_2 / Q_t	0.8	0.7	0.8	1.8	4
Q_3 / Q_n	40	50	120	230	450
Q_4 / Q_{max}	60	90	200	300	600

#Size present in the dataset

Table 3-9: Meter performance data for Make C meters (Type 6)

Flow Ranges (m^3/h)	40mm	50mm	80mm	100mm	150mm#
Q_{start}	-	-	-	-	0.035
Q_1 / Q_{min}	-	-	-	-	0.035
Q_2 / Q_t	-	-	-	-	0.15
Q_3 / Q_n	-	-	-	-	400
Q_4 / Q_{max}	-	-	-	-	600

#Size present in the dataset

Table 3-10: Meter performance data for Make C meters (Type 7)

Flow Ranges (m^3/h)	40mm	50mm	80mm	100mm#	150mm
Q_{start}	-	0.05	0.1	0.11	0.5
Q_1 / Q_{min}	-	0.15	0.2	0.3	0.8
Q_2 / Q_t	-	1.0	2.5	3.0	5.0
Q_3 / Q_n	-	20	55	90	250
Q_4 / Q_{max}	-	35	110	180	350

#Size present in the dataset

To assess the completeness and consistency of the 42 meters in the verified dataset, the meters were grouped per manufacturer and using the meter alias (**Table 3-3**), each meter was assigned a unique identifier (ID). The meter S/N linked to the unique ID was kept in the records for ease of tracking while validating and analysing the data. Each entry was assessed to confirm that the additional required information needed for the analysis (relating to stand size and land use) was available. A few entries did not have the stand area recorded, but the original consumer dataset from Ncube (2019) contained the street address. The online corporate geo-informatics (CGIS) maps from the City of Johannesburg's (CoJ) e-services website were utilised to find the missing stand area and zoning information.

3.4 Logging Data Analysis Template

A template for analysing each meter's logging data was set up in Microsoft Excel (**Figure 3-3**) to ensure each meter was uniformly evaluated. **Appendix C** provides an example of this workbook for meter S-W1-9. Although the various meter makes and types were not compared with one another, it was important to analyse each meter with its manufacturer's performance specification data. Due to the anticipated large number of Microsoft Excel formulas that were to be required for the data analysis, the ***Name Manager*** tool in Excel was used to organise and manage the data within the Microsoft Excel workbook, i.e., descriptive names to cells and ranges were assigned and thus made the writing of formulas easier and more readable, while also reducing errors relating to the correct data that needed to be assessed and analysed. The workbook consisted of five sections; each section was set up on a separate worksheet. The last section, however, required multiple worksheets, each containing an individual meter's logging data. The five sections were as follows:

1. View Data
2. Data Validation
3. Performance Data
4. Database
5. Template (for individual meter logging data analysis)

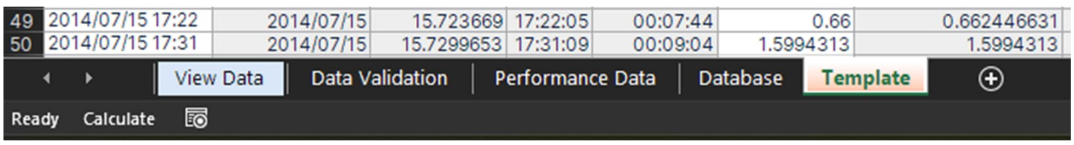

Figure 3-3: The developed workbook

The [View Data] worksheet provided a concise overview of a selected meter's information and logged data analysis results, presented in an A4-sized report format. The worksheet was designed with interactive functionality i.e., you can select a specific meter from a drop-down list, and the content and graphs related to the selected meter will dynamically update to display the chosen meter's data. This design streamlined data viewing and eliminated the necessity for providing individual reports for each meter within the workbook. The individual meter reports are shown in **Appendix A**.

The [Data Validation] worksheet contained the defined validation criteria that were determined and was aimed at ensuring consistency and accuracy of the data to be employed in the data analysis process. These criteria incorporated lists for selecting the meter model, meter size, stand type, dominant flow range, and comments on the meter sizing.

The [Performance Data] worksheet showed the performance data for each meter make and type and adhered to the manufacturer's datasheet specifications, as summarised in **Tables 3-4** to **3-10**. Furthermore, based on the meter's logged consumption data, the worksheet undertook accuracy calculations across the various flow ranges and sizes available for that particular type.

The [Database] worksheet featured a table that summarised all the analysed meters within the workbook. This worksheet functioned as the data source for the meter report displayed in the [View Data] worksheet.

The [Template] worksheet was designed to analyse each meter's logged consumption data and capture other meter and site-specific information. An essential element of the worksheet's design was the emphasis on ease of duplication; this feature ensured that a corresponding copy of the [Template] worksheet could be effortlessly created for every new meter integrated into the workbook. This duplication capability had been a primary consideration in the worksheet's development, influencing the organisation and functionality of other sections within the workbook. This approach streamlined the process of adding new meters and ensured consistency across data analysis, allowing for a standardised yet flexible framework to accommodate various meters and sites. The structure of the [Template] worksheet included predefined formulas, tables, and fields designed to adapt to the inputted data automatically, minimising manual adjustments and facilitating a more efficient workflow. The workbook was prepared to easily handle expanding datasets by simplifying the duplication process, ensuring that each meter's data was analysed with uniform precision and thoroughness.

Given the numerous formulas, numerous checks, the data manipulation requirements, the graphs to be generated, and the workbook's interactive features, the performance of the workbook was noticeably negatively affected after the meter data (totalling 1,051,819 records). The workbook size and performance became unacceptably large and slow, respectively. As a solution, separate workbooks for each meter manufacturer (Make A-C) were created. However, considering the large number of meters of Make C in the dataset, the workbook for Make C was further broken down per meter type. This approach resulted in better analysis performance and navigation of the dataset.

Details regarding the data manipulation, formulas employed, calculations, and analysis will be discussed next.

3.5 Consumption Analysis and Consumer Profiling

Having explained the template workbook in the preceding text, the [Template] worksheet of the workbook was where the bulk of the data manipulation and analysis took place. Processes in this section will be elaborated on below:

The [Template] worksheet was duplicated and individually populated for each of the 42 meters within the verified and validated dataset. For every meter, this process involved recording site-specific data directly into its corresponding [Template] worksheet. The types of information captured included the stand type (either Multi-Residential or Business), stand size (m^2), number of units on the stand, AADD (kL/day) as per ***Swift***, meter size (mm), meter type, and meter installation date. The meter's age in years was calculated by using the meter installation date and the flow logging start date as per Ncube's (2019) data. **Figure 3-4** shows the details of meter S-W1-1 in the meter input data section of the [Template] worksheet.

Meter Input Data			
Meter Reference:	S-W1-1		Meter Serial No.: [redacted]
Stand Type:	Multi-Residential		
Stand Size:	31 455	m^2	
No. of Units:	234		
AADD (S):	32.162	kL/day	*Based on Swift data*
Diameter:	40	mm	
Meter Type:	[redacted]	Single Bulk	
Multiplication factor:	1		
Meter Installation Date:	2013/11/08		
Estimated Meter Age:	0.42	*Years, at time of Ncube's (2019) logging*	
Pipe Diameter:	40	mm	
Pipe DiameterDown:	40	mm	
Night period:	23:00:00	03:59:59	
Day period:	04:00:00	22:59:59	

Figure 3-4: Details for meter S-W1-1 in the meter input data section of the workbook

The raw logged data, consisting of date-time and corresponding consumption records, which were measured on pulse-based intervals, were manipulated as follows:

- The interval between each date-time measuring point was calculated. Because the loggers were set up for pulse-based logging, the readings provided an indication of how water was consumed. The start date and time and end date and time were obtained, and the logging duration was calculated in both hours and days.

- For combination meters, the consumption from both meters was combined.
- Allowance was made to factor the logged consumption. Meter factors are multipliers used to correct or convert the reading obtained from the meter's dials to the actual volume of water consumed. In terms of the research's dataset, bulk meters sized 40mm to 100mm rarely have a meter factor other than one (x1) to take into consideration when reading consumption logged by the meter. However, a meter factor is common for 150mm meters, in which case the consumption logged needs to be multiplied by the given factor (typically x10).
- For each meter, the average flow over the entire logging period was calculated.
- The logged consumption was split between weekday and weekend usage, and the daily average (per hour, over a 24-hour period) was calculated for each.
- The logged consumption was split between day (04:00 – 23:00) and night (23:00 – 04:00). As shown in **Figure 3-4**, the worksheet was set up to allow for the duration of these periods to be changed.
- Various descriptive consumption statistics were calculated — Some to be used as is (single values) while others were used as inputs for distribution and frequency calculations. These statistics included the mean, standard error, median, mode, standard deviation, variance, kurtosis, skewness, range, minimum, and maximum (see **Figure 3-5** for meter S-W1-1). provides an example of the manipulated logging data section.
- The consumption output data was analysed to distinguish between day and night flow metrics. The calculated metrics included the average night flow, average day flow, maximum flow, minimum night flow, night flow ratio, and AADD. The minimum night flow and

night flow ratio served as an indication of on-site leakage (see **Figure 3-6** for meter S-W1-1).

Logging Data		
Start Date:	2014/05/07	
End Date:	2014/05/15	
Start Time:	15:05:35	
End Time:	13:49:22	
Logging Duration:	190.73	hours
Logging Duration (d):	7.95	days
No. Of Intervals:	17075	observations
Logging Intervals (Pulse Based) (L):		
Mean (L):	00:00:40	min
Median (L):	00:00:40	min
Mode (L):	00:00:50	min
Standard Deviation (L):	00:00:23	min
Variance (L):	00:00:00	min^2
Min (L):	00:00:03	min
Max (L):	00:32:48	min
Consumption Statistics (C):		
Mean (C):	9.93	kL/hour
Standard Error (C):	0.03	
Median (C):	8.96	kL/hour
Mode (C):	7.44	kL/hour
Standard Deviation (C):	4.14	kL/hour
Variance (C):	17.15	$(kL/hour)^2$
Kurtosis (C):	113.74	
Skewness (C):	7.17	
Range (C):	94.55	
Min (C):	0.18	kL/hour
Max (C):	94.74	kL/hour
Sum:	169600.10	
Count:	17074	observations

Figure 3-5: Logged data and consumption statistics for meter S-W1-1

Consumption Output Data		
Average Night Flow:	7.68	kL/hour
Average Day Flow:	10.42	kL/hour
Maximum Flow:	94.74	kL/hour
Minimum Night Flow:	3.03	kL/hour
Night Flow Ratio:	0.30	
AADD:	238.38	kL/day

Figure 3-6: Consumption output data indicating day and night flow metrics for meter S-W1-1

After the calculation of the above results from the raw data, different results were visually presented, including:

- Graphs of the daily average consumption profile over 24 hours, with separate curves for weekdays and weekends, as well as the combined average for all days of the week. An example of this profile for meter S-W1-9 is illustrated in **Figure 3-7**.

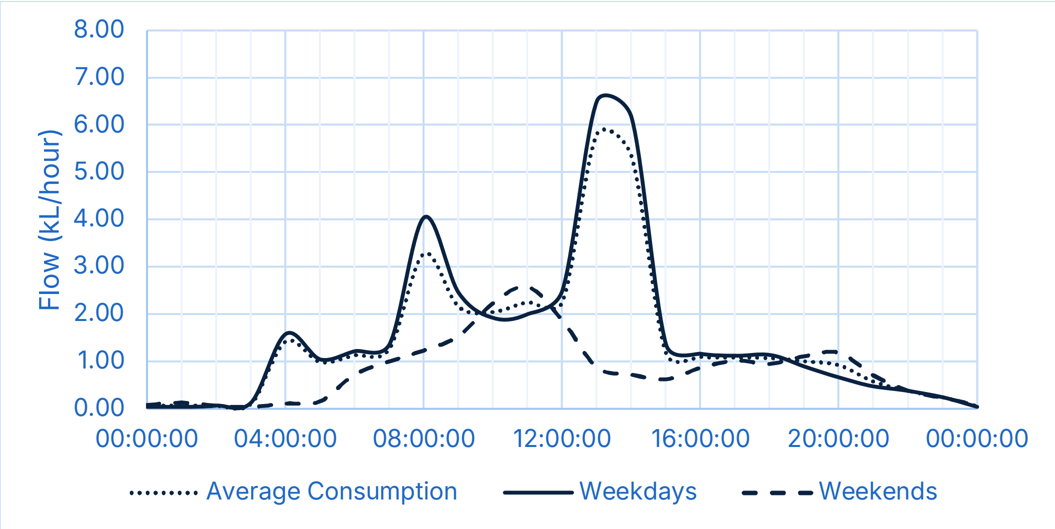

Figure 3-7: An example profile of daily average consumption for meter S-W1-9

- Graphs of the logged consumption over the entire duration of logging and its average. An example of this profile for meter S-W1-9 is illustrated in **Figure 3-8**.

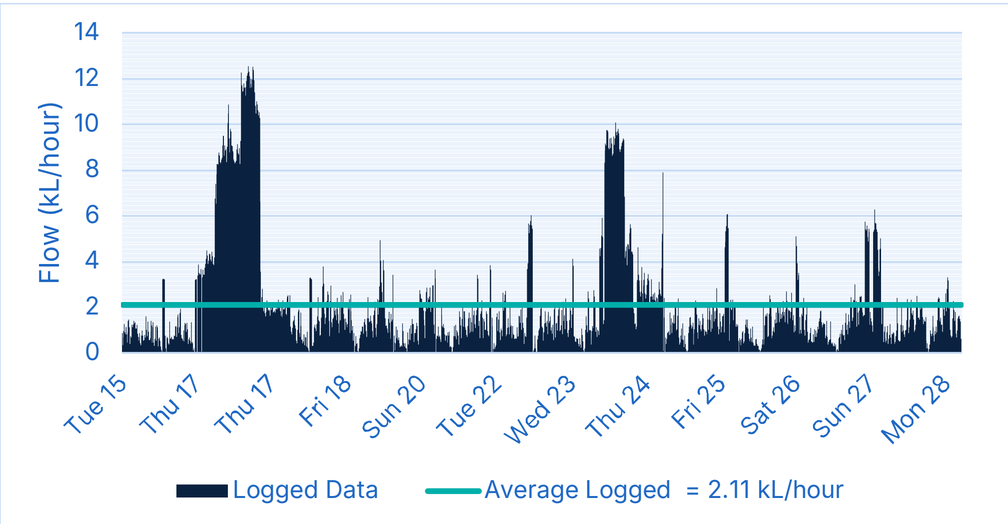

Figure 3-8: An example graph showing logged consumption for meter S-W1-9

- Graphs of the distribution of flow among distinct flow range categories outlined in the manufacturer's datasheet. Each category contributes to the total flow. These categories are below starting flow ($<Q_{start}$), starting flow (Q_{start}), minimum flow (Q_1 / Q_{min}), transitional flow (Q_2 / Q_t), continuous/permanent flow (Q_3 / Q_n), and maximum flow (Q_4 / Q_{max}). An example of this distribution for meter S-W1-9 is illustrated in **Figure 3-9**.

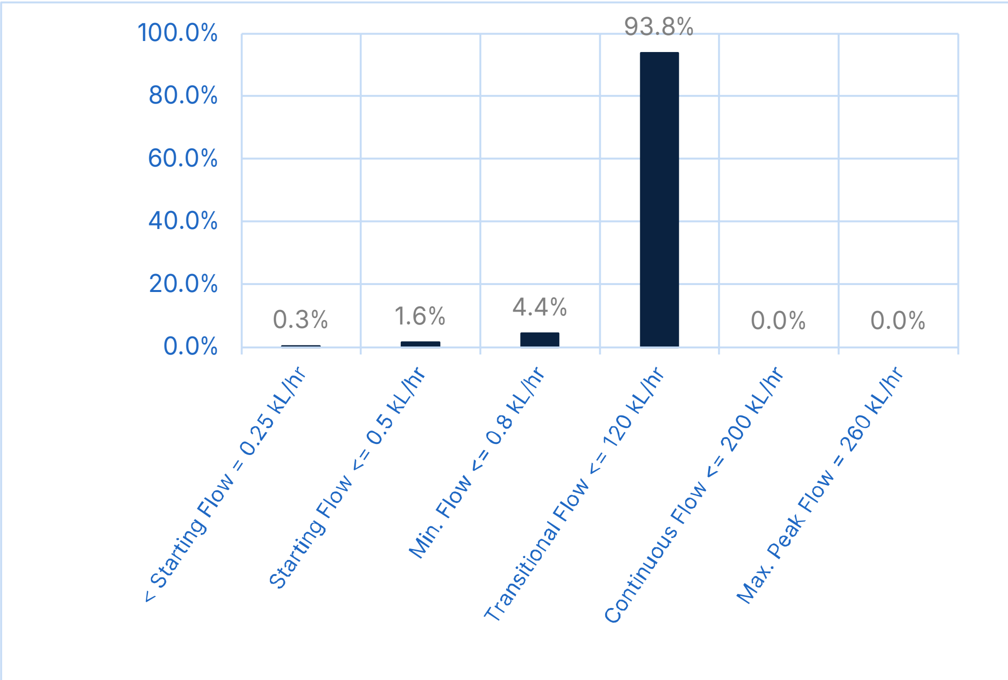

Figure 3-9: An example graph of flow distribution for meter S-W1-9 within meter flow ranges

- Graphs of the distribution of the frequency of occurrence for each recorded flow value. An example of this distribution is illustrated in Figure 3-10.

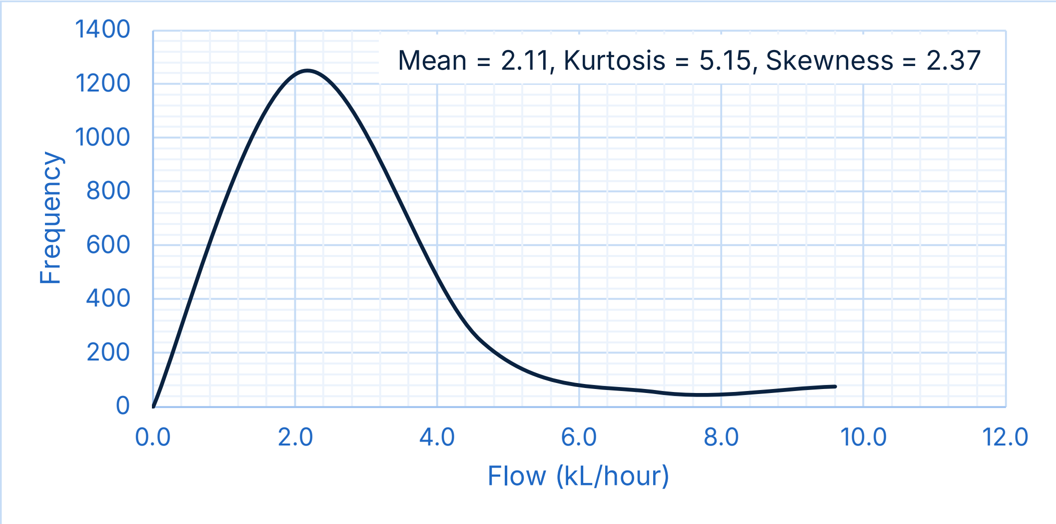

Figure 3-10: An example graph of frequency of flow occurrence for meter S-W1-9

- Graphs of the comparison of meter sizing illustrating the consumption distribution and highlighting the flow ranges of various meter sizes applicable to the specific meter type. An example of this comparison for meter S-W1-9 is illustrated in **Figure 3-11**.
- A meter weighted accuracy comparison of the sizes applicable to each meter type. The weighted accuracy was calculated based on the procedure described in "Optimal water meter selection systems" (Johnson, 2001). The meter manufacturer's datasheet was used to obtain the performance specifications across the flow ranges. The error limits, as used by Johnson (2001), were adapted for in-use meters and assigned to each flow range (see **Table 3-11)**. The weighted accuracy was calculated by multiplying the applicable error limit with the percentage of flow within that flow range. An example of this comparison for meter S-W1-9 is illustrated in **Figure 3-12**.

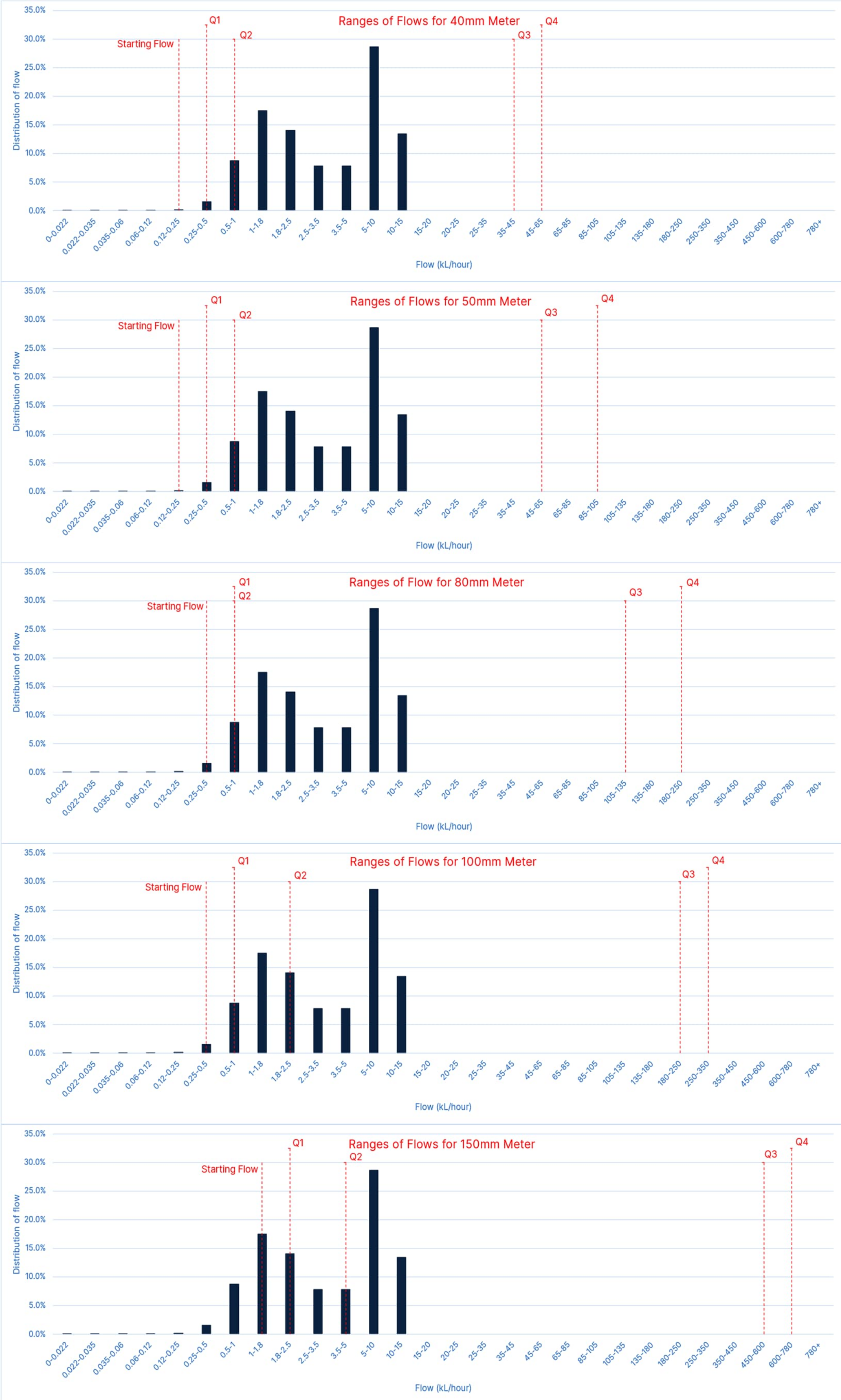

Figure 3-11: Example graphs of meter sizing comparison for meter S-W1-9

Table 3-11: Error limits for calculation of weighted accuracy for in-use meters (adapted from Johnson, 2001)

Flow Ranges	**New Meter Error Limits (%)**	**In-Use Meter Error Limits (%)**
< Starting flow (sf)	100	100
sf – q_{min}	15	15
q_{min} – q_t	5	8
q_t – q_n	2	3.5
q_n – q_{max}	2	3.5
q_{max} – 1.3 q_{max}	5	8
>1.3 q_{max}	100	100

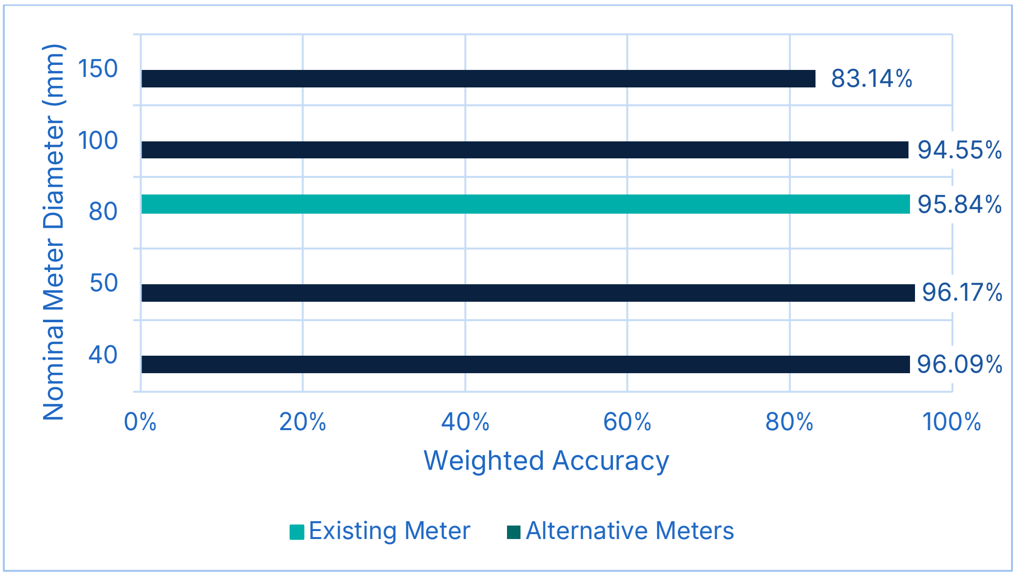

Figure 3-12: An example graph of meter weighted accuracy for meter S-W1-9

3.6 Meter Sizing based on AADD

The optimal meter size based on actual consumption is determined following the manipulation and visualisation of the logged data, especially when looking at the series of graphs depicted in **Figure 3-11**. However, it is not conventional practice to size bulk meters based on actual consumption but on theoretical consumption. As indicated in Section **2.2.1.2,** the use of Average Annual Daily Demand (AADD) is not ideal because it provides an average measure of water demand over time, rather than the instantaneous flows that water meters are designed to handle. However, in this dataset, detailed information about the fixtures, such as the type and quantity installed at the stands, is not available. This lack of data prevents the use of more precise methods like the Fixture Value Method, which relies on instantaneous peak demand for sizing. Consequently, the study is constrained to use AADD for estimating water demand. While this method does not account for peak instantaneous flows, it is the best available approach given the current data limitations.

Theoretical Average Annual Daily Demand (AADD)is still typically estimated using the guidelines provided in the ***Red Book. The*** following were considered in the estimation of the theoretical AADD for multi-residential and business facilities in the dataset:

- The Ncube (2019) dataset included all the data required for estimating the theoretical AADD, with the exception of each stand's zoning designation, and in some cases stand size. As with the missing stand areas, the online CGIS maps from the CoJ e-services website were utilised to find the stand zoning information.
    - The dataset indicated the rates category of the stand, i.e., whether residential or business, which could be used to identify the basic category of zoning of the stand. Knowing the sub-categories for the residential stands in the dataset assisted in better matching the type of development and land use to the water demand tables in the ***Red Book***.
    - The residential sub-categories are driven by density, and CoJ defines this in their Land Use Scheme (City of Johannesburg, 2018) as follows:
        - Residential 1: One dwelling per stand, i.e., a single house
        - Residential 2: 10-20 dwellings per hectare, i.e., multiple-dwelling such as cluster housing or townhouse complexes

- Residential 3: 21-40 dwellings per hectare, i.e., multiple-dwelling such as cluster housing or townhouse complexes
- Residential 4: 41-120 dwellings per hectare, i.e., multiple-dwelling such as apartments and blocks of flats

- Various studies (Husselmann & Van Zyl, 2006; Jacobs, et al., 2004; Booyens & Haarhoff, 2002) have indicated that the AADD guideline in the ***Red Book*** is conservative and, therefore, overestimates AADD values. These studies have recommended revision. In response to the need to provide realistic and current AADD estimates, van Zyl, et al. (2008) proposed a single guideline curve, which, although relevant, focused on single dwelling houses per stand, i.e., Residential 1, and did not take into consideration stands with multiple units (Residential 2-4). As such, van Zyl's (2008) guideline could not be used to estimate the size of the main meters connected to the multi-residential facilities.
- Similar to demand estimation for domestic use (van Zyl, et al., 2008), a new guideline was proposed by van Zyl, et al. (2017) for non-domestic (e.g. commercial and educational) users. This study provides guideline curves for non-domestic stands within an area rather than the individual stands themselves, and therefore could not be used for the meters in the dataset.

Based on the above, theoretical demands were calculated as follows:

- Demands were calculated using values from Table 9.14 of the ***Red Book*** (CSIR, 2005) depicted by **Figure 3-13**. Since the 42 verified meter installation dates range from 1988 to 2013, the AADD values in the ***Red Book*** were employed since these values have remained unchanged since their first publication in the "Guidelines for the provision of engineering services in residential townships" (***Blue Book)*** (CSIR, 1983). The latest version of the ***Red Book*** (DHS, 2019) would not have been available and applicable during the sizing of the 42 meters.

- For the multi-residential stands, categories 2 and 3 were used based on the stand zone (Residential 2, 3 or 4) and the midpoint between the upper and lower limit for the AADD was used. The multi-residential stands in the dataset were considered to predominantly represent middle-income households, and as such, the utilisation of the midpoint between the upper and lower AADD limits was deemed appropriate.
- For non-residential stands, the guideline provides a demand per unit of gross floor area, which is also known as floor space ratio. Unfortunately, this information was not available in the dataset, and therefore, the stand area was used in place of the gross floor area.

- To assess how the updated AADD estimates in the 2019 edition of the ***Red Book*** would compare with the AADD estimates in the 2005 edition of the ***Red Book*** (CSIR, 2005) in the sizing of the 42 verified meters, Table J.2 (depicted by **Figure 3-14**) of the ***Red Book*** (DHS, 2019) was employed.
    - For the multi-residential stands, Group/cluster housing (medium density) was selected for category 2, and Flats (medium density) was selected for category 3. AADD was calculated as kL/ha/d.
    - For the non-residential stands, the business/ commercial category was employed. The Floor Area Ratio (FAR) was not known, and therefore, AADD was calculated as kL/ha/d.

Table 9.14: Water demand for developed areas			
CATEGORY	TYPE OF DEVELOPMENT	UNIT	ANNUAL AVERAGE WATER DEMAND (ℓ/day) UNLESS OTHERWISE STATED
1	Dwelling houses *(Residential zone I)*	Erf area for dwelling house	See Figure 9.9 for erven not exceeding 2 000 m^2. For erven >2 000 m^2, base demand on local conditions
2	Low-rise multiple-dwelling unit buildings *(Residential zones II and III)*	Dwelling	Upper limit 1 000[a] Lower limit 600[a]
3	High-rise multiple-dwelling unit buildings *(Residential zone IV)*	Dwelling	Upper limit 700[a] Lower limit 450[a]
4	Offices and shops	100 m^2 of gross floor area[b]	400
5	Government and municipal	100 m^2 of gross floor area[b]	400
6	Clinic	100 m^2 of gross floor area[b]	500
7	Church	Erf	2 000
8	Hostels	Occupant	150
9	Developed parks	Hectare of erf area	≤2 ha: 15 kℓ[c][d] >2 ha ≤10 ha: 12,5 kℓ[c][d] >10 ha: 10 kℓ[c][d]
10	Day school / crèche	Hectare of erf area	As per developed parks[d]
11	Boarding school	Hectare of erf area plus boarders	As per developed parks plus 150 ℓ/boarder
12	Sportsground	Hectare of erf area	As per developed parks
13	Public open spaces[e]	Hectare of erf area	See note [e] below

(a) Water demand includes garden watering of all common areas outside the limits of the buildings.

(b) Gross floor area obtained using applicable floor space ratio from the town planning scheme.

(c) Demand for developed parks to be considered as drawn over six hours on any particular day in order to obtain the peak demand.

(d) Where the designer anticipates the development of parks and sportsgrounds to be of a high standard, e.g. 25 mm of water applied per week, the annual average water demand should be taken as follows: ≤2 ha: 50 kℓ[c]; >2 ha ≤10 ha: 40 kℓ[c]; >10 ha: 30 kℓ[c].

(e) Refer to Chapter 5 and distinguish between "soft open space" and "semi-public open space".

Figure 3-13: AADD estimates from the ***Red Book*** (CSIR, 2005)

Table J.2: Recommended unit Average Annual Daily Demands

Land use		Density [#1] units/ha	Stand size [#1] m^2	Unit of measure	Water demand (AADD) kL/ha/d [#1]	Water demand (AADD) kL/unit/d [#3]
Residential stands	High density, small sized	20 to 12	400 to 670	kL/unit	11	0.60 to 0.80
	Medium density, medium sized	12 to 8	670 to 1 000	kL/unit	9	0.80 to 1.00
	Low density, large sized	8 to 5	1 000 to 1 600	kL/unit	8	1.00 to 1.30
	Very low density, extra large sized	5 to 3	1 600 to 2 670	kL/unit	7	1.30 to 2.00
Stands for low-income housing (waterborne sanitation)	High density, small sized	30 to 20	270 to 400	kL/unit	9	0.30 to 0.40
	Medium density, medium sized	20 to 12	400 to 670	kL/unit	7	0.40 to 0.50
	Low density, extra large sized	12 to 8	670 to 1 000	kL/unit	6	0.50 to 0.60
Stands for low-income housing (dry sanitation)	High density, small sized	30 to 20	270 to 400	kL/unit	7	0.25 to 0.30
	Medium density, medium sized	20 to 12	400 to 670	kL/unit	6	0.30 to 0.35
	Low density, extra large sized	12 to 8	670 to 1 000	kL/unit	4	0.35 to 0.40
Group/cluster housing	High density	60 to 40	130 to 200	kL/unit	21	0.40 to 0.45
	Medium density	40 to 30	200 to 270	kL/unit	17	0.45 to 0.50
	Low density	30 to 20	270 to 400	kL/unit	14	0.50 to 0.60
Flats	Very high density	100 to 80	80 to 100	kL/unit	25	0.25 to 0.30
	High density	80 to 60	100 to 130	kL/unit	23	0.30 to 0.35
	Medium density	60 to 50	130 to 160	kL/unit	21	0.35 to 0.40
	Low density	50 to 40	160 to 200	kL/unit	19	0.40 to 0.45
Agricultural holdings	Including irrigation	< 3	< 2 670	kL/unit	12	4.00
	Domestic water only	< 3	< 2 670	kL/unit	6	2.00
Golf estate - excluding golf course water requirements		< 3	< 2 670	kL/unit	9	3.00
Retirement village		20 to 12	400 to 670	kL/unit	11	0.60 to 0.80
Business/commercial		FAR = 0.4	n.a.	kL/100 m^2 [#2]	21	0.65
Industrial		FAR = 0.4	n.a.	kL/100 m^2 [#2]	13	0.40
Government institutions		FAR = 0.4	n.a.	kL/100 m^2 [#2]	13	0.40
Warehousing		FAR = 0.4	n.a.	kL/100 m^2 [#2]	10	0.30
Institutional		FAR = 0.4	n.a.	kL/100 m^2 [#2]	20	0.60
Municipal services		FAR = 0.4	n.a.	kL/100 m^2 [#2]	20	0.60
Educational		FAR = 0.4	n.a.	kL/100 m^2 [#2]	20	0.60

[#1] - Assumed net area factor = 0.8 x gross area (20% allowance for roads, servitudes and public open spaces)

[#2] - FAR (Floor Area Ratio) is the ratio of the floor area of a building to its site area. Also referred to as FSR (Floor Space Ratio).

[#3] - Unit type as defined in the column "unit of measure"

d = day

Figure 3-14: AADD estimates from the ***Red Book*** (DHS, 2019)

3.7 Effects on Municipal Revenue

Using results computed from the above methods, specifically consumption and meter accuracy, Apparent Losses resulting from incorrectly sized water meters were estimated and employed to illustrate the financial implications of incorrectly sized municipal meters for a Municipality. This involved the following processes:

- Based on the weighted accuracies calculated for the various meter sizes applicable to each specific meter type, the meter size offering the best accuracy was compared to its companion meter in the dataset.
- The losses resulting from a difference in the size between the existing and alternative bulk meter, were calculated as the residual percentage from the meter's accuracy. For example, if the weighted meter accuracy was calculated to be 94.66%, then the Apparent Losses became 5.34%.
- The AADD calculated from the logging data (in kL/day) was converted to also reflect the Apparent Losses in kL/month and kL/year for both meter sizes.
- The additional consumption that was registered by the alternative bulk meter was calculated as a percentage of the AADD (see **Figure 3-15** for meter S-W1-9).

Existing Meter Size:	80 mm		
Existing Meter Accuracy:	95.84%		
Apparent Losses Due To Meter Size:	4.16%		
	2.20	kL/day	
	66.08	kL/month	
	803.99	kL/year	
Existing Meter Comment:	Alternative meter is more suitable		
Alternative Meter Size:	50 mm		
Alternative Meter Accuracy:	96.17%		
Apparent Losses Due To Meter Size:	3.83%		*Reduction in losses: -0.34%*
	2.02	kL/day	
	60.71	kL/month	
	738.61	kL/year	
Additional consumption registered:	8.13%	*based on AADD and alternative meter size*	

Figure 3-15: Example of estimated Apparent Losses due to resizing of meter S-W1-9.

- The estimated billed amount is based on the consumption calculated as the AADD over 30 days and the rising block tariffs for 2013/2014 (see **Table 3-12**) and 2023/2024 (see **Table 3-13**), respectively. Thereafter, the revenue loss was estimated based on the Apparent Losses. The two financial years allowed for comparing the estimated effect on municipal revenue of when the meter logging took place versus current times. The potential additional revenue that could have been generated with the use of an alternative meter is calculated as the difference in revenue loss between the existing and alternative meters for the year 2023/2024, without considering any additional Apparent Losses. An example of this estimation for meter S-W1-9 is illustrated in **Figure 3-16**.

Table 3-12: City of Johannesburg rising block tariffs in 2013/2014 (City of Johannesburg, 2013)

Residential Tariffs 2013/2014		**Business Tariffs 2013/2014**	
0-6	R -	<200	R 20.96
>6-10	R 5.84	>200	R 21.72
>10-15	R 9.27		
>15-20	R 12.91		
>20-30	R 16.86		
>30-40	R 17.88		
>40	R 21.91		

Table 3-13: City of Johannesburg rising block tariffs in 2023/2024 (City of Johannesburg, 2023)

Residential Tariffs 2023/2024		**Business Tariffs 2023/2024**	
0-6	R -	<200	R 57.61
>6-10	R 24.33	>200	R 60.78
>10-15	R 25.39		
>15-20	R 35.60		
>20-30	R 49.20		
>30-40	R 53.81		
>40-50	R 67.89		
>50	R 72.75		

Billed Consumption:		1522.42	kL/month	*based on the AADD determined for the existing logged meter*
Billed Amount (2013/2014):	R	32 961.38	/month	*using the CoJ rising block tariffs*
Revenue Loss (2013/2014):	R	1 447.84		*based on the Apparent Losses determined for the existing meter*
Revenue Loss (2023/2024):	R	4 807.43		

Billed Amount (2023/2024):	R	109 229.47	/month	*using the CoJ rising block tariffs*
Revenue Loss (2013/2014):	R	1 330.10		*based on the Apparent Losses determined for the alternative meter*
Revenue Loss (2023/2024):	R	4 416.46		
Additional revenue that would have been generated if the alternative meter was employed:	R	390.97	/month	

2013/2014 Tariffs				**Billed**
0-6	R	-	R	-
>6-10	R	5.84	R	23.36
>10-15	R	9.27	R	46.35
>15-20	R	12.91	R	64.55
>20-30	R	16.86	R	168.60
>30-40	R	17.88	R	178.80
>40	R	21.91	R	32 479.72
		Total Billed	**R**	**32 961.38**

2023/2024 Tariffs				**Billed**
0-6	R	-	R	-
>6-10	R	24.33	R	97.32
>10-15	R	25.39	R	126.95
>15-20	R	35.60	R	178.00
>20-30	R	49.20	R	492.00
>30-40	R	53.81	R	538.10
>40-50	R	67.89	R	678.90
>50	R	72.75	R	107 118.20
			R	**109 229.47**

Figure 3-16: An example of the effect of meter accuracy on municipal revenue for meter S-W1-9

3.8 Fire Demand Considerations

Ensuring robust fire protection is paramount, especially in urban areas, where the safety of residents and properties relies heavily on effective firefighting measures. As alluded to in **Section 1.3.1**, incorporating fire flow requirements when sizing a water meter is often at the expense of accurately logging the meter's daily readings.

The approach to evaluating alternative fire demand considerations involved both a literature review and the analysis of an example scenario for a multi-residential and business stand, respectively. The literature review aimed to gain insight and understanding of the alternatives that can be considered when demand for fire flow needs to be considered, as well as the associated benefits and drawbacks. The example scenarios demonstrated the practical implications of sizing a water meter with fire flow provisions, utilising the guidelines in the ***Red Book***.

The following was considered in the estimation of the fire demand for each of the two scenarios:

- The Ncube (2019) dataset did not provide any insight regarding the stands' risk classification or planning parameters, such as floor ratios and on-site firefighting requirements. The water requirements for firefighting in the ***Red Book*** are dependent on a fire-risk category. As such, in the absence of this information, a fire-risk classification was assumed for the stand based on the zoning (refer to **Section 3.6**).
    - As per the definitions provided in the ***Red Book*** (CSIR, 2005) muti-residential stands zoned as Residential 2 and 3, and non-residential stands were assigned a ***Moderate Risk***. The stands zoned as Residential 4 were assigned a ***High Risk***. The minimum design fire flow was calculated using values from Table 9.18 and Table 9.19, converting L/min to kL/hr.
    - The fire risk classification descriptions in the 2019 edition of the ***Red Book*** (DHS, 2019) differ slightly, and a ***Moderate Risk 1*** (categorised as industrial, business, high-rise flats ≥ four storeys) was used for the non-residential stands, and ***Moderate Risk 2*** (categorised as cluster and low-income housing, high rise flats ≤ three storeys) was used for multi-residential stands. The minimum design fire flow was calculated using values from Table J.17 and Table J.18, converting L/s to kL/hr.
- The AADDs calculated previously (using both editions of the ***Red Book***) were adjusted with the relevant Peak Hour Factor. This then provided the Peak Hour Demand (PHD) in kL/hr used to select an appropriate meter size to accommodate the estimated daily consumption. Information regarding the supply zones within which the meters from the dataset are situated was not available in Ncube's (2019) data and therefore assumptions had to be made.

- Figure 9.11 in the 2005 edition of the ***Red Book*** (CSIR, 2005) provides instantaneous peak factors with no indication of the time interval over which the peak flows were measured. As such, the peak hour factors, as suggested by Vorster et al (1995) were used. A PF_{hour} of 4.6 and 3.30 was used for the multi-residential and business stands, respectively.
- Tables J.9 in the 2019 edition of the ***Red Book*** (DHS, 2019) was used. A PF_{hour} of 4.6 and 3.30 was used for the multi-residential and business stands, respectively. The highest peak factors were used because individual stands were considered and not a supply zone. This was based on the premise that the number of consumers influences the peak factor (Diao, et al., 2010). The smaller the number of consumers, the higher the peak factor, and vice versa.

- The fire demand was then added to the PHD, and a new meter size was selected based on the total demand when including fire flow.

3.9 Concluding Remarks

The purpose of this chapter was to outline the methodology developed to address the research objectives and questions. The methods described for manipulating logging data for consumption analysis and generating consumer profiles were intended to yield valuable insights. This chapter underscored the importance of data validation and consistent data analysis to minimize bias whilst investigating the 42 bulk meters that made up the dataset used for analysis in this research study.

The visualization of the flow logging data analysis and meter consumption characteristics assisted significantly in comprehending the consumer profile associated with each meter, which was required for meter size selection and estimating the Apparent Losses. The effect of these Apparent Losses on municipal revenue could be calculated, and the method for applying a step tariff structure was detailed.

Outlining the methodology and steps taken in this research study allows for future research to be undertaken by other researchers through reproducibility or to improve and build on.

The following chapter outlines the results obtained and calculated from the methodology developed.

CHAPTER 4

4 ANALYSIS AND RESULTS

This chapter delves into the data analysis and results of this study.

Chapter 1 presents the research objectives, hypotheses, and questions. To address these, the data analysis is segmented into three sections: Consumption Profiles, On-Site Leakage, and Meter Sizing. Despite the small size of the bulk water meter dataset (42 verified meters), some observations regarding the suitability of the meter sizes are evident.

Appendix A provides individual analysis reports for each meter within the dataset.

4.1 Consumption Profiles

In Chapters 1 and 2, we discussed how each water meter is designed to operate within specific flow rate ranges. If the flow falls outside these designated ranges, it can compromise the accuracy of the water meter readings. Understanding how consumers use water is crucial when selecting the right size water meter. However, consumers' water use information is not typically available upfront.

The proportion of water usage within each meter's flow rate ranges was calculated to gain insight into users' consumption patterns. The results for each meter are presented in **Table 4-1** for multi-residential stands and **Table 4-2** for business stands; grey font was used to indicate flow ranges where no water usage was observed. The percentage of stands with consumption below the meter's starting flow ('<starting flow') was found to be 39% for multi-residential properties and 71% for businesses. Observing these high percentages of low flows at non-residential consumers is understandable as their water use activities are not as prevalent as residential consumers. The percentage of '<starting flow' consumption for multi-residential consumers

was lower, ranging from 0.1% to 3.3%, than that of business consumers, which ranged from 0.1% to 70%. (see **Table 4-3**). Other low flow ('starting flow' and 'minimum flow') percentages are also shown in **Table 4-3**.

Table 4-1: Proportion of flows within the verified meter flow ranges for multi-residential stands

Unique ID	Meter Size (mm)	<Starting Flow	Starting Flow	Minimum Flow Rate (Q_1)	Transitional Flow Rate (Q_2)	Permanent Flow Rate (Q_3)	Maximum Flow Rate (Q_4)	Mean Consumption (kL/hr)
AI-F-1	40	0.0%	0.2%	0.3%	99.5%	0.0%	0.0%	1.48
AI-F-2	40	0.0%	0.3%	0.5%	99.2%	0.0%	0.0%	1.72
EK-H-1	40	0.0%	0.0%	0.0%	83.3%	16.7%	0.0%	20.27
AI-F-3	40	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	3.43
S-W1-1	40	0.0%	0.0%	0.0%	98.7%	0.5%	0.2%	9.93
S-W1-2	40	0.1%	0.4%	8.9%	90.6%	0.0%	0.0%	1.40
EK-H-4	50	1.5%	3.4%	29.4%	65.7%	0.0%	0.0%	0.89
S-W1-6	50	0.0%	0.1%	17.0%	82.9%	0.0%	0.0%	1.09
S-M-3	50	0.1%	0.7%	6.2%	93.0%	0.0%	0.0%	0.87
S-W1-8	80	1.9%	7.7%	17.0%	73.4%	0.0%	0.0%	0.93
S-W1-9	80	0.3%	1.6%	4.4%	93.8%	0.0%	0.0%	2.11
S-W1-14	100	0.0%	0.1%	0.1%	99.8%	0.0%	0.0%	13.83
S-MT-1	100	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	1.20
S-W1-15	100	0.3%	9.4%	37.4%	52.9%	0.0%	0.0%	1.46
S-W1-16	100	0.0%	0.0%	1.5%	98.5%	0.0%	0.0%	5.2
S-W1-17	100	0.2%	6.8%	19.7%	73.3%	0.0%	0.0%	1.95
S-W1-18	100	0.0%	0.1%	0.7%	99.2%	0.0%	0.0%	7.84
S-W1-19	100	0.0%	0.0%	0.1%	99.9%	0.0%	0.0%	16.57
S-W1-20	100	0.6%	15.9%	43.0%	40.6%	0.0%	0.0%	1.18
S-W1-21	100	0.0%	0.4%	4.9%	94.7%	0.0%	0.0%	3.85
EK-H-5	100	0.0%	0.2%	3.4%	96.3%	0.0%	0.0%	4.21
S-W1-22	100	0.0%	0.0%	2.5%	97.5%	0.0%	0.0%	5.05
S-W1-23	100	3.3%	18.2%	66.5%	12.0%	0.0%	0.0%	0.78
S-W1-24	100	1.9%	19.5%	63.4%	15.1%	0.0%	0.0%	0.76
S-W1-25	100	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	6.11
S-W1-26	100	0.3%	4.9%	27.8%	67.0%	0.0%	0.0%	1.78
S-W2-1	150	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	3.02
EK-H-6	150	0.0%	0.0%	0.7%	99.3%	0.0%	0.0%	13.81

Table 4-2: Proportion of flow within the verified meter flow ranges for business stands

Unique ID	Meter Size (mm)	<Starting Flow	Starting Flow	Minimum Flow Rate (Q_1)	Transitional Flow Rate (Q_2)	Permanent Flow Rate (Q_3)	Maximum Flow Rate (Q_4)	Mean Consumption (kL/hr)
S-M-1	40	0.5%	1.9%	2.2%	95.4%	0.0%	0.0%	1.18
EK-H-2	50	0.1%	0.7%	14.4%	84.8%	0.0%	0.0%	1.69
S-W1-3	50	0.1%	0.5%	5.4%	94.0%	0.0%	0.0%	1.46
S-W1-4	50	70.0%	50.4%	38.3%	3.5%	0.0%	0.0%	0.24
EK-H-3	50	0.7%	2.3%	28.3%	68.7%	0.0%	0.0%	0.96
S-W1-5	50	38.8%	9.0%	52.1%	0.0%	0.0%	0.0%	0.10
S-M-2	50	0.0%	0.6%	0.9%	98.4%	0.0%	0.0%	1.67
S-W1-7	80	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	11.77
S-W1-10	100	0.0%	0.4%	0.2%	99.3%	0.0%	0.0%	9.15
S-W1-11	100	0.0%	0.7%	0.8%	80.7%	15.2%	2.6%	8.34
S-W1-12	100	50.0%	46.7%	3.4%	0.0%	0.0%	0.0%	0.21
AI-F-4	100	1.3%	13.2%	22.5%	63.0%	0.0%	0.0%	0.33
S-W3-1	100	3.7%	8.2%	88.0%	0.0%	0.0%	0.0%	0.53
S-W1-13	100	4.5%	13.9%	15.0%	66.6%	0.0%	0.0%	1.14

Table 4-3: Percentage of consumption within the verified meter low flow ranges

	<Starting Flow			Starting Flow			Minimum Flow (Q1)		
Stand Type	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**	**Min.**	**Max.**	**Ave.**
Multi-Residential	0.1%	3.3%	1%	0.1%	19.5%	5%	0.1%	66.5%	16.2%
Business	0.1%	70%	17%	0.4%	50.4%	11.4%	0.2%	88%	20.9%

It's worth noting that the transitional flow range (Q_2) is the most dominant flow range for 89% of multi-residential properties and 71% of businesses, and this is indicative of the fact that the meter size is not necessarily correct. Most meters are oversized. A meter's transitional flow range typically covers a broad spectrum. So, to gain a better understanding, the proportion of flow in meter flow ranges and the frequency of occurrence of different flow rates are analysed below.

The 80mm multi-residential stand meter, S-W1-9, is used in this section as an example. **Figure 4-1** presents (a) the proportion of flows through the meter within the meter's defined flow rate ranges and (b) the frequency of occurrence of flows. Notably, although 93.8% of water usage falls within the transitional flow rate range, the mean flow rate was only 2.11 kL/hr. The kurtosis and skewness values in **Figure 4-1 (b)** provide insight into the distribution of the flow rates. A positive kurtosis value of 5.15 suggests that the distribution has moderately heavy tails compared to a normal distribution, thus indicating the presence of some outliers or flow rates that deviate from the mean, though not to an extreme extent. The positive skewness value of 2.37 indicates a right-skewed distribution, implying more instances of low flow rates compared to high flow rates. In this distribution, while there are some occasional higher flow rate events, they are less extreme and frequent.

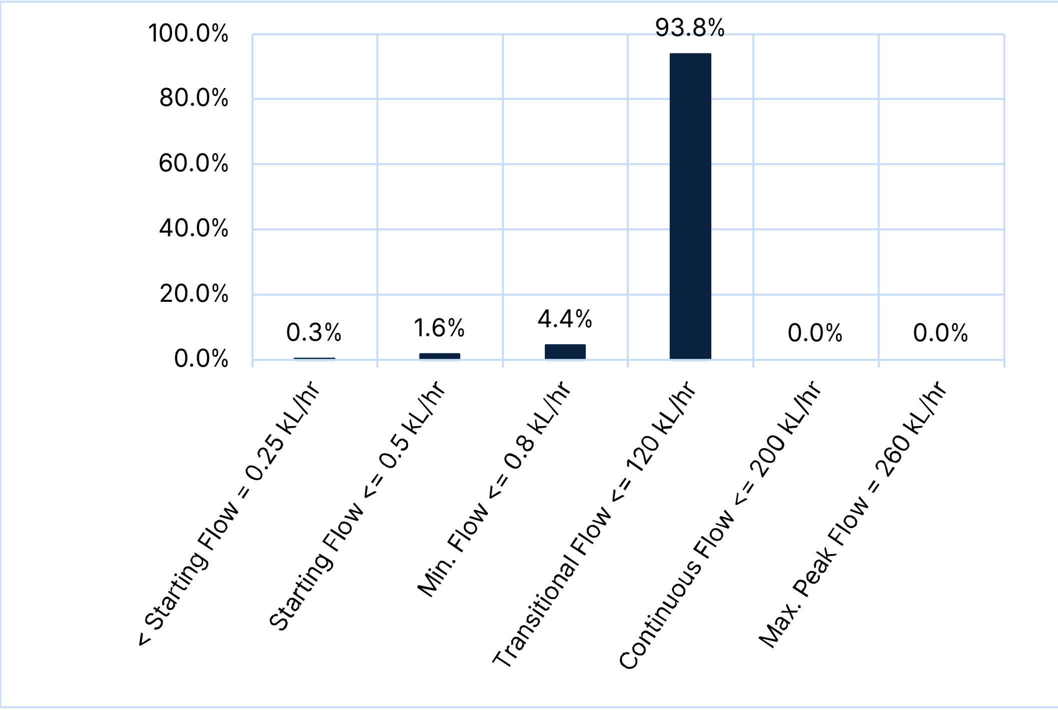

Figure 4-1 (a) Proportion of flow within meter S-W1-9's defined flow rate ranges

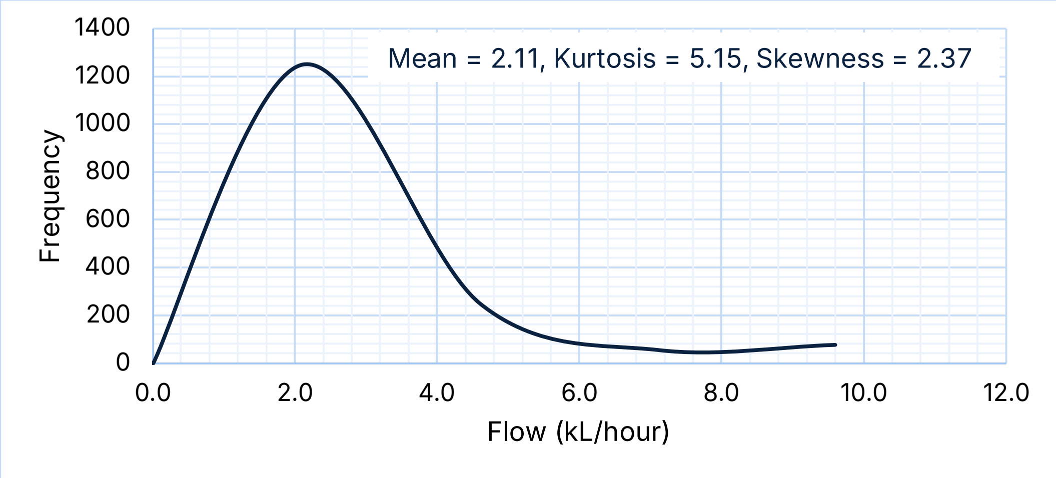

Figure 4-1 (b) Frequency of occurrence of flow through meter S-W1-9

Figure 4-1 (a) and (b): Flow distribution through meter S-W1-9 (an 80mm meter at a multi-residential stand).

Despite the broad transitional flow range of 0.8-120 kL/hr for meter S-W1-9, most flows occur at the low end of this range – for example, the average flow of 2.11 kL/hr occurs within the first 2% of the transitional flow range. For this meter, the maximum flow recorded was 12.54 kL/hr, and this is notably distant from the permanent flow range (120-200 kL/hr). The logging duration for this meter was 13 days. Based on the above consumption characteristics analysed, meter S-W1-9 is significantly over-sized.

Figure 4-2 illustrates the distribution of flow across a range of closer intervals, contrary to the meter's specified flow ranges as shown in **Figure 4-1**. Visually depicting the flow distribution of meter S-W1-9 highlights the concentration of low flow rates and emphasises the absence of flow rates past the 10-15 kL/hr interval. This visual representation supports the above-mentioned analysis that meter S-W1-9 is significantly over-sized.

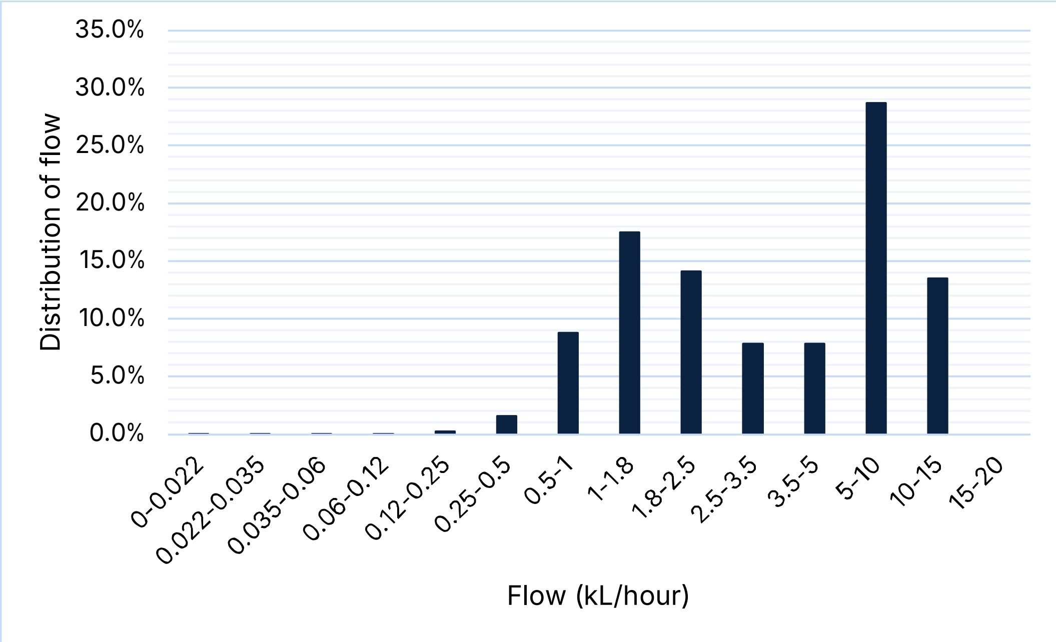

Figure 4-2: Flow distribution through meter S-W1-9 (an 80mm meter at a multi-residential stand)

Similarly, the 100mm business stand meter, AI-F-4, is used as an example. **Figure 4-3** presents (a) the proportion of flows through the meter within the meter's defined flow rate ranges and (b) the frequency of occurrence of flows. Strikingly, only 63.0% of water usage was observed within the transitional flow rate range, accompanied by a mean flow rate of 0.33 kL/hr (see **Figure 4-3 (b)**). A positive kurtosis value of 8.74 is significantly higher than 3, which is the kurtosis of a normal distribution. This high kurtosis value indicates a very peaked distribution with heavy tails, indicating significant outliers or extreme values that are much higher or lower than the mean. The positive skewness value of 2.32, similar to that observed for meter S-W1-9, also indicates a right-skewed distribution. Therefore, in this distribution, there are a significant number of occurrences that are much higher than the mean, but they are less frequent.

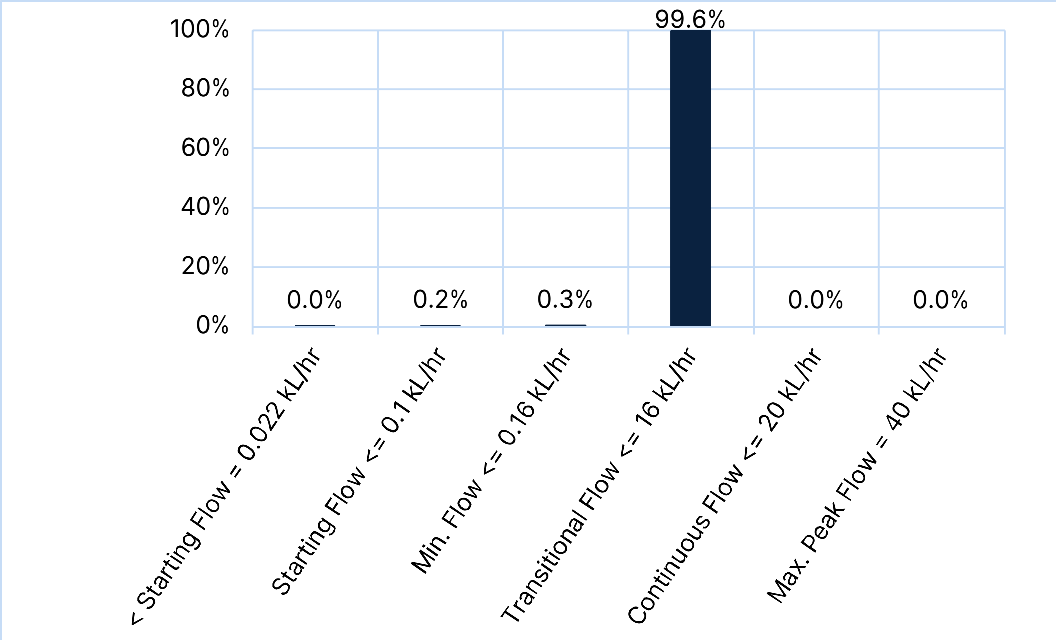

Figure 4-3 (a) Proportion of flow within meter AI-F-4's defined flow rate ranges

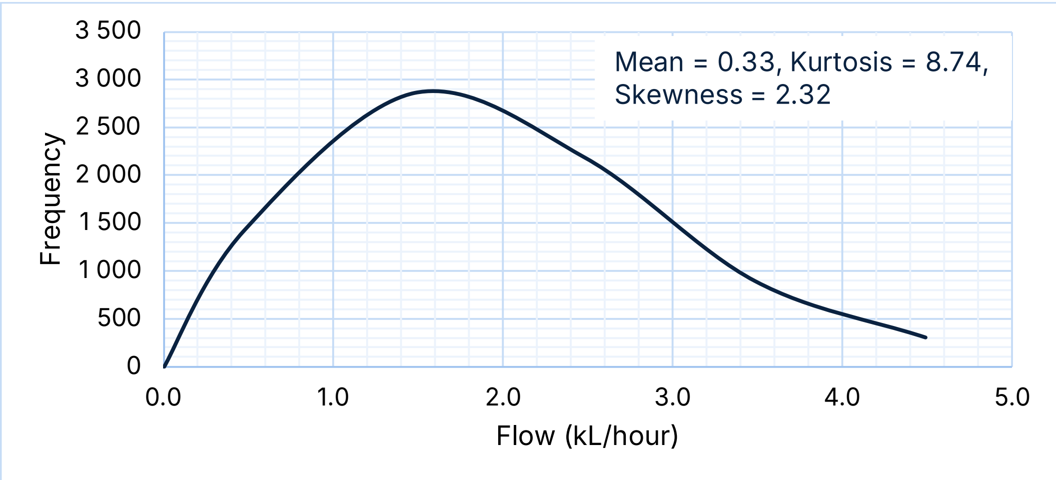

Figure 4-3 (b) Frequency of occurrence of flow through meter AI-F-4

Figure 4-3 (a) and (b): Flow distribution through meter AI-F-4 (an 100mm meter at a business stand).

Given that the transitional flow range for meter AI-F-4 was 0.4-100 kL/hr, most flows occur within the minimum flow range (0.25-0.4 kL/hr) given the average flow of 0.33 kL/hr. The maximum flow observed was 1.8 kL/hr, which represents a minimal portion (1.4%) of the transitional flow range capacity, let alone the permanent flow range (100-125 kL/hr). These consumption characteristics are based on a logging duration of 7 days, and it is evident that meter AI-F-4 is significantly over-sized.

Figure 4-4 highlights that flow rates were not only observed within the minimum flow range, but also well below the starting flow range (<0.07 kL/hr), providing a visual representation that the meter is significantly over-sized.

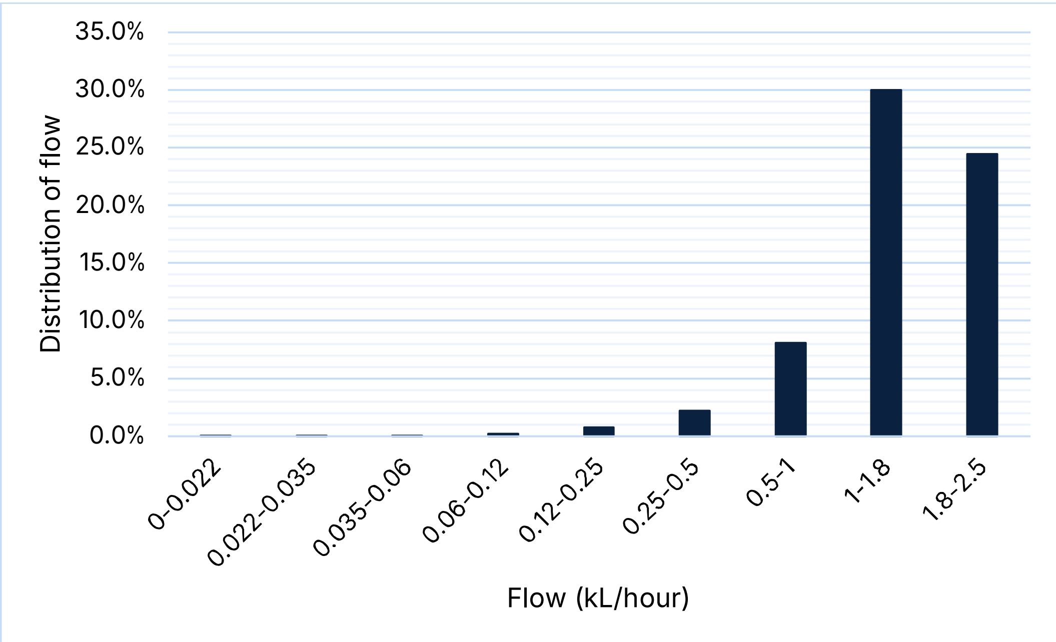

Figure 4-4: Flow distribution through meter AI-F-4 (an 100mm meter at a business stand)

This above analysis of the two meters (S-W1-9 and AI-F-4) emphasises the importance of understanding a customer's daily water use patterns when selecting the appropriate water meter size. Although the meter dataset analysed in this study was small (i.e., 42 No), most meters recorded flow rates far less than the capacities of the existing meter. Only two multi-residential meters (EK-H-1 and S-W1-1) recorded consumption within the permanent flow rate range, measuring 16.7% and 0.5%. For the business stands, only one meter (S-W1-11) recorded consumption in the permanent flow rate range (accounting for 15.2% of total consumption) and some in the maximum flow range (2.6%). However, this meter (S-W1-11) recorded 12 significant spikes ranging from 176-346 kL/hr over a total period of fewer than three minutes. These spikes in flow were observed during typical working hours and on five consecutive workdays. Given the pattern and timing of these spikes, they were unlikely caused by a leak or faulty logger and more plausibly reflect business-specific activities or operational procedures that necessitate brief, high-volume water use (for example, hydrant testing). Consumption below the starting flow was observed for 11 multi-residential meters (40%) and 10 business meters (71%). Although the proportion of flows varied (0.1 to 3.3% for multi-residential meters and 0.1% to 70.0% for business meters), this consumption was considered unregistered by the meters, which is concerning as it can lead to considerable Apparent Losses.

Figures 4-5 and **4-6** present the average daily consumption profiles for all multi-residential and business meters within the dataset, respectively. Despite outlier values, these figures substantiate the observation that most meters recorded flow rates significantly below the capacities of the existing meters.

The consumer profiling findings indicate the widespread issue with the selection of meter sizes, confirming that bulk water meters are often oversized. This mismatch between meter capacity and actual consumer usage patterns results in flows predominantly registering within low flow ranges, where meters are less accurate, indicating the potential for unregistered flow and increasing Apparent Losses. Neglecting to consider how customers will be using water daily puts Municipalities at risk of increased Apparent Losses, which results in financial loss.

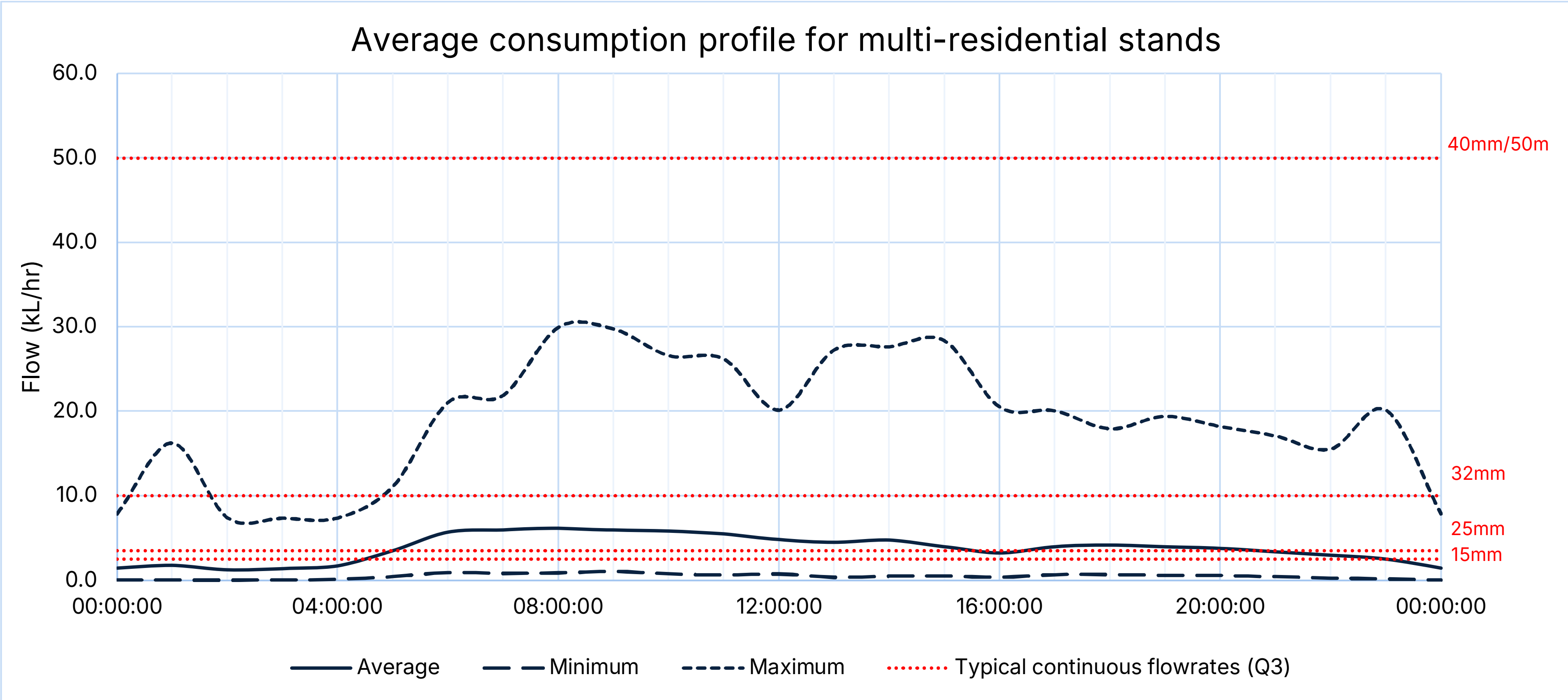

Figure 4-5: Average consumption profile for multi-residential stands

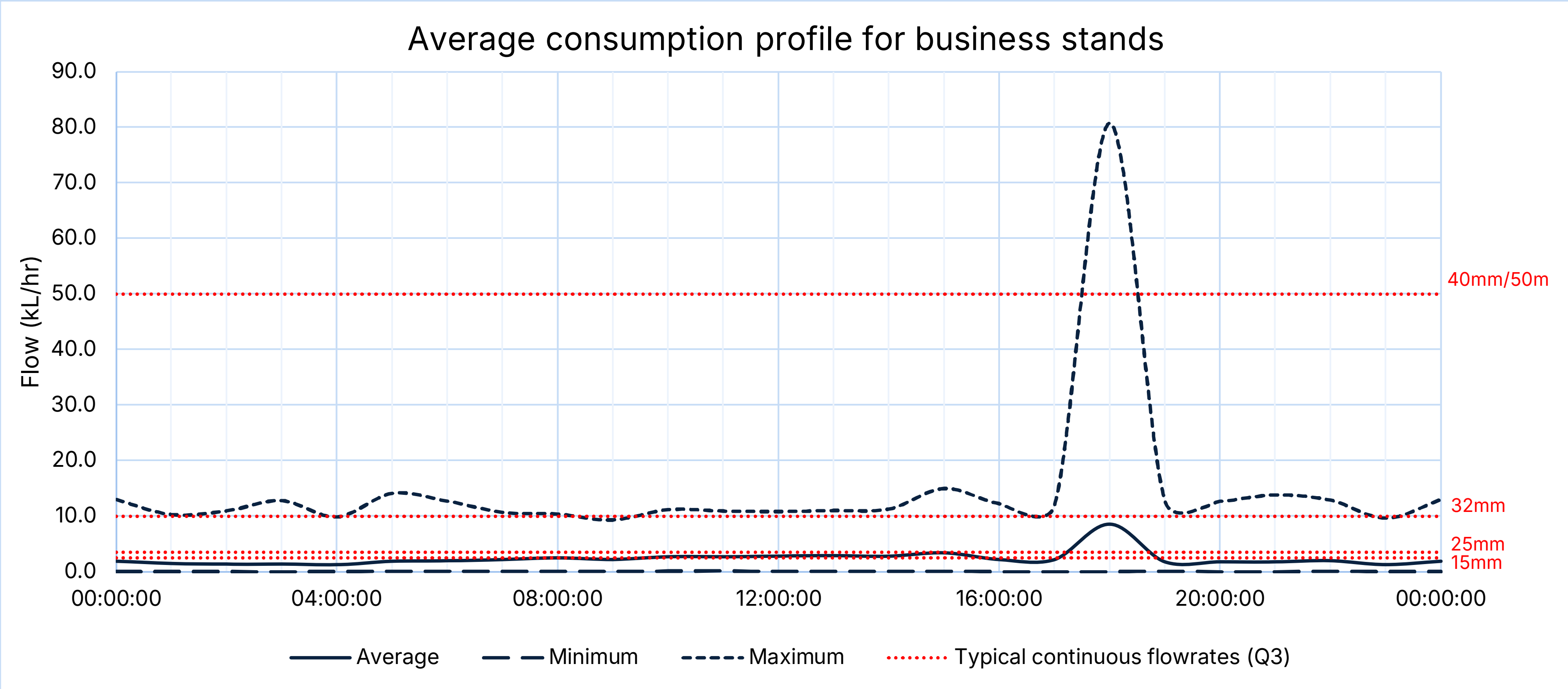

Figure 4-6: Average consumption profile for business stands

The next section presents the extent of on-site leakage, informed by the logged flow data.

4.2 On-Site Leakage

The Minimum Night Flow (MNF) was identified from each meter's logged data by analysing the flow during a specified "night" period, which for this study was defined as 23h00 – 04h00. Flows were recorded at every multi-residential stand and at about 65% of the business stands. In terms of the former, it is improbable that each of the 28 stands had on-site leakage, especially considering some of the findings from complimentary on-site leakage investigations (Couvelis & van Zyl, 2012; Lugoma, et al., 2012; Ncube & Taigbenu, 2016). Some of these studies indicated on-site leakage was observed in as many as 64% of the properties within medium to high-income areas (refer to the additional discussion on this in Section **2.3**). The night-time flow observed in the multi-residential units might be actual consumption due to, for example, flushing of a toilet or showering. This seems probable in stands where the observed MNF and calculated MNF ratios were insignificant. **Table 4-4** and **Table 4-5** summarise the observed MNF for each meter in the multi-residential and business datasets, respectively. **Figure 4-7** and **Figure 4-8** provide a visual summary of the observed MNF ratios. The MNF Ratio was calculated by dividing the MNF by the average flow, i.e., $\frac{MNF}{Average\ Consumption}$.

What was notable from the MNFs observed, regardless of whether it was due to small leaks or actual consumption, was that several stands had MNFs that were below the meter's starting flow. For multi-residential properties, this applied to 14 out of the 28 stands (50%), and for business properties, 10 out of the 11 stands (91%).

To reiterate what was highlighted in **Chapter 2**, a meter is the most inaccurate at low flow rates. A meter's starting flow range is the flow rate at which the meter registers consumption at the maximum permissible error. It does not mean that a meter cannot register any flow below this range, but it will measure with greater degrees of error. Therefore, it can be presumed that the MNFs observed are an under-representation of the actual consumption through the meters as the meters are incapable of accurately reading those flows.

Table 4-4: Minimum night flows for multi-residentials stands

Unique ID	Meter Size (mm)	Average Night Flow (kL/hr)	Average Day Flow (kL/hr)	Max. Flow (kL/hr)	MNF (kL/hr)	Meter Starting Flow (kL/hr)	MNF Ratio
AI-F-1	40	0.408	1.518	5.294	0.024	0.022	1.62%
AI-F-2	40	0.222	1.789	6.870	0.077	0.022	4.48%
EK-H-1	40	5.225	21.715	90.000	2.299	0.15	11.34%
AI-F-3	40	1.021	3.571	16.364	0.137	0.022	3.98%
S-W1-1	40	7.681	10.419	94.737	3.029	0.15	30.50%
S-W1-2	40	0.169	1.423	4.787	0.028	0.15	2.01%
EK-H-4	50	0.185	0.901	4.604	0.002*	0.16	0.25%
S-W1-6	50	0.559	1.177	4.919	0.282	0.15	25.78%
S-M-3	50	0.194	0.888	15.517	0.005*	0.05	0.52%
S-W1-8	80	0.202	0.977	3.161	0.095*	0.25	10.25%
S-W1-9	80	0.145	2.163	12.544	0.025*	0.25	1.20%
S-W1-14	100	8.856	14.509	43.796	0.028*	0.25	0.20%
S-MT-1	100	0.943	1.276	22.250	0.061	0.006	5.11%
S-W1-15	100	0.304	1.481	5.515	0.021*	0.25	1.41%
S-W1-16	100	2.216	5.534	14.694	1.084	0.25	20.83%
S-W1-17	100	0.179	1.984	6.674	0.023*	0.25	1.17%
S-W1-18	100	1.873	8.222	21.251	0.573	0.25	7.31%
S-W1-19	100	3.450	16.943	56.338	0.282	0.25	1.70%
S-W1-20	100	0.124	1.200	4.212	0.024*	0.25	2.06%
S-W1-21	100	0.669	3.965	69.498	0.079*	0.25	2.05%
EK-H-5	100	4.000	4.256	13.433	0.017*	0.25	0.41%
S-W1-22	100	1.322	5.354	15.611	0.866	0.25	17.13%
S-W1-23	100	0.229	0.992	2.600	0.100*	0.25	12.81%
S-W1-24	100	0.217	1.001	3.200	0.100*	0.25	13.07%
S-W1-25	100	2.592	6.537	18.538	1.821	0.25	29.79%
S-W1-26	100	0.307	1.862	7.064	0.188*	0.25	10.59%
S-W2-1	150	0.573	3.166	10.000	0.072	0.035	2.38%
EK-H-6	150	5.067	14.564	38.298	2.736	0.9	19.81%

***Indicates MNFs that were below the meter's starting flow**

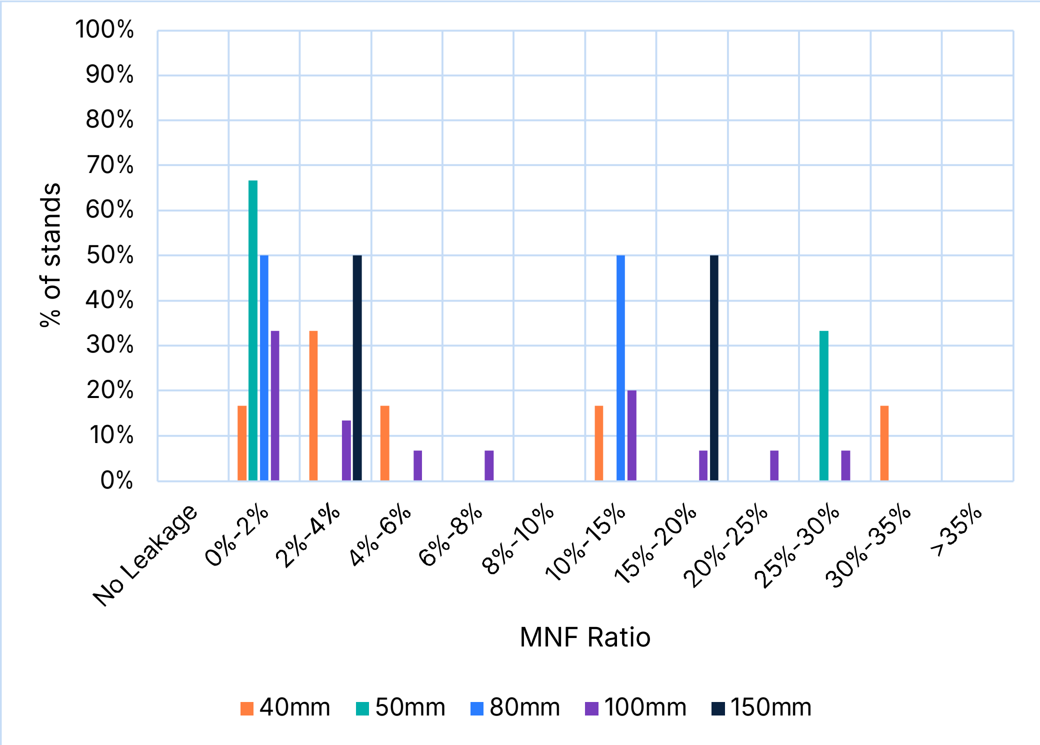

Figure 4-7: MNF ratio percentages at multi-residential stands

Table 4-5: Minimum night flows for business stands

Unique ID	Meter Size (mm)	Average Night Flow (kL/hr)	Average Day Flow (kL/hr)	Max. Flow (kL/hr)	MNF (kL/hr)	Meter Starting Flow (kL/hr)	MNF Ratio
S-M-1	40	0.040	1.239	7.109	0.015*	0.05	1.30%
EK-H-2	50	0.807	1.806	36.000	0.0003*	0.16	0.02%
S-W1-3	50	0.714	1.542	8.145	0.061*	0.15	4.16%
S-W1-4	50	0.000	0.240	0.844	-	0.15	-
EK-H-3	50	0.521	0.968	22.500	0.0002*	0.16	0.02%
S-W1-5	50	0.000	0.097	0.523	-	0.15	-
S-M-2	50	0.118	1.727	20.930	0.017*	0.05	1.00%
S-W1-7	80	11.468	11.848	29.316	7.624	0.25	64.77%
S-W1-10	100	0.021	9.165	19.523	0.016*	0.25	0.18%
S-W1-11	100	0.020	8.352	346.154	0.013*	0.25	0.15%
S-W1-12	100	0.136	0.220	0.881	0.048*	0.25	22.91%
Al-F-4	100	0.185	0.335	1.796	0.001*	0.07	0.41%
S-W3-1	100	0.076	0.568	2.886	0.049*	0.11	9.31%
S-W1-13	100	0.000	1.142	7.944	-	0.25	-

Indicates MNFs that were below the meter's starting flow

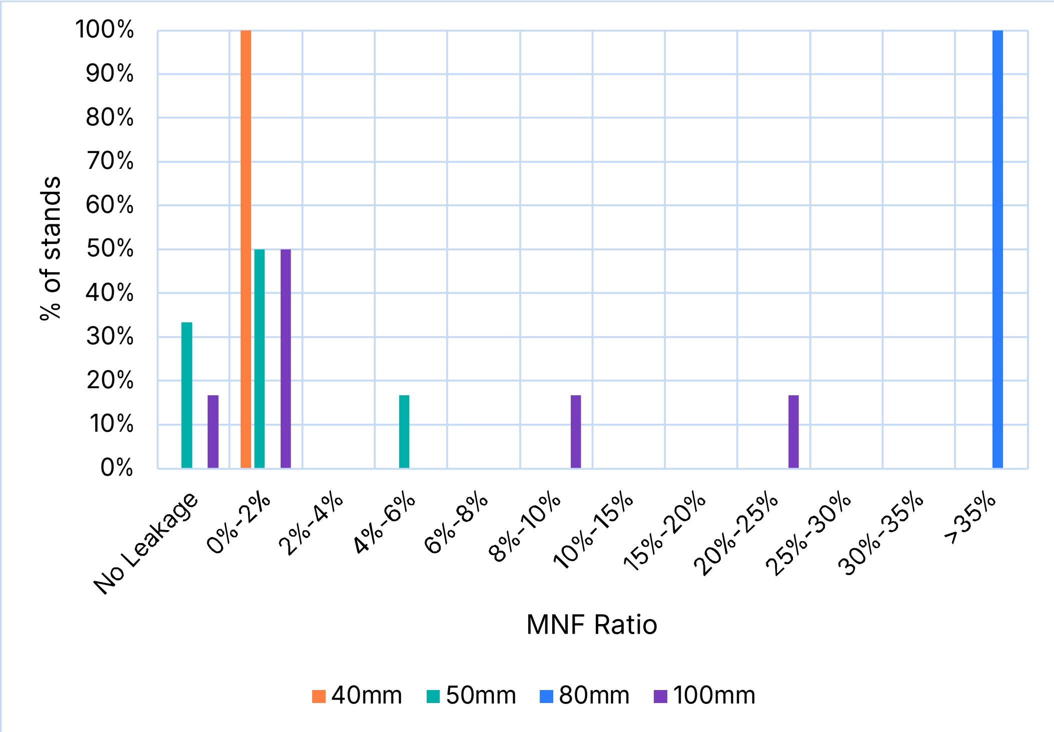

Figure 4-8: MNF ratio percentages at business stands

When considering the stands individually, the observed low flows might seem insignificant. However, once all the meters within a Municipality are given similar due consideration, and the quantities lost are considered over a month or year, the water quantities that are lost through under-registering meters become substantial.

In the next section, the following will be addressed - the meters' ability to reliably register flow, the extent of Apparent Losses, and the selection of more suitable meter sizes.

4.3 Meter Sizing

4.3.1 Meter Reading Accuracy

Figure 4-9 shows the distribution of flow across a range of intervals for meter S-W1-9 (previously highlighted in **Section 4.1**) and the meter's flow ranges (note that Q_1 and Q_2 coincide within the same interval). At each of the meter's flow ranges, the meter has an expected error (refer to **Figure 1-4** that illustrates that a meter's reading accuracy varies across different flow rates).

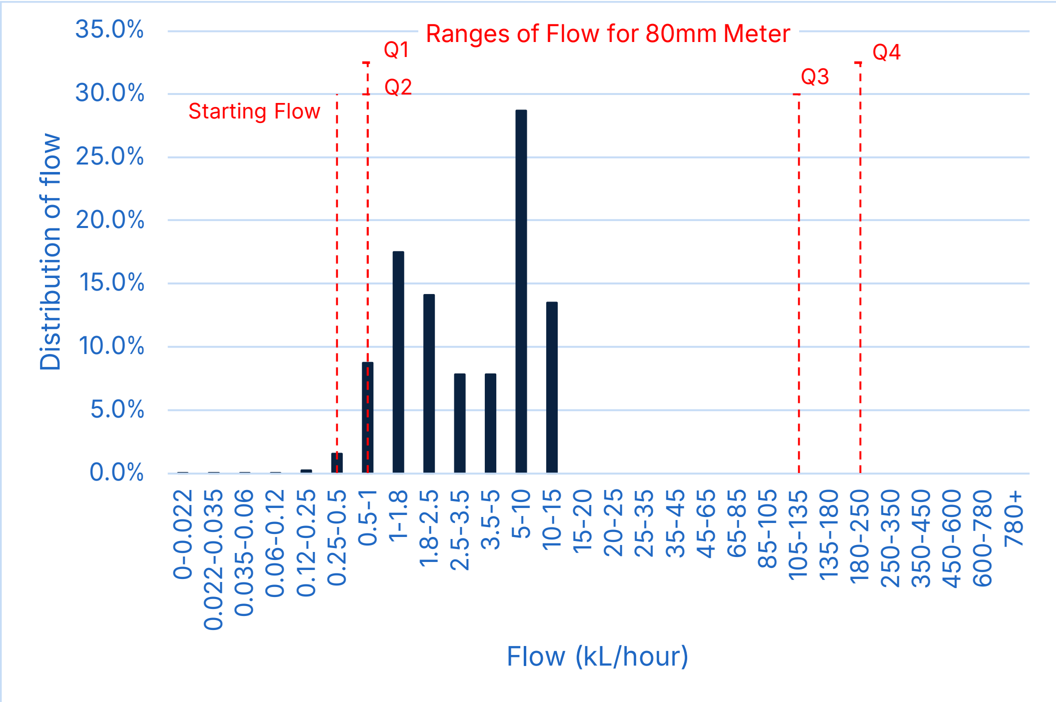

Figure 4-9: Ranges of flow for meter S-W1-9 (an 80mm meter at a multi-residential stand)

Figure 4-10 illustrates the weighted accuracy comparison for meter S-W1-9 across the available meter sizes for this type. The calculated weighted accuracy for meter S-W1-9 is 97.38%, indicating a potential loss of 2.62%. Weighted accuracy provides a more accurate reflection of the meter's performance over time by accounting for fluctuating consumption levels.

As stated in Section **1.3.5**, comparing different meter makes and types is outside of the scope of this research study. However, it is possible that a different meter (be it a different manufacturer or meter type) of the same size might provide a higher accuracy (compared to that of the existing meter) due to the meter's characteristics.

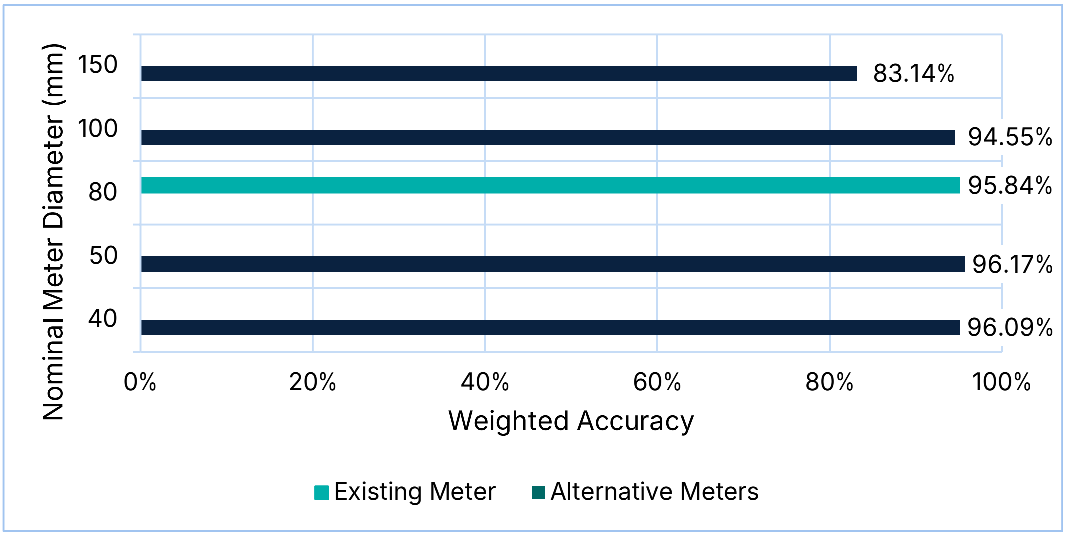

Figure 4-10: Weighted accuracy for various bulk meter sizes compared with meter S-W1-9

Considering that Apparent Losses are billed at the customer retail rate, the significance of the loss through meter S-W1-9 becomes apparent by analysing the stand's AADD of 50.75 kL. The AADD value results in a daily shortfall of 2.20 kL. Projected over time, the cumulative loss amounts to 66.08 kL per month or 803.99 kL per year. The estimated effects of these losses on Municipal revenue are discussed in more detail in the upcoming section.

Selecting a smaller meter for S-W1-9, in this case, a 50mm meter rather than the existing 80mm meter, would yield the best accuracy, i.e., accuracy will increase to 96.17%, and an additional 8.13% of flow will be registered by the meter. It should, however, be noted that the smallest size bulk meter is not necessarily the best suited for all occasions. The meter specification datasheets should always be referenced as it is possible, for example, for the transitional flow range of a 50mm meter to start slightly lower than that of a 40mm meter in the same meter series, and for both to have the same starting flow range values. In the case of this 80mm meter (S-W1-9), whose transitional flow range is 0.8-120 kL/hr, the transitional flow range for the 40mm and 50mm meters in the series started at 0.8 kL/hr and 0.7 kL/hr, respectively.

Table 4-6 and **Table 4-7** present meter accuracy values for the existing meters and the best alternative bulk meter based on the flow profile for multi-residential and business stands, respectively. If the replacement of the existing bulk meter with an alternative would have caused a decrease in accuracy, the alternative meter entry in the tables was indicated as "N/A".

For some meters in **Table 4-6** and **Table 4-7** (e.g., Al-F-1 and S-M-1), an existing 40mm meter is replaced with a 50mm meter, which generates an improved accuracy that, from a practical standpoint, is negligible. Conversely, for some existing meters (e.g., S-M-3 and S-W1-7), replacement with an alternative meter size results in no notable increase in accuracy. This lack of accuracy improvement can be attributed to the meter's performance specifications and the flow profile of the consumer. When all consumption falls within the meter's transitional and permanent flow ranges, the meter error is consistently 3.5%. Consequently, it is plausible that a 100mm and a 40mm meter may both generate a 96.5% accuracy under these conditions. The 100mm meter will, however, be oversized and will constitute an unnecessary expenditure.

Meter S-W1-1 was identified as the only meter where upsizing from the existing 40mm to an 80mm meter would enhance accuracy. Upon closer inspection of the logging data for meter S-W1-1, this upsizing stems from an abnormal spike in the flow recorded during the logging period. This flow momentarily exceeded the Q_{max} flow range of the existing meter (60 kL/hr) for 44 seconds and, shortly after, again for 26 seconds. Despite the very short period, the maximum flow observed was 94.74 kL/hr, which, as per the meter's datasheet, exceeds the "once in a lifetime" Q_{max} that the existing 40mm meter can withstand without incurring permanent damage. However, it should be noted that this stand had a calculated MNF ratio of 30.50%, indicating a significant on-site leak (refer to **Table 4-4**). The spike, observed in the afternoon, may have been related to leak investigation activities.

Table 4-6: Existing and alternative bulk meter sizes and accuracies for multi-residentials stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Alternative Meter Size (mm)	Alternative Meter Accuracy	Difference in Accuracy	Additional Consumption Registered*
AI-F-1	40	96.47%	50	96.48%	-0.01%	0.34%
AI-F-2	40	96.48%	50	96.49%	-0.01%	0.37%
EK-H-1	40	96.50%	50	96.50%	0.00%	-
AI-F-3	40	96.50%	50	96.50%	0.00%	-
S-W1-1	40	95.88%	80	96.50%	-0.62%	15.59%
S-W1-2	40	95.95%	50	96.07%	-0.12%	2.98%
EK-H-4	50	93.36%	40	93.46%	-0.10%	1.54%
S-W1-6	50	95.72%	N/A	-	-	-
S-M-3	50	96.09%	40	96.15%	-0.06%	1.66%
S-W1-8	80	93.05%	50	95.18%	-2.13%	32.19%
S-W1-9	80	95.84%	50	96.17%	-0.33%	8.13%
S-W1-14	100	96.48%	50	96.49%	-0.01%	0.31%
S-MT-1	100	96.50%	50	96.50%	0.00%	-
S-W1-15	100	93.46%	50	96.09%	-2.63%	41.92%
S-W1-16	100	96.43%	40	96.50%	-0.07%	2.03%
S-W1-17	100	94.62%	50	96.16%	-1.54%	29.73%
S-W1-18	100	96.46%	50	96.50%	-0.04%	1.16%
S-W1-19	100	96.49%	50	96.50%	-0.01%	0.26%
S-W1-20	100	92.21%	50	95.72%	-3.51%	47.12%
S-W1-21	100	96.20%	50	96.47%	-0.27%	7.43%
EK-H-5	100	96.28%	40	96.45%	-0.17%	4.81%
S-W1-22	100	96.39%	40	96.50%	-0.11%	3.16%
S-W1-23	100	88.26%	50	95.13%	-6.87%	61.51%
S-W1-24	100	89.53%	50	94.87%	-5.34%	53.79%
S-W1-25	100	96.50%	40	96.50%	0.00%	-
S-W1-26	100	94.40%	50	96.29%	-1.89%	35.06%
S-W2-1	150	96.50%	-	-	-	-
EK-H-6	150	96.47%	40	96.50%	-0.03%	0.88%

Based on the AADD and alternative bulk meter size

Table 4-7: Existing and alternative bulk meter sizes and accuracies for business stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Alternative Meter Size (mm)	Alternative Meter Accuracy	Difference in Accuracy	Additional Consumption Registered*
S-M-1	40	95.74%	50	95.79%	-0.05%	1.13%
EK-H-2	50	95.71%	40	95.72%	-0.01%	0.26%
S-W1-3	50	96.13%	N/A	-	-	-
S-W1-4	50	81.54%	40	81.54%	0.00%	-
EK-H-3	50	94.30%	40	94.35%	-0.05%	0.98%
S-W1-5	50	55.66%	40	55.66%	0.00%	-
S-M-2	50	96.38%	40	96.39%	-0.01%	0.15%
S-W1-7	80	96.50%	40	96.50%	0.00%	-
S-W1-10	100	96.42%	50	96.47%	-0.05%	1.56%
S-W1-11	100	96.24%	N/A	-	-	-
S-W1-12	100	42.76%	50	70.62%	-27.86%	68.92%
AI-F-4	100	92.71%	40	95.94%	-3.23%	46.20%
S-W3-1	100	88.00%	50	94.02%	-6.02%	53.33%
S-W1-13	100	89.87%	50	94.58%	-4.71%	49.13%

Based on the AADD and alternative bulk meter size

Based on the data presented in **Table 4-6** and **Table 4-7**, 4 of the 28 multi-residential meters and 3 of the 14 businesses showed no increase in accuracy. However, with the exception of three meters (S-W1-6, S-W1-3, and S-W1-11), the remaining meters were better suited to a smaller and more appropriate bulk meter size; which would have resulted in decreased accuracy for one multi-residential meter (S-W1-6) and two business meters (S-W1-3 and S-W1-11). The difference in accuracy between the 40mm and 50mm meters was minimal. The more significant differences in accuracy were observed when the larger meters, sized 80mm – 150mm, were replaced with smaller bulk meters.

Except for two meters (EK-H-1, and AI-F-3) – and excluding a fourth (S-W1-1) due to a night flow ratio of 30.5% indicating potential on-site leakage — all other meters were found to be over-sized. The highest recorded accuracy for any existing meter among both multi-residential and business stands was 96.5%. This level of accuracy indicates that the flow was consistently within the transitional and permanent flow ranges, where a 3.5% error is expected. On the lower end, the minimum accuracy observed was 88.26% for multi-residential meters (S-W1-23) and 42.76% for business meters (S-W1-12).

While analysing alternative meter sizes, consideration was given to the replacement of existing meters with 15mm, 25mm, or 32mm meters. None of the manufacturer datasheets for the meters in the dataset had a 32mm meter and was therefore not considered as an alternative bulk meter size. This analysis revealed that while these smaller meters could accurately measure most consumption profiles in the dataset with a high accuracy rate of 96.5%, there were instances where the flow exceeded the meters' maximum flow rate capacity. For example, meter S-M-2 had 2.1% of the total flow registering beyond the meter's Q_4 range. Despite the low percentage of consumption occurring at or beyond the Q_4 range, allowing flow to exceed the maximum capacity for extended periods can lead to permanent damage to the meter; an outcome that must be avoided.

Twenty-one consumers' consumption profiles were suitable for a domestic-sized meter to be used without registering any flow past the Q_3 range, nearly 46% of the dataset size. A 15mm meter would have been suitable for one multi-residential and five business stands, while a 25mm meter would have been appropriate for 10 multi-residential stands and no business consumers. A 32mm meter would have worked for two multi-residential and three business stands; without this option, these stands would have required a 40mm or 50mm meter. As noted by Ncube (2019), the use of 32mm meters is rare. However, 32mm meters exist and can accommodate those high flows that exceed a 25mm meter's permanent flow range (Q_3), and where a 40mm or 50mm meter is considered too large. **Table 4-8** and **Table 4-9** indicate the meter accuracy for existing meters and the suitability of a domestic meter size based on the consumption profile for multi-residential and business stands, respectively. In all instances where flows were larger than the permanent flow range of a domestic-sized meter, "N/A" is indicated in the column.

Table 4-8: Existing and alternative domestic meter sizes and accuracies for multi-residentials stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Alternative Meter Size	Alternative Meter Accuracy	Difference in Accuracy	Additional Consumption Registered*
AI-F-1	40	96.47%	25	96.50%	-0.03%	0.83%
AI-F-2	40	96.48%	25	96.50%	-0.02%	0.54%
EK-H-1	40	96.50%	N/A	N/A	N/A	N/A
AI-F-3	40	96.50%	N/A	N/A	N/A	N/A
S-W1-1	40	95.88%	N/A	N/A	N/A	N/A
S-W1-2	40	95.95%	25	96.50%	-0.55%	14.03%
EK-H-4	50	93.36%	25	96.49%	-3.13%	48.79%
S-W1-6	50	95.72%	25	96.50%	-0.78%	18.85%
S-M-3	50	96.09%	N/A	N/A	N/A	N/A
S-W1-8	80	93.05%	25	96.50%	-3.45%	51.42%
S-W1-9	80	95.84%	N/A	N/A	N/A	N/A
S-W1-14	100	96.48%	N/A	N/A	N/A	N/A
S-MT-1	100	96.50%	N/A	N/A	N/A	N/A
S-W1-15	100	93.46%	25	96.50%	-3.04%	48.17%
S-W1-16	100	96.43%	N/A	N/A	N/A	N/A
S-W1-17	100	94.62%	25	96.50%	-1.88%	36.21%
S-W1-18	100	96.46%	N/A	N/A	N/A	N/A
S-W1-19	100	96.49%	N/A	N/A	N/A	N/A
S-W1-20	100	92.21%	25	96.50%	-4.29%	57.07%
S-W1-21	100	96.20%	N/A	N/A	N/A	N/A
EK-H-5	100	96.28%	N/A	N/A	N/A	N/A
S-W1-22	100	96.39%	N/A	N/A	N/A	N/A
S-W1-23	100	88.26%	15	96.50%	-8.24%	72.73%
S-W1-24	100	89.53%	25	96.50%	-6.97%	68.99%
S-W1-25	100	96.50%	N/A	N/A	N/A	N/A
S-W1-26	100	94.40%	32	96.50%	-2.10%	38.86%
S-W2-1	150	96.50%	32	96.50%	0.00%	-
EK-H-6	150	96.47%	N/A	N/A	N/A	N/A

Table 4-9: Existing and alternative domestic meter sizes and accuracies for business stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Alternative Meter Size	Alternative Meter Accuracy	Difference in Accuracy	Additional Consumption Registered*
S-M-1	40	97.24%	32	96.50%	-0.76%	18.58%
EK-H-2	50	97.41%	N/A	N/A	N/A	N/A
S-W1-3	50	97.70%	32	96.50%	-0.37%	9.86%
S-W1-4	50	82.74%	15	96.48%	-14.94%	83.89%
EK-H-3	50	96.18%	N/A	N/A	N/A	N/A
S-W1-5	50	57.23%	15	96.39%	-40.73%	95.30%
S-M-2	50	97.89%	N/A	N/A	N/A	N/A
S-W1-7	80	98.00%	N/A	N/A	N/A	N/A
S-W1-10	100	97.92%	N/A	N/A	N/A	N/A
S-W1-11	100	97.78%	N/A	N/A	N/A	N/A
S-W1-12	100	42.86%	15	96.50%	-53.74%	97.29%
AI-F-4	100	94.33%	15	96.48%	-3.77%	53.64%
S-W3-1	100	90.64%	15	96.50%	-8.50%	73.40%
S-W1-13	100	91.31%	32	96.50%	-6.63%	67.82%

Existing bulk meters can be replaced with domestic-sized meters, but then the entire connection from the mainline will have to be downsized. Otherwise, the pressure drop will be significant. Therefore, engagement with the relevant consumer would be necessary before replacement, to allow the consumer time to adjust their internal reticulation. Municipalities often have the authority, as per their Water Services By-laws, to install and replace water meters, including changing the size of the meter, if they deem it necessary. These by-laws typically grant the Municipality the right to make decisions regarding the type, size, and capacity of water meters based on various factors. If meter downsizing is applicable, the relevant Municipal by-laws should be consulted.

The following provides illustrative examples of municipal by-laws regarding water meter sizing and installation, as demonstrated by the regulations of two South African cities. In Section 30(7) of the City of Johannesburg Water Services By-laws (City of Johannesburg, 2023), the Council has the authority to replace an existing water meter with one of a size it considers necessary if it determines that the volume of water supplied to the premises makes the current meter size inappropriate. Similarly, Section 45(1) of the City of Ekurhuleni Water Services By-laws (City of Ekurhuleni, 2023) stipulates that the City will decide the appropriate type, size, and capacity of the water meter or measuring device at any premises' water connection. Furthermore, Section 45(4) allows for the City to substitute the meter for one of a different size or type to measure current average daily water consumption better, adapt to changes in consumption patterns, respond to a consumer request, or for other reasons deemed valid by the City.

4.3.2 Estimated Effects on Municipal Revenue

A very small difference in Apparent Losses due to upward meter replacement can become significant once extrapolated. Conversely, a slight increase in accuracy can result in sizable increases to revenue, especially when considering the scale of a Municipality. **Table 4-10** and **Table 4-11** summarise the estimated loss in monthly revenue for the existing bulk meters, based on the CoJ's rising block tariffs for 2013/2014 and 2023/2024 (refer to **Table 3-12** and **Table 3-13**). The potential gain in revenue for installing a suitably sized alternative meter, based on the 2023/2024 rising block tariffs, is also indicated.

Considering the calculated additional revenue for multi-residential stands (as per **Table 4-10**), the cumulative estimated monthly revenue increase, considering the most suitable alternative meter size (domestic or bulk), amounts to R28,259.29. This additional revenue exhibits a range from R17.81 to R4,212.28 per individual meter. Over a year, this corresponds to a substantial total of R339,111.43 in additional revenue derived solely from 23 meters (meters annotated with an * in **Table 4-10**).

Table 4-10: Monthly revenue loss due to meter inaccuracy and additional revenue gained from alternative meter size for multi-residential stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Monthly Revenue Loss (2013/2014)	Monthly Revenue Loss (2023/2024)	Additional Revenue – Bulk Meter Alternative	Additional Revenue – Domestic Meter Alternative
Al-F-1	40	96.47%	R853.67	R2 834.52	R9.67	R23.61*
Al-F-2	40	96.48%	R991.74	R3 292.98	R12.10	R17.81*
EK-H-1	40	96.50%	R11 600.59	R38 518.63	R-	N/A
Al-F-3	40	96.50%	R1 963.36	R6 519.15	R-	N/A
S-W1-1	40	95.88%	R6 733.01	R22 356.31	R3 484.80*	N/A
S-W1-2	40	95.95%	R931.41	R3 092.64	R92.27	R433.95*
EK-H-4	50	93.36%	R998.13	R3 314.21	R50.91	R1 616.90*
S-W1-6	50	95.72%	R772.28	R2 564.29	R-	R483.28*
S-M-3	50	96.09%	R560.53	R1 861.18	R30.97*	N/A
S-W1-8	80	93.05%	R1 089.99	R3 619.22	R1 165.05	R1 860.91*
S-W1-9	80	95.84%	R1 447.84	R4 807.43	R390.97*	N/A
S-W1-14	100	96.48%	R7 960.93	R26 433.49	R82.52*	N/A
S-MT-1	100	96.50%	R683.86	R2 270.68	R-	N/A
S-W1-15	100	93.46%	R1 612.79	R5 355.12	R2 244.74*	R2 579.52
S-W1-16	100	96.43%	R3 039.22	R10 091.43	R205.05	N/A
S-W1-17	100	94.62%	R1 747.53	R5 802.50	R1 724.87	R2 101.18*
S-W1-18	100	96.46%	R4 540.36	R15 075.83	R174.25*	N/A
S-W1-19	100	96.49%	R9 506.45	R31 565.22	R83.26*	N/A
S-W1-20	100	92.21%	R1 577.53	R5 238.04	R2 468.21	R2 989.25*
S-W1-21	100	96.20%	R2 399.32	R7 966.70	R591.87 *	N/A
EK-H-5	100	96.28%	R2 567.57	R8 525.38	R410.03 *	N/A
S-W1-22	100	96.39%	R2 986.68	R9 916.97	R313.14 *	N/A
S-W1-23	100	88.26%	R1 744.19	R5 791.43	R3 562.40	R4 212.28*
S-W1-24	100	89.53%	R1 656.39	R5 499.90	R2 958.54	R3 794.14*
S-W1-25	100	96.50%	R3 497.37	R11 612.68	R-	N/A
S-W1-26	100	94.40%	R1 663.60	R5 523.83	R1 936.67	R2 146.57*
S-W2-1	150	96.50%	R1 730.71	R5 746.66	N/A	R-*
EK-H-6	150	96.47%	R7 970.07	R26 463.82	R233.06*	N/A
Total			**R84 827.15**	**R281 660.21**		

Suitable alternative meter

Likewise, in the case of business stands (as per **Table 4-11**), the collective monthly revenue augmentation totals R24,813.79. The revenue uplift varies from R4.00 to R11,882.02 per meter, resulting in a yearly increase of R297,765.49 from 12 meters (meters annotated with an * in **Table 4-11**).

Table 4-11: Monthly revenue loss due to meter inaccuracy and additional revenue gained from alternative meter size for business stands

Unique ID	Existing Meter Size (mm)	Existing Meter Accuracy	Revenue Loss (2013/2014)	Revenue Loss (2023/2024)	Additional Revenue – Bulk Meter Alternative	Additional Revenue – Domestic Meter Alternative
S-M-1	40	95.74%	R821.22	R2 298.05	R25.93	R426.93*
EK-H-2	50	95.71%	R1 181.42	R3 306.02	R8.58*	N/A
S-W1-3	50	96.13%	R920.18	R2 574.99	R-	R254.00*
S-W1-4	50	81.54%	R850.17	R2 379.07	R-	R1 995.84*
EK-H-3	50	94.30%	R911.18	R2 549.78	R24.88*	N/A
S-W1-5	50	55.66%	R1 213.20	R3 394.96	R-	R3 235.30*
S-M-2	50	96.38%	R984.77	R2 755.72	R4.00*	N/A
S-W1-7	80	96.50%	R6 676.41	R18 682.87	R-	N/A
S-W1-10	100	96.42%	R5 313.21	R14 868.18	R232.27*	N/A
S-W1-11	100	96.24%	R5 096.52	R14 261.81	R-	N/A
S-W1-12	100	42.76%	R4 364.34	R12 212.92	R8 416.89	R11 882.02*
AI-F-4	100	92.71%	R409.39	R1 145.61	R529.32	R614.46*
S-W3-1	100	88.00%	R1 127.42	R3 154.91	R1 682.56	R2 315.78*
S-W1-13	100	89.87%	R2 012.59	R5 631.91	R2 767.17	R3 819.73*
Total			**R31 882.02**	**R89 216.82**		

Suitable alternative meter

Figure 4-11 illustrates the cumulative revenue loss for both multi-residential and business stands, as per the figures provided in **Tables 4-8** and **4-9**.

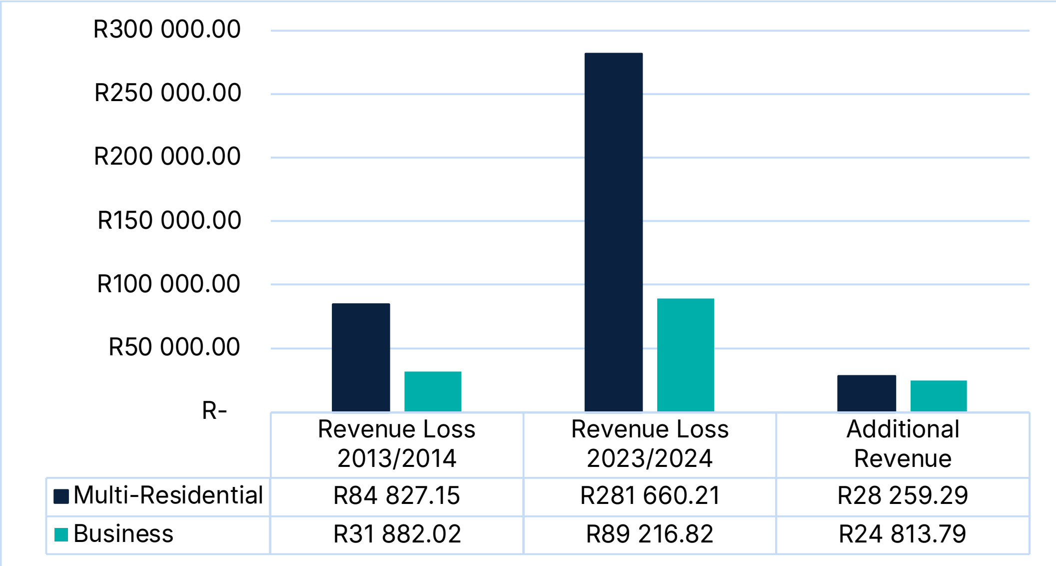

Figure 4-11: Cumulative monthly revenue loss due to meter inaccuracy and additional revenue gained from alternative meter size

Opting for meter sizes that align optimally with the daily consumer profile and ensuring the highest accuracy could generate a cumulative additional annual revenue of R636,876.92 from 35 meters. Extrapolating this discovery to encompass the bulk meters integrated into municipal billing systems, it becomes evident that the potential for incremental revenue amounts to millions annually. This effect is further magnified when considering that sewer charges are contingent on monthly water consumption charges.

4.3.3 Comparative Analysis of Calculated AADD

The original criteria used to determine the size of the existing water meters are not documented in Ncube's (2019) data. Using the methodology described in Section **3.6,** the AADD for each stand was calculated. Interestingly, there is a notable difference between the AADD calculated for multi-residential stands using the CSIR (2005) ***Red Book*** and the DHS (2019) ***Red Book*** (see **Figure 4-12**). The results for the latter are less scattered and relatively linear. The difference is not as exaggerated for the business stands, as seen in **Figure 4-13**.

A regression analysis was conducted to compare the AADD determined using the CSIR (2005) and DHS (2019) guidelines and the AADD derived from the logged consumption data. These results are illustrated in **Figure 4-14 (a and b)** and **Figure 4-15 (a and b),** respectively. The R^2 value for multi-residential stands is 0.17 and 0.05 (for the CSIR (2005) and DHS (2019) editions, respectively), which in both cases, suggests a weak correlation between the AADD measurements. In contrast, the business stands exhibit an R^2 value of 0.79 in both cases, signalling a much stronger correlation. It is suspected that if the AADD for business stands were adjusted to include fire flow requirements, the correlation might significantly diminish.

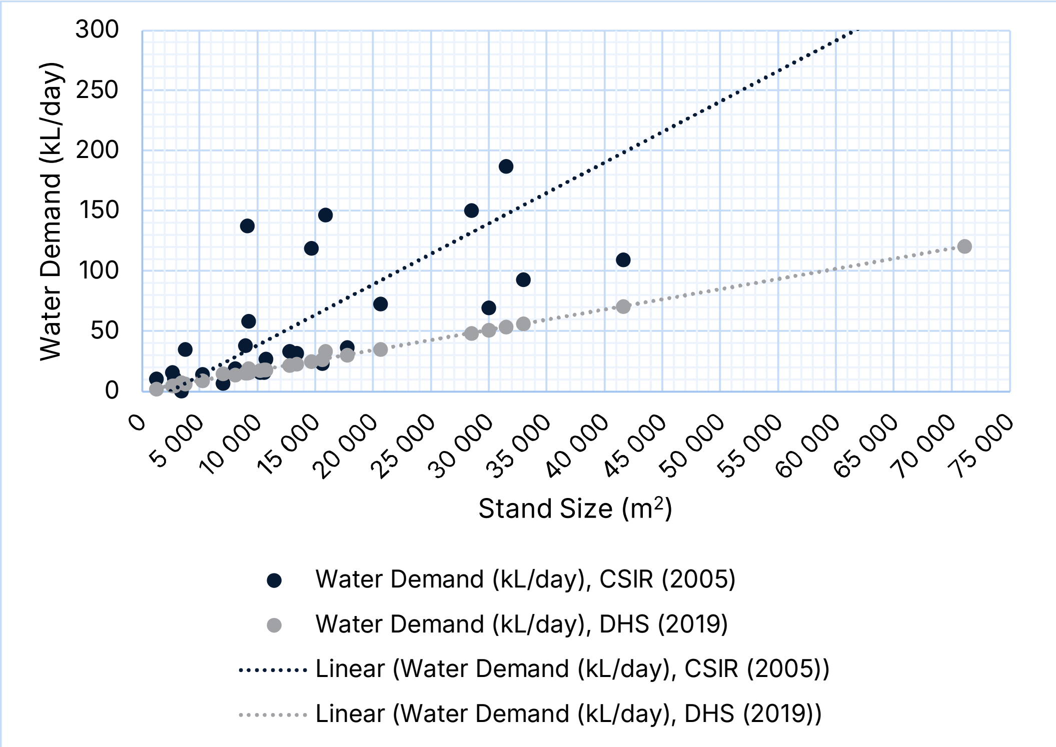

Figure 4-12: AADD calculated for multi-residential stands using the CSIR (2005) ***Red Book*** and the DHS (2019) ***Red Book.***

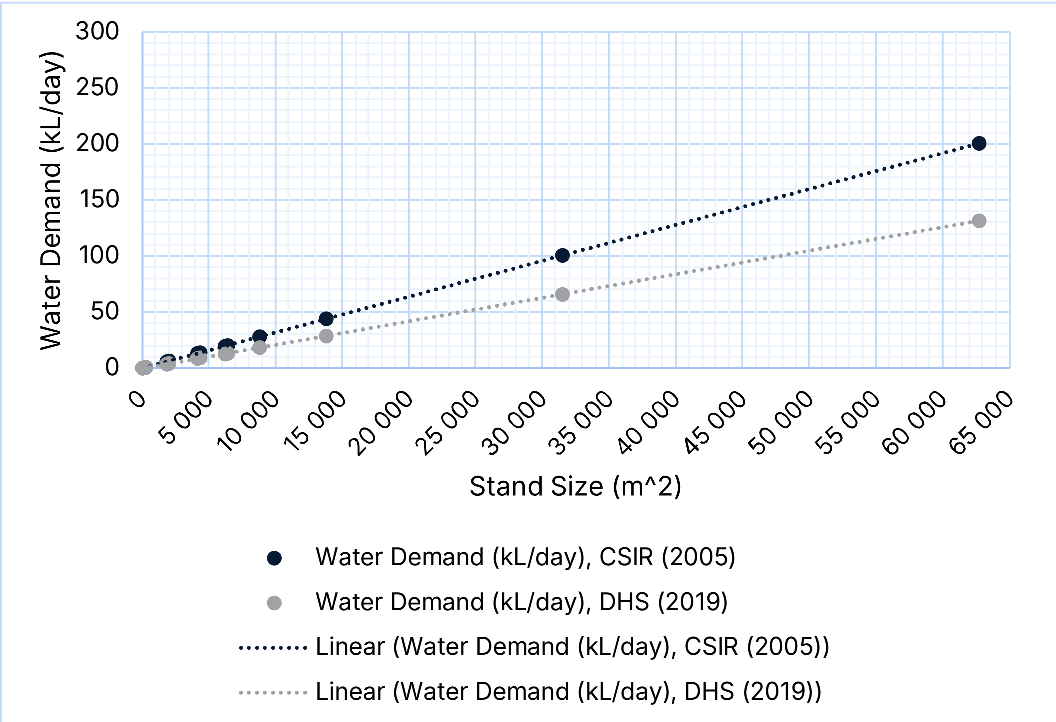

Figure 4-13: AADD calculated for business stands using the CSIR (2005) ***Red Book*** and the DHS (2019) ***Red Book.***

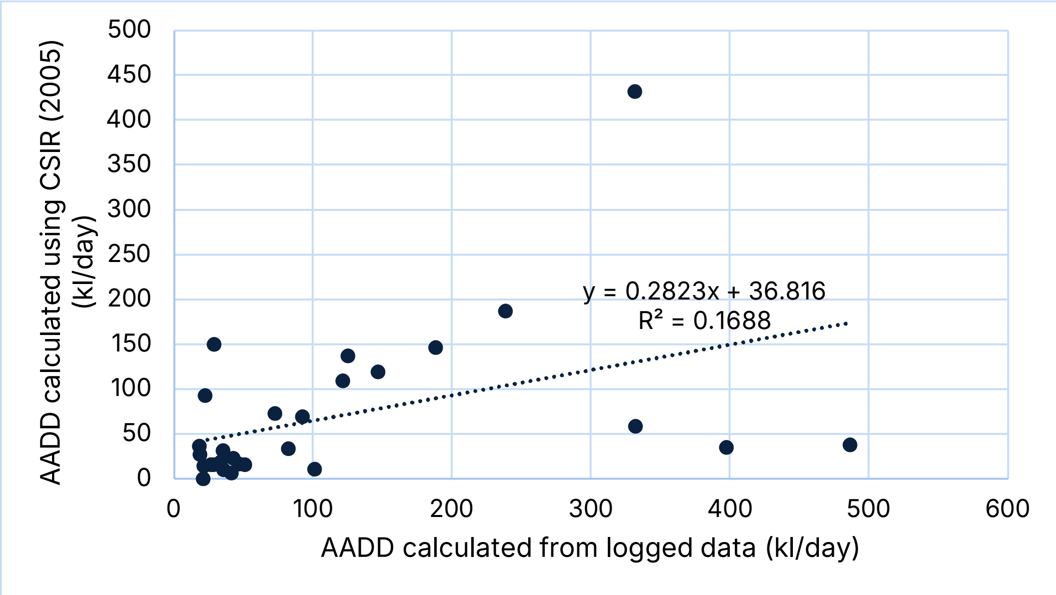

Figure 4-14 (a): The relationship between the AADD calculated using the CSIR (2005) and the AADD that was calculated from logged data for multi-residential stands.

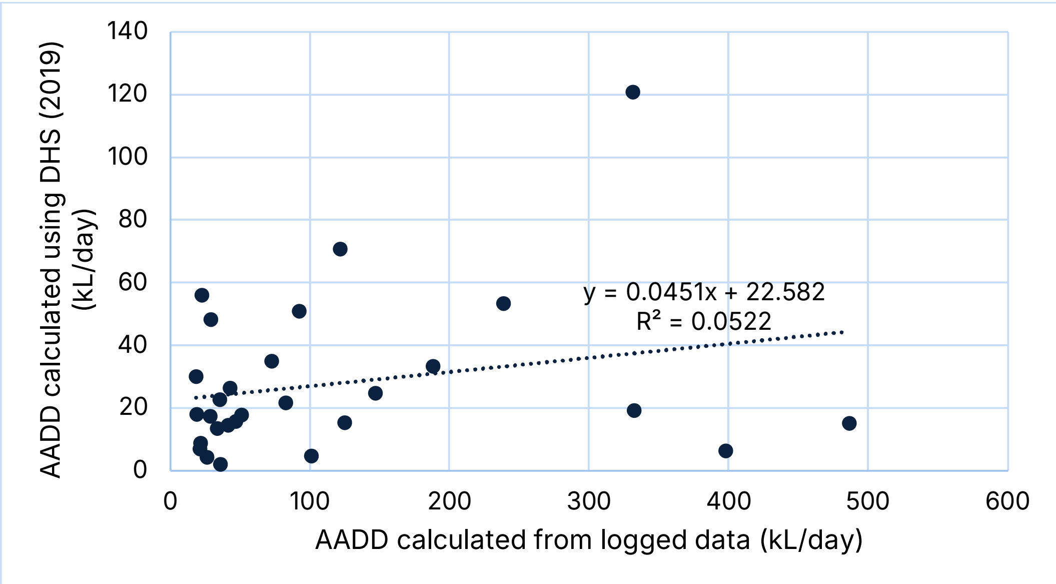

Figure 4-14 (b): The relationship between the AADD calculated using the DHS (2019) guidelines and the AADD that was calculated from logged data for multi-residential stands.

Figure 4-14 (a) and (b): The relationship between the AADD calculated using the CSIR (2005) and DHS (2019) guidelines and the AADD that was calculated from logged data for multi-residential stands.

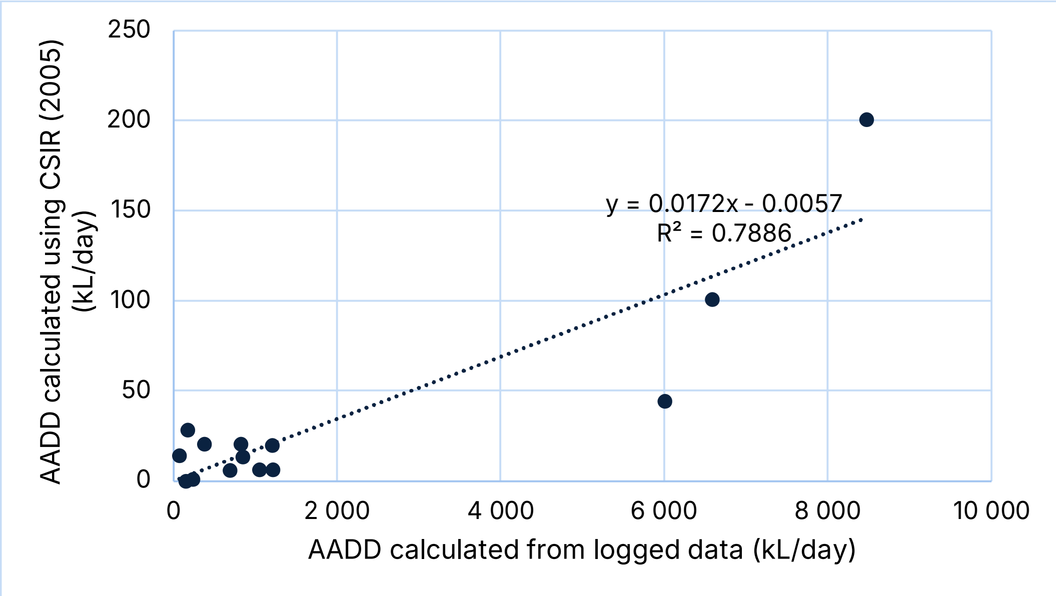

Figure 4-15 (a): The relationship between the AADD calculated using the CSIR (2005) and the AADD that was calculated from logged data for business stands.

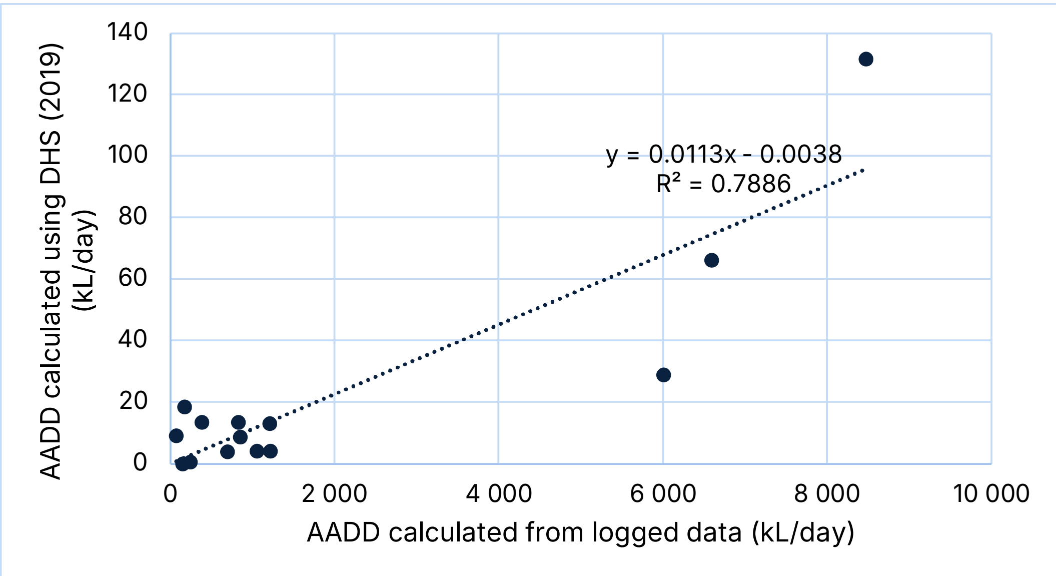

Figure 4-15 (b): The relationship between the AADD calculated using the DHS (2019) guidelines and the AADD that was calculated from logged data for business stands.

Figure 4-15 (a) and (b): The relationship between the AADD calculated using the CSIR (2005) and DHS (2019) guidelines and the AADD that was calculated from logged data for business stands.

4.3.4 Water Demand for Fire Fighting

Ncube's (2019) data lacks specific information concerning fire requirements and on-site firefighting equipment, such as hose reels, hydrants, sprinklers, etc. However, similar to the estimation of the AADD, fire flow demands can also be estimated using the ***Red Book*** guidelines. To demonstrate the impact of incorporating fire demand on the sizing of existing meters, a multi-residential meter (S-W1-15) and a business meter (AI-F-4) from the dataset were analysed. **Table 4-12** and **Table 4-13** summarise the relevant details and results from calculating the AADD based on the CSIR (2005) and DHS (2019) ***Red Books*** and selecting an appropriate meter size given the calculated peak hour demand (PHD). These tables further outline the calculated required fire demand and reassess the meter sizing to ensure it accommodates fire demand.

A domestic meter would have been suitable in both cases (S-W1-15 and AI-F-4) based on the AADD calculated. Incorporating fire demand resulted in oversizing the meter, with the estimated daily peak demand registering within the existing multi-residential meter's transitional flow range and below the business meter's starting flow range. The above scenarios highlight the impact of incorporating fire demand into meter sizing. The effects of oversized meters on meter accuracy and municipal revenue were elaborated in sections **4.3.1** and **4.3.2**, respectively.

If a fire occurred at the location with meter S-W1-15, a domestic-sized meter would be insufficient to meet the fire flow requirements, even at its maximum flow rate (Q_{max}). If firefighting efforts rely on on-site storage tanks equipped with pumps, it's important to note — as highlighted in Section **2.4.1** — that domestic-sized meters can be adversely affected by low flow conditions. Therefore, installing a UFR valve is advised to mitigate these issues. For premises with storage tanks directly supplied by the meter, municipal by-laws should ideally mandate the installation of UFR valves to ensure safety and efficiency in emergency situations.

Table 4-12: Details and characteristics of example multi-residential meter S-W1-15 used for a fire flow scenario

Unique ID				**S-W1-15**
Existing meter size (mm)				100
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.25	0.8	1.8	230	300

Calculated AADD using CSIR (2005) ***Red Book*** (kL/day)	32.0
Peak Hour Demand (PHD) (kL/hr) using PF = 4.6	6.13

Suitable meter size (mm) – Section **4.1**, **Table 4-8**	25
Q_3 range(kL/hr)	3.5 – 7.00
Comment: A 15mm meter would not be suitable because the PHD of 6.13 kL/hr will be greater than the meter's overload flow rate (Q_4) of 3.125 kL/hr.	

Fire demand (CSIR, 2005) (kL/hr)	360
Total demand (kL/hr)	366.13

Meter size to accommodate fire flow (mm)				100
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.25	0.8	1.8	230	300
Comment: The continuous flow (Q_3) range for a 150mm meter is 450 kL/hr, which would accommodate the fire flow, and the transitional flow (Q_2) range starting at 4 kL/hr will register the PHD of 6.1 kL/hr. However, the starting flow (Q_{start}) range is 1 kL/hr whereas a 100mm meter provides a Q_{start} of 0.25 kL/hr. A 100mm meter can accommodate the fire flow (although it will fail) and provides a lower starting flow range to accommodate low flows.				

Calculated AADD using DHS (2019) ***Red Book*** (kL/day)	22.70
Peak Hour Demand (PHD) (kL/hr) using PF = 4.60	4.35

Suitable meter Size (mm) – Section **4.1**, **Table 4-8**	25
Q_3 range (kL/hr)	3.5 – 7.00
Comment: A 15mm meter would not be suitable because the PHD of 4.35 kL/hr will be greater than the meter's overload flow rate (Q_4) of 3.125 kL/hr.	

Fire Demand (DHS, 2019) (kL/hr)	90
Total Demand (kL/hr)	94.35

Meter size to accommodate fire flow (mm)				80
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.1	0.2	0.51	120	200
Comment: A 50mm meter would not be suitable because the total demand of 94.35 kL/hr will be greater than the meter's overload flow rate (Q_4) of 90 kL/hr. An 80mm meter can accommodate both the PHD and the fire flow.				

Table 4-13: Details and characteristics of example business meter AI-F-4 used for a fire flow scenario

Unique ID				**AI-F-4**
Existing meter size (mm)				**100**
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.07	0.25	0.4	100	125

Calculated AADD using CSIR (2005) ***Red Book*** (kL/day)	0.80
Peak Hour Demand (PHD) (kL/hr) using PF = 3.30	0.11

Suitable meter size (mm) – Section **4.1**, **Table 4-8**				15
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.002	0.0156	0.025	2.5	3.125
Comment: A 15mm meter can register the PHD of 0.11 kL/hr and is the smallest meter size available.				

Fire demand (CSIR, 2005) (kL/hr)	360
Total demand (kL/hr)	360.11

Meter size to accommodate fire flow (mm)				150
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.09	0.254	0.406	160	200
Comment: The fire flow exceeds even the 150mm meter's Q_4 of 200 kL/hr for this meter type, even though the starting flow of 0.11 kL/hr would be accommodated. Unfortunately, regardless of the bulk meter chosen when considering other meter types, none has a starting flow low enough to accommodate the PHD of 0.11 kL/hr and a fire flow of 360.11 kL/hr.				

Calculated AADD using DHS (2019) ***Red Book*** (kL/day)	0.53
Peak Hour Demand (PHD) (kL/hr) using PF = 3.30	0.07

Suitable meter Size (mm) – Section **4.1**, **Table 4-8**				15
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.002	0.0156	0.025	2.5	3.125
Comment: A 15mm meter can register the PHD of 0.07 kL/hr and is the smallest meter size available.				

Fire Demand (DHS, 2019) (kL/hr)	180
Total Demand (kL/hr)	180.07

Meter size to accommodate fire flow (mm)				100
Q_{start} (kL/hr)	Q_1 (kL/hr)	Q_2 (kL/hr)	Q_3 (kL/hr)	Q_4 (kL/hr)
0.07	0.25	0.4	100	125
Comment: The continuous flow (Q_3) range for a 150mm meter is 200 kL/hr, which would accommodate the fire flow, but the starting flow (Q_{start}) range starting at0.09 kL/hr will not register the PHD of 0.07 kL/hr. A 100mm meter can accommodate the fire flow (although it will fail) and provides a lower starting flow range to accommodate the PHD of 0.07 kL/hr.				

In contrast, for bulk meters, considering the findings from Mac Bean & Ilemobade (2019) that the average extracted fire flow for 99.7% of all fire incidents in the City of Johannesburg had an average of less than 900 L/min (54 kL/hr), a meter can be selected and designed to fail during a fire event. This means that it will be expected that the meter will operate in the overload flow range and will, therefore, sustain permanent damage. This approach provides the option to accommodate fire flow demand whilst measuring daily consumption accurately and then replacing the meter after a fire event. **Table 4-14** provides the maximum peak/overload flow rates of a typical Woltmann type meter often used within South African Municipalities, drawing attention to the potential for meters to handle much larger flows during emergencies.

Table 4-14: Example overload flow rates for typical Woltmann type water meters

Meter Size (mm)	Q_{max} (kL/hr)
40	60
50	90
80	200
100	300
150	600

4.4 Concluding Remarks

The analysis conducted in this research has shed light on critical aspects of incorrect water meter sizing for multi-residential and business stands and its impact on municipal revenue generation, especially when accommodating fire flow demands.

In the evaluation of meter accuracy (Section **4.3.1**), it became evident that the choice of meter size profoundly affects the measurement of daily water consumption. Oversized meters, while capable of accommodating high flow rates, mostly register flow in the lower zones or transitional flow range of the meter during daily usage, which compromises measurement accuracy. This oversizing compromises the billing process and may lead to significant revenue losses, as demonstrated in the estimates presented in Section **4.3.2**.

Conversely, choosing smaller, more accurately sized meters can yield additional revenue for Municipalities, particularly when extrapolated across the entire Municipality. Inaccurately measured consumption affects the water consumption billed and the sewer charges, which are typically based on water consumption.

Section **4.3.3** examined the correlation between the calculated Average Annual Daily Demand (AADD) recommended by the CSIR (2005) and DHS (2019) ***Red Book*** guidelines and the AADD derived from logged consumption data. While there was a weak correlation for multi-residential stands, the business stands exhibited a much stronger correlation, indicating the opportunity for investigating the demands suggested by the DHS (2019) ***Red Book***, similar to the studies done considering the previous editions of the ***Red Book*** (Section **4.3.3**).

One of the most critical findings of Section **4.3.4** was the impact of including fire demand in the sizing of meters. When fire flow requirements were considered, meters were oversized to accommodate these demands, which led to a substantial compromise. While these oversized meters can handle the high flow demands during a fire emergency, they do not accurately measure daily water usage. The scenarios discussed in Section **4.3.4** emphasised the challenges of balancing these competing demands.

CHAPTER 5

5 SUMMARIES, CONCLUSION AND RECOMMENDATIONS

The study aimed to investigate the impact of incorrectly sized bulk water meters, considering multi-residential and business users, on water consumption and municipal revenue. In support of this, a systematic approach was developed to assess the implications of incorrect meter sizing on municipal revenue from resulting Apparent Losses.

A crucial recurring consideration in this study was the observation that water meters exhibit varying levels of accuracy across their measuring range for different flow rates. When flow rates are observed outside of these ranges (too low or too high), the accuracy of the meter readings is compromised, which contributes to Apparent Losses.

This chapter summarises the main findings and conclusions from this research and reviews how the stated research objectives and questions were addressed.

5.1 Research Summaries

5.1.1 Objective 1, Highlights and Remarks

Objective 1:

Using logged data from a verified and validated dataset of installed bulk meters, to generate consumption profiles and determine on-site leakage for some multi-residential and business consumers of potable water.

Study Highlights:

Based on the consumption profiles generated using the logged data and the on-site leakage determined, the results highlight the importance of understanding consumers' daily water use when selecting a water meter size.

The study presents detailed observations on water use patterns across multi-residential and business stands within the dataset and found that flow below the meters' starting flow range was observed at 40% of the multi-residential stands and 71% of the business stands. Most meters within the dataset were found to be over-sized based on the consumption patterns of the consumers. This over-sizing is particularly evident in the transitional flow range (Q_2) analysis, where the majority of the flow was recorded at the lower end of the range, far below the capacity of the meters considering the permanent flow range (Q_3) and maximum flow (Q_4).

A notable highlight from the MNF analysis was that 50% of the multi-residential and 91% of the business stands had MNFs observed below the meter's starting flow. Due to the increased inaccuracy of mechanical meters when measuring low flows, it is presumed that the MNFs observed in this study are an under-representation of the actual consumption through the meters.

The low flows observed at each stand might appear negligible. Still, given the high percentage of stands within the dataset where low flow was observed, the results suggest that the Apparent Losses due to meter under-registration can become substantial when extrapolated to consider all the meters within a Municipality.

Concluding Remarks:

In addressing Objective 1, the study supports the view from the literature that there is a widespread issue with oversizing bulk meters (Van Zyl, 2011; Couvelis, 2012), leading to inaccuracies in low flow rate measurement or resulting in unregistered flows. Although on-site leakages occur after the meter, the high occurrence of low-intensity and the associated inaccuracies or omissions of flow recorded directly affects the Non-Revenue Water of Municipalities resulting in a potential financial loss.

5.1.2 Objective 2, Highlights and Remarks

Objective 2:

To size the installed bulk multi-residential and business meters in the dataset using reliable estimates of demands.

Study Highlights:

Through the detailed analysis of the consumption profiles of the 42 meters in the dataset, the results indicated that 35 stands would have benefitted from an alternative meter size, which provided an increased weighted accuracy. Although the accuracy difference between a 40mm and 50mm meter was negligible from a practical standpoint, when larger meters were downsized, the improvement in accuracy was more noticeable.

Sizing water meters based on logged consumption data yields the best results because they provide insights into nuanced usage patterns over time. However, it is noted that this type of detailed data is rarely available or practical, and so water demand remains mostly estimated. The Fixture Value Approach and Average Annual Daily Demand (AADD) are two common methods used for demand estimation. The Fixture Value Approach still typically results in the oversizing of both service lines and water meters and updates are required to make it more relevant to modern times. The approach considers the worst-case instantaneous peak demand that could occur, and it is a common approach to match the theoretical water demand with the performance specification of water meters (Johnson, 2001).

In South Africa, the AADD is typically estimated using the guidelines from the ***Red Book*** and various studies suggest that residential consumers have more predictable water use patterns than non-residential consumers. The study provides a comparative analysis of the calculated AADD from logged data and the AADD determined using the ***Red Book*** guidelines (both the CSIR (2005) and DHS (2019) versions). A weak correlation was observed for the multi-residential stands using both versions of the guidelines. A much stronger correlation was observed for the business stands; however, if fire demand was incorporated, the correlation might significantly diminish. This weak correlation suggests that the current methods for estimating AADD might not be entirely reflective of actual water use, especially for multi-residential stands.

It is important to note that the Fixture Value Method would have been a more accurate approach for meter sizing due to its consideration of instantaneous peak demand. However, due to the lack of detailed information on the type and quantity of fixtures, the study was constrained to use the AADD method.

Concluding Remarks:

The more closely a water meter is matched to a consumer's usage pattern, the more water will be accounted for and billed. To mitigate the Apparent Losses due to meter under-registration at low flow rates, the study suggests a better understanding and consideration of consumers' daily water usage patterns when selecting a meter size. The results from using the ***Red Book*** AADD estimation suggests that there is still room for improvement in developing more accurate estimates based on consumer profiles.

5.1.3 Objective 3, Highlights and Remarks

Objective 3:

To size the installed bulk multi-residential and business meters in the dataset for fire demand.

Study Highlights:

Considering the two meters from the dataset that were analysed, a domestic-sized meter would have been more suitable in both cases, based on the AADD calculated, and the incorporation of fire flow requirements resulted in significantly over-sized meters changing the meter sizes from a 15mm to 100mm, and a 25mm to 150mm, respectively.

In light of the findings relating to bulk meter sizing for fire demand, several recommendations and implications emerge. First, meter sizing decisions must carefully balance the need for accuracy in billing with the need to accommodate fire flow demands. One alternative to accommodate the demand for firefighting is to have on-site storage tanks, which could allow for the use of a domestic-sized meter. However, many papers suggest that the installation of a tank downstream of the meter may cause under-registration of the water meter (Ferrante, et al., 2023), due to the low flow conditions associated with re-filling the tank after usage. In these cases, Municipalities should consider the installation of UFR valves to reduce Apparent Losses (Couvelis & van Zyl, 2012; Mutikanga, et al., 2011; Fantozzai, et al., 2009; Yaniv, 2009). For bulk meters, allowing meters to fail during fire events and replacing them afterwards may be a viable strategy to accommodate fire flow without sacrificing the need to measure daily consumption accurately. As per the findings from six studies (Ilemobade, 2023) the fire flows in both SANS 10090 and the ***Red Book*** were much larger than the average fire flows that were recorded for the fire incidents and are therefore deemed conservative.

Concluding Remarks:

Ultimately, the study's results underscore the complexity of water meter sizing decisions and their far-reaching implications for Municipalities. Careful consideration of meter size and accurate measurement of water demand and fire flow requirements is essential to ensure efficient operations and revenue generation while meeting critical fire safety needs. Further research and monitoring of metering practices will be crucial in optimising these decisions for the benefit of both Municipalities and consumers.

5.1.4 Objective 4, Highlights and Remarks

Objective 4:

To determine the impact of the incorrectly sized bulk multi-residential and business meters on water consumption and municipal revenue.

Study Highlights:

Considering the 35 stands that would have benefitted from an alternative meter size, the study estimated that an additional R636,876.92 could have been generated within one year, were these meters more appropriately sized to match the daily consumer profile. Extrapolating these findings across all municipal bulk meters highlights the possibility of accumulating millions in additional revenue annually.

Concluding Remarks:

The potential for additional revenue through more appropriate meter sizing based on a consumer's daily water use underscores the importance of this issue. The recurring revenue that Municipalities generate from logging water meter consumption is a critical revenue stream to ensure cash flow for service delivery. In addressing Objective 4, the study highlights that incorrectly sized meters have a direct impact on meter accuracy and municipal revenue collection.

5.2 Future Research and Recommendations

Based on the research exclusions and results from the study, there is opportunity for future research. These include:

- The dataset analysed consisted of 28 multi-residential and 14 business users. Analysis of larger datasets would be useful in gaining further insight into the Apparent Losses from bulk-sized meters.
- Consumer profiles were generated based on a minimum seven-day flow logging period, allowing for weekday and weekend usage patterns. Longer durations of flow logging would provide better insight into usage patterns. The consideration of seasonal variation would also be beneficial with regard to developing consumption patterns and assessing the seasonal consumption fluctuations for multi-residential and business users.

- The estimated effects on municipal revenue excluded the analysis of consumer historic consumption or billing data, which could provide further insight into the effect of the Apparent Losses on revenue, also considering that sewer charges are based on monthly water consumption charges. The study also did not consider the payback period should the bulk meters have been down-sized.
- The estimated Apparent Losses only considered the weighted accuracy given the consumer profile and meter size. The additional Apparent Losses due to meter age were not estimated, which would contribute to the estimated effects on municipal revenue.
- The use of 32mm meters was only briefly considered in this study. There is opportunity to better assess the inclusion of 32mm meters as a standard alternative meter size, to bridge the gap between a 25mm and 40mm or 50mm meter.
- The use of electromagnetic flow and ultrasonic water meters were not considered. The benefit and feasibility of their use in municipal metering of larger consumers could be investigated.
- The fire flow demand estimations were done using the ***Red Book*** guidelines, however there are studies noting the flows suggested are conservative. There is opportunity to re-assess the meter sizing considering empirical firefighting data.
- Given the consumer profiles, the peak factors observed (as well as the frequency of occurrence) can be assessed and compared with those suggested in the ***Red Book*** guidelines.

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Appendix A **Individual Meter Analysis Reports**

Example Extract of Reports to reduce file size - Refer to full document submitted for all reports

Diameter:	40 mm	Meter Type:	[redacted]	*Single Bulk*
Meter Reference:	AI-F-1	Estimated Meter Age:	3.3 year(s)	*At time of Ncube's (2019) logging*
Stand Type:	Multi-Residential	No. of Units:	13	
Stand Size:	1251 m^2	AADD (S):	12.247 kL/day	*Based on Swift data*

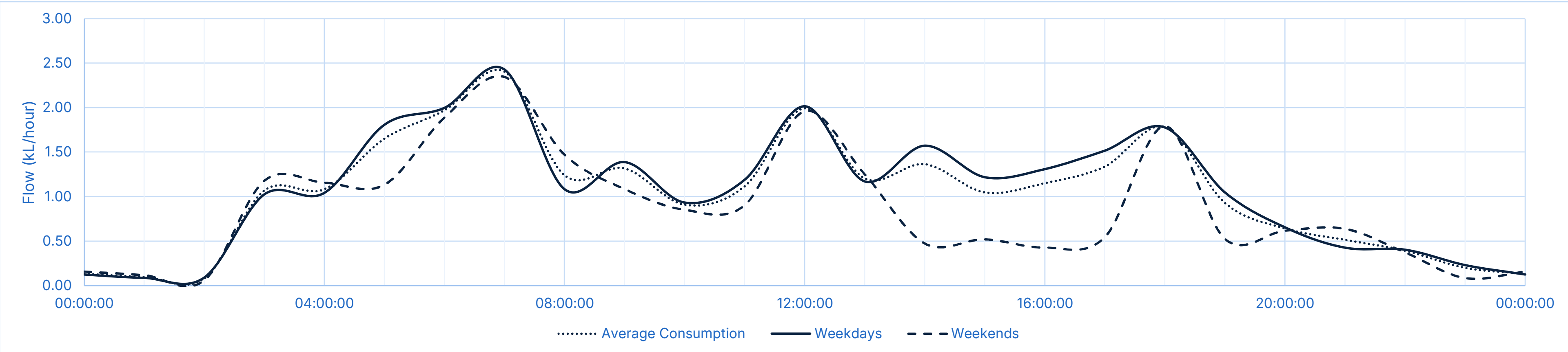
Logging Intervals:	Pulse Based	No. Of Intervals:	7 721	*Observations*
Start Time:	16:09:00	End Time:	13:40:40	
Start Date:	2014/05/09	End Date:	2014/05/15	
Logging Duration:	141.5 hrs	AADD:	35.49	kL/day

LOGGED CONSUMPTION CHARACTERISTICS

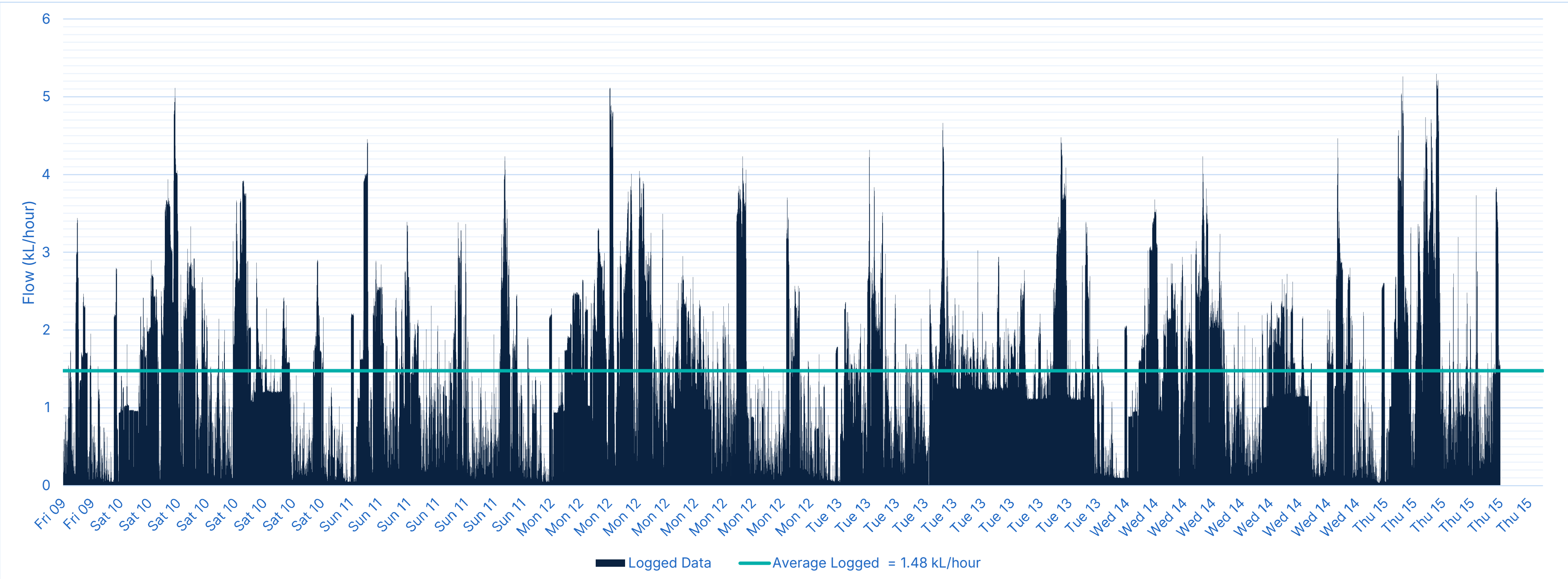
Maximum Flow:	5.29	kL/hour	Average Day Flow:	1.52	kL/hour	*Day Period: 04h00 - 23h00*
Minimum Night Flow:	0.02	kL/hour	Average Night Flow:	0.41	kL/hour	*Night Period: 23h00 - 04h00*
Night Flow Ratio:	1.62%		Average Flow:	1.48	kL/hour	

CONSUMPTION PROFILE

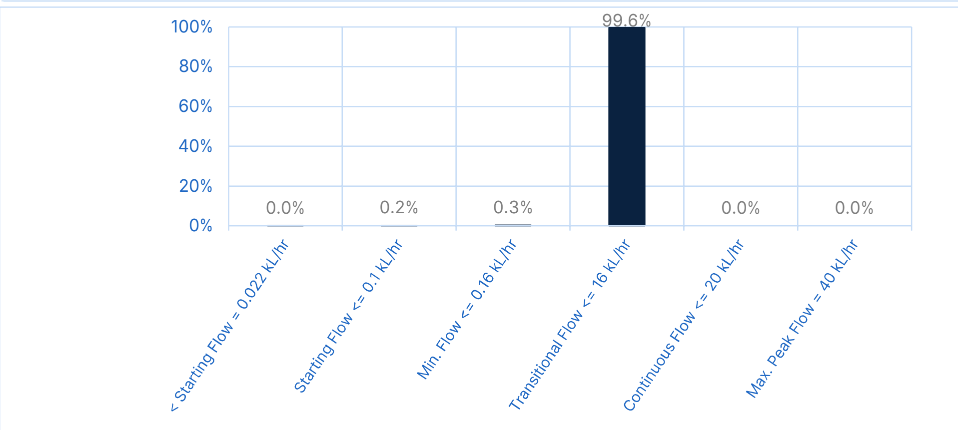
Daily Average



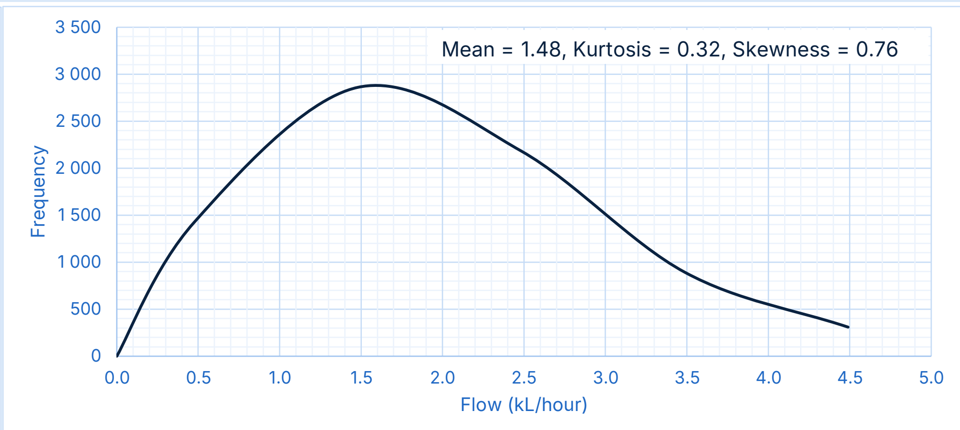
Logged Consumption



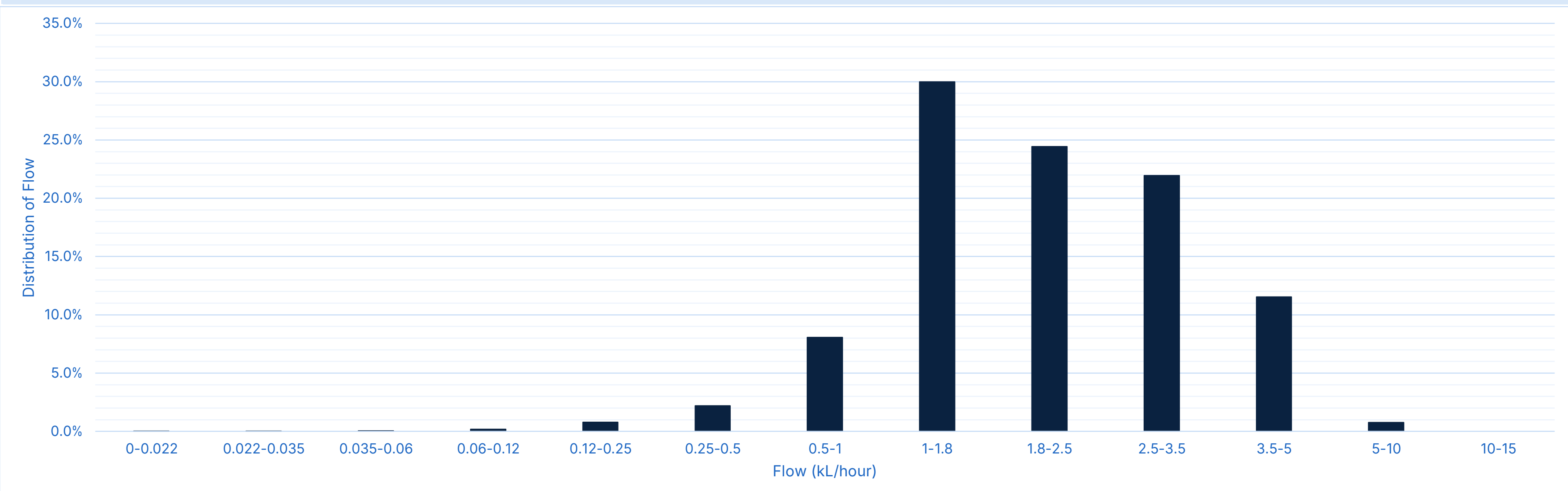
Flow Range



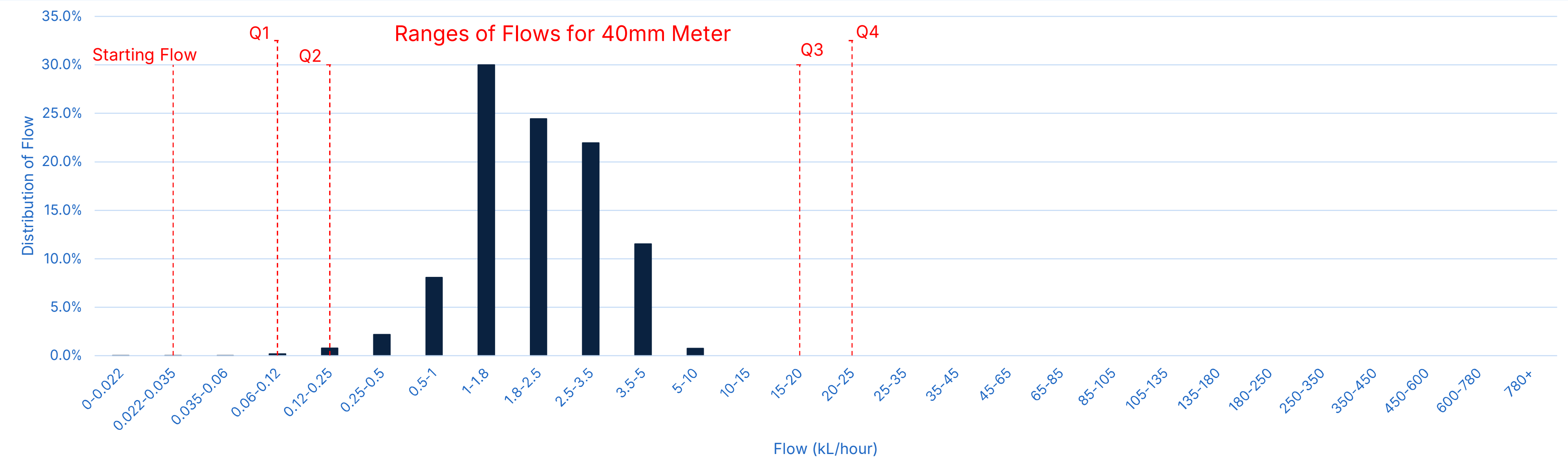
Distribution, Skewness, and Kurtosis

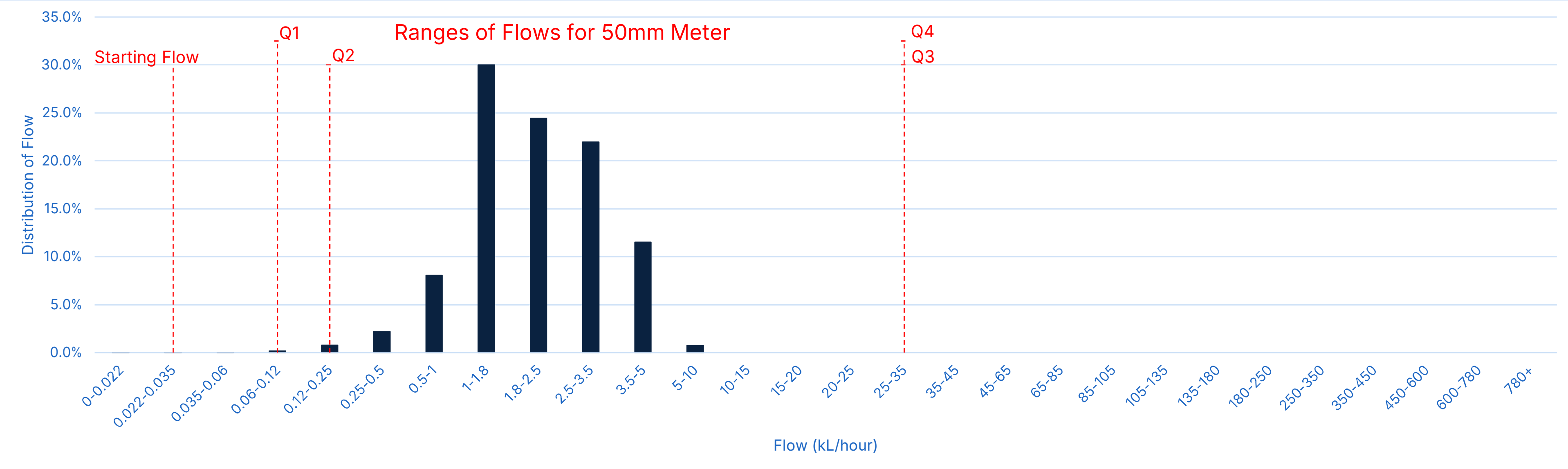


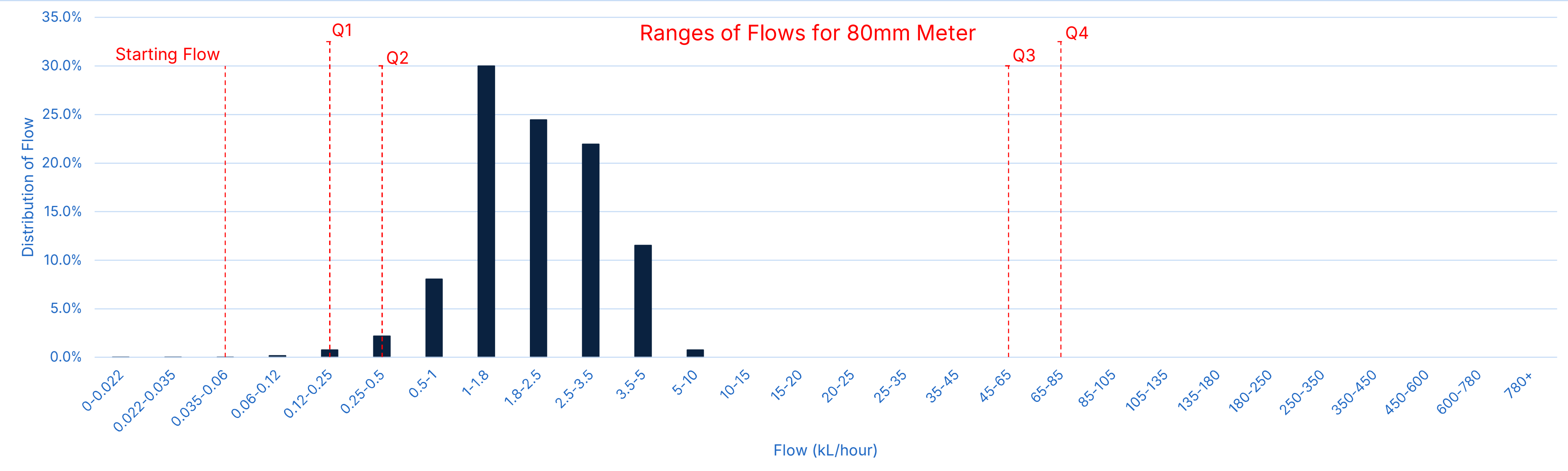
Distribution of Flow

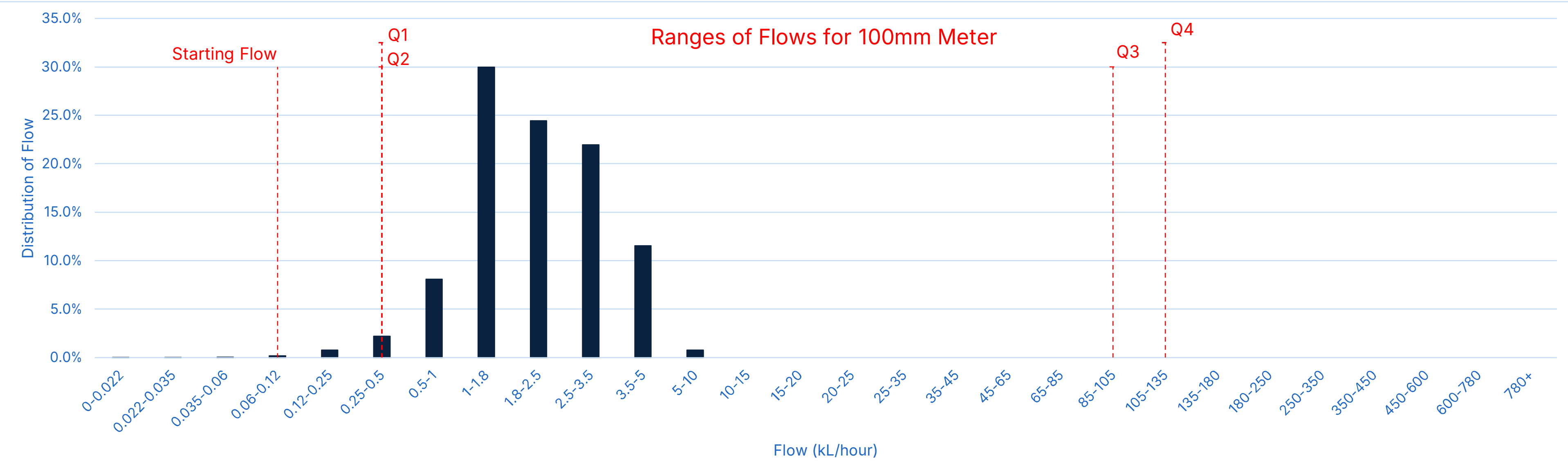


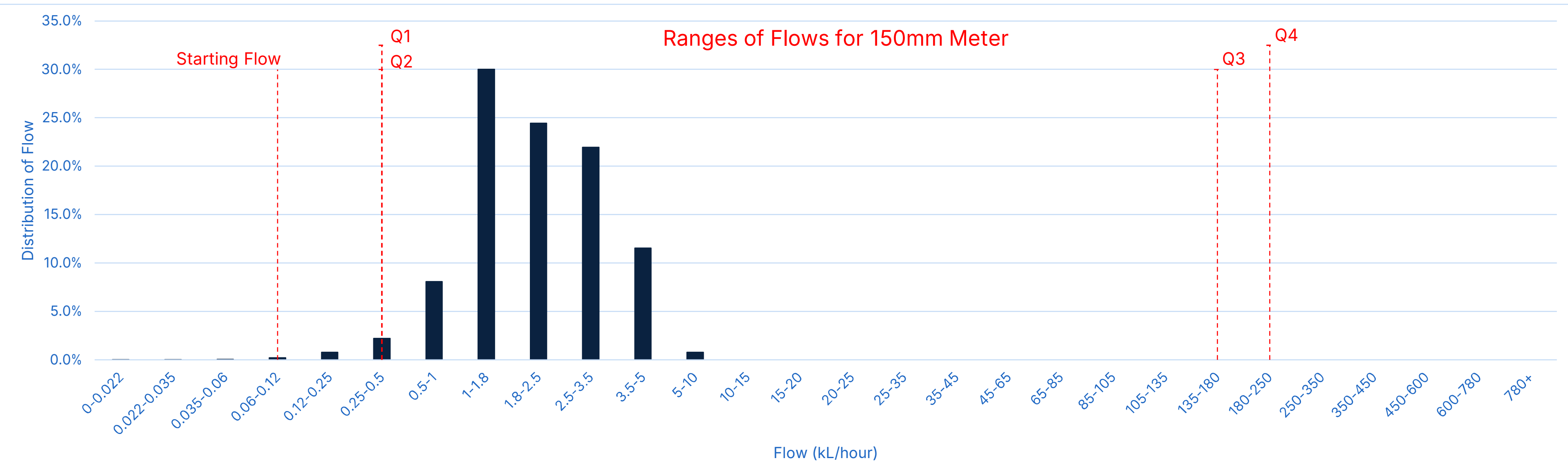
METER SIZING COMPARISON



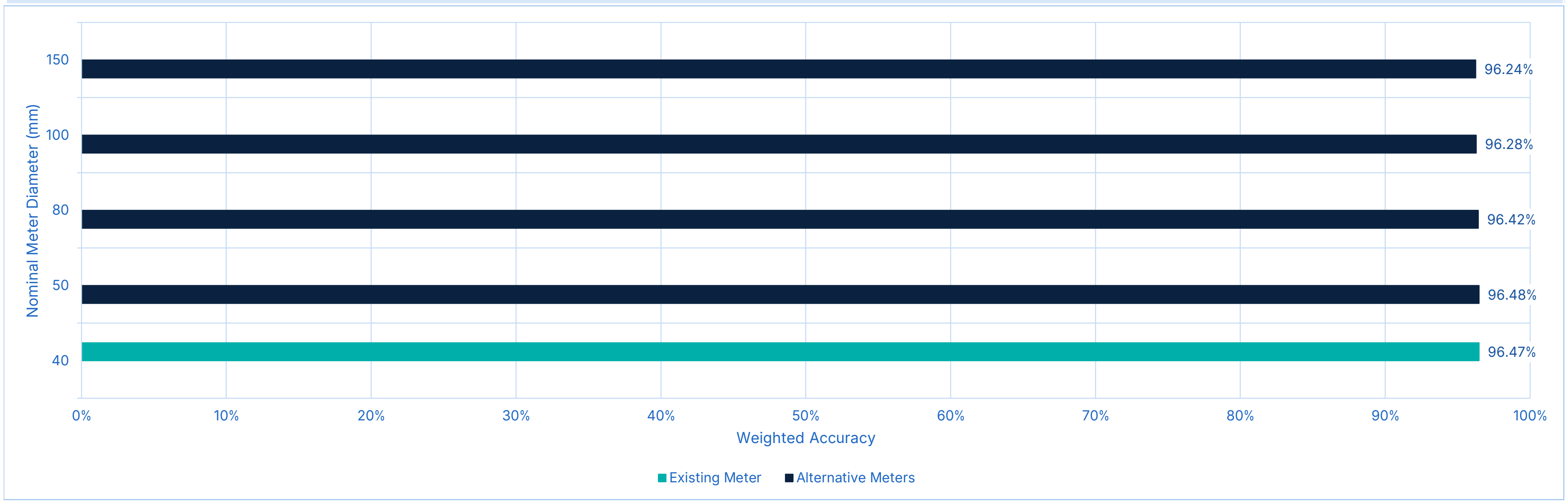








WEIGHTED ACCURACY



ESTIMATED APPARENT LOSSES DUE TO METER SIZE

Installed Meter Size:	40 mm		Alternative Bulk Meter Size:	50 mm		***25mm viable***
Installed Meter Accuracy:	96.47%		Alternative Meter Accuracy:	96.48%		***96.50%***
Apparent Losses Due To Meter Size:	3.53%		Apparent Losses Due To Meter Size:	3.52%		***Reduction in losses: -0.01%***
	1.30	kL/day		1.29	kL/day	
	38.96	kL/month		38.83	kL/month	
	474.04	kL/year		472.43	kL/year	
Installed Meter Comment:	Alternative meter is more suitable		Additional consumption registered:	0.34%		***based on AADD and alternative meter size***

ESTIMATED EFFECT ON MUNICIPAL REVENUE

Billed Consumption:		1 064.79	kL/month	***based on the AADD determined for the existing logged meter***					
Billed Amount (2013/2014):	R	22 934.80	/month	***Using the CoJ rising block tariffs***	Billed Amount (2023/2024):	R	75 937.21	/month	***Using the CoJ rising block tariffs***
Revenue Loss (2013/2014):	R	853.67	***based on the Apparent Lossesdetermined for the existing meter***		Revenue Loss (2013/2014):	R	850.76	***based on the Apparent Lossesdetermined for the existing meter***	
Revenue Loss (2023/2024):	R	2 834.52			Revenue Loss (2023/2024):	R	2 824.85		
Additional revenue that would have been generated if the alternative meter was employed:						R	9.67	/month	***comparing 2023/2024***

Diameter:	40 mm		Meter Type:	[redacted]	*Single Bulk*
Meter Reference:	AI-F-2		Estimated Meter Age:	10.2 year(s)	*At time of Ncube's (2019) logging*
Stand Type:	Multi-Residential		No. of Units:	12	
Stand Size:	7001 m^2		AADD (S):	17.326 kL/day	*Based on Swift data*

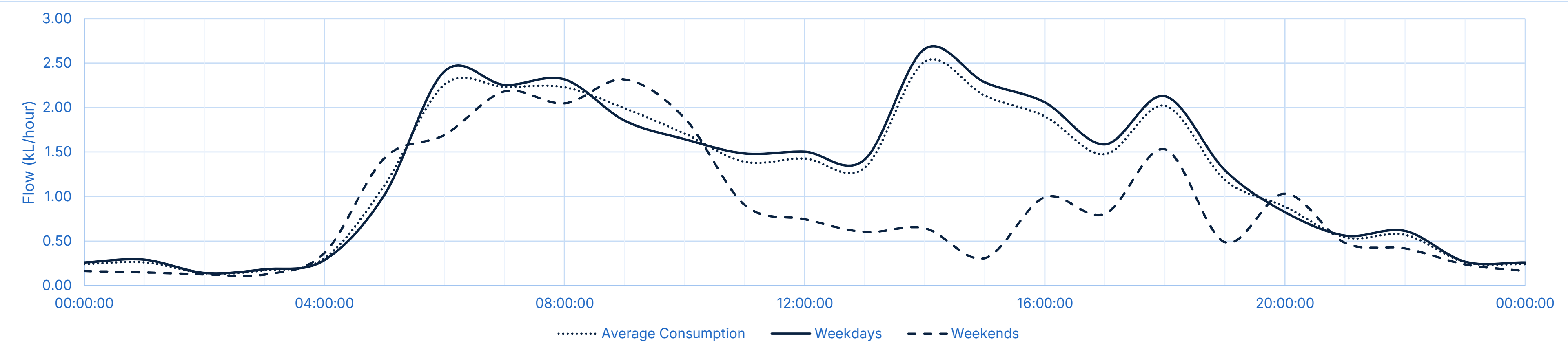
Logging Intervals:	Pulse Based		No. Of Intervals:	14 454	*Observations*
Start Time:	10:40:21		End Time:	12:53:02	
Start Date:	2014/10/28		End Date:	2014/11/05	
Logging Duration:	194.2	hrs	AADD:	41.36	kL/day

LOGGED CONSUMPTION CHARACTERISTICS

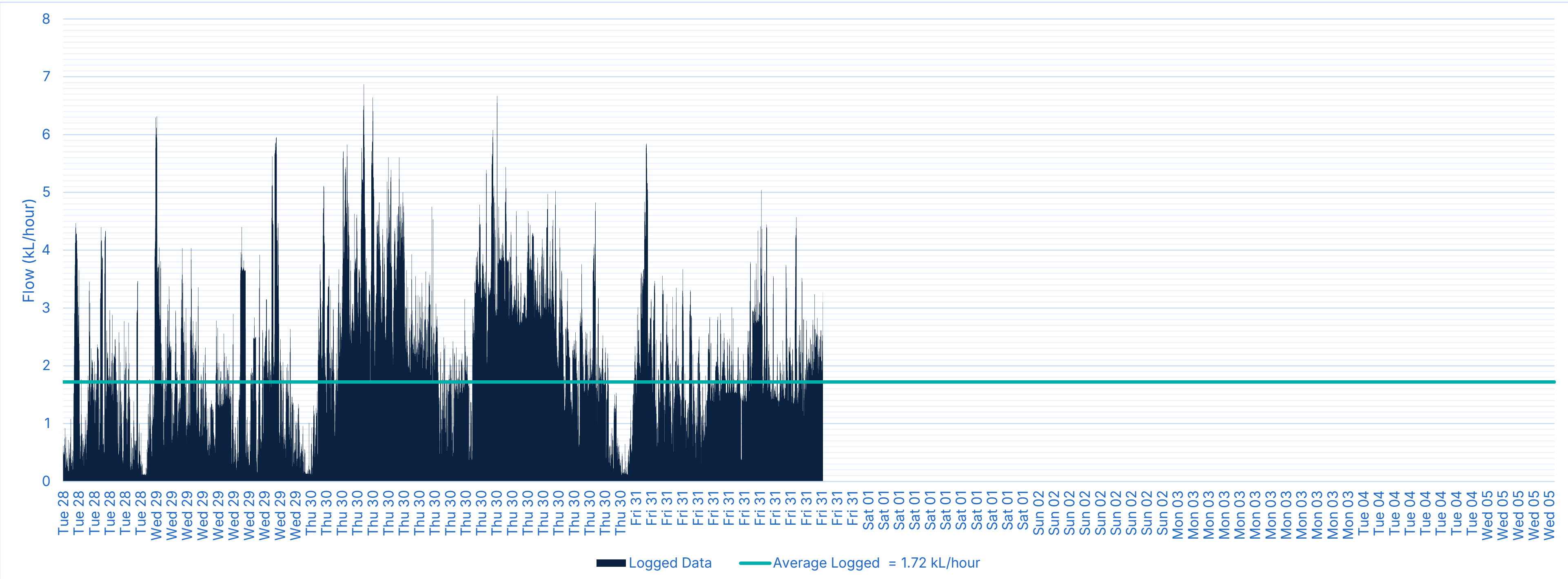
Maximum Flow:	6.87	kL/hour	Average Day Flow:	1.79	kL/hour	*Day Period: 04h00 - 23h00*
Minimum Night Flow:	0.08	kL/hour	Average Night Flow:	0.22	kL/hour	*Night Period: 23h00 - 04h00*
Night Flow Ratio:	4.48%		Average Flow:	1.72	kL/hour	

CONSUMPTION PROFILE

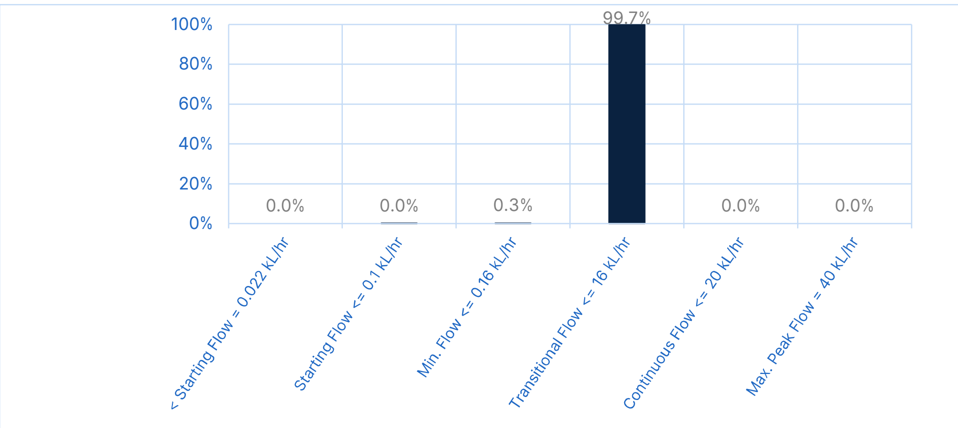
Daily Average



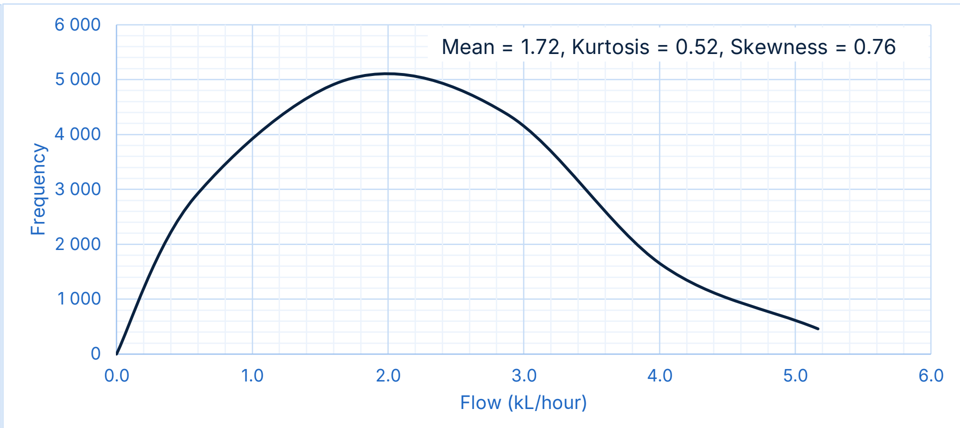
Logged Consumption



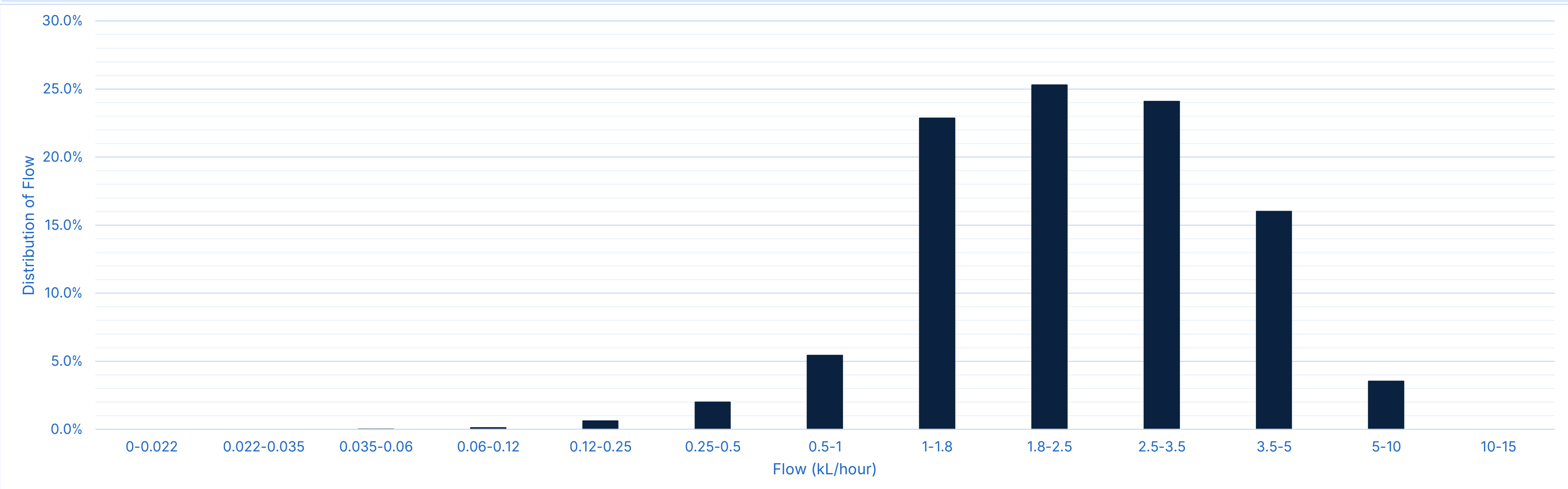
Flow Range



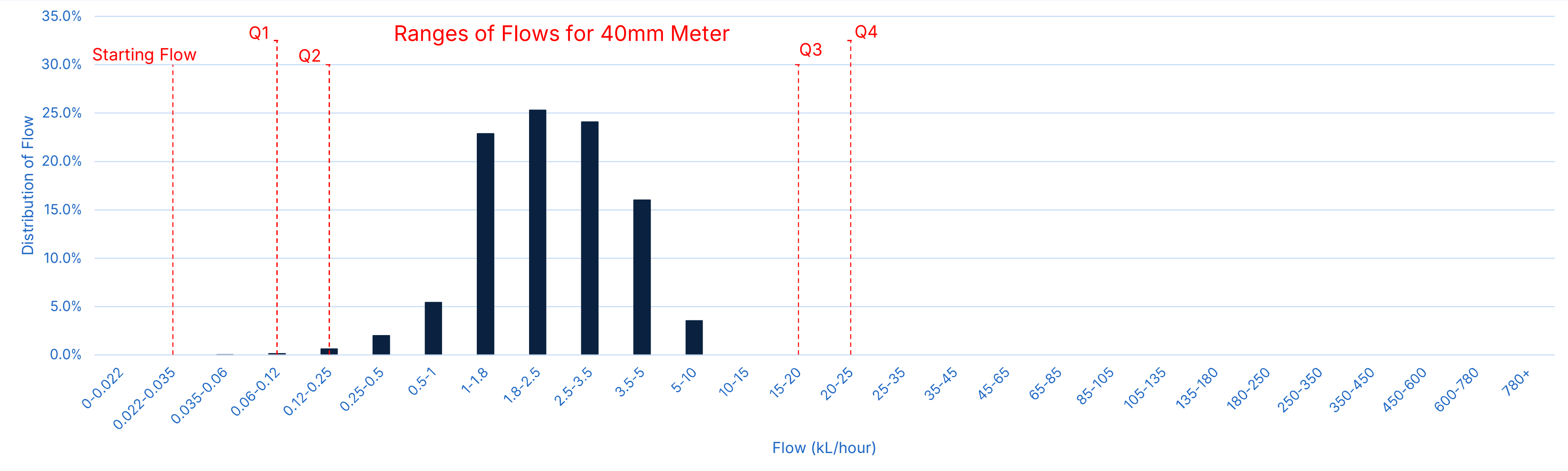
Distribution, Skewness, and Kurtosis

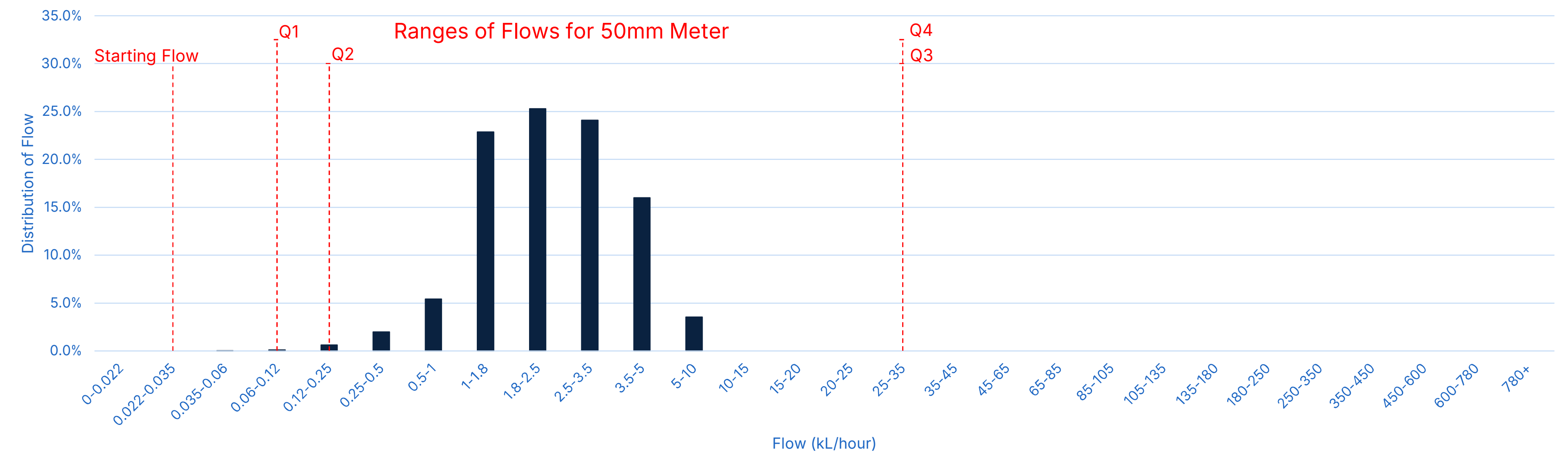


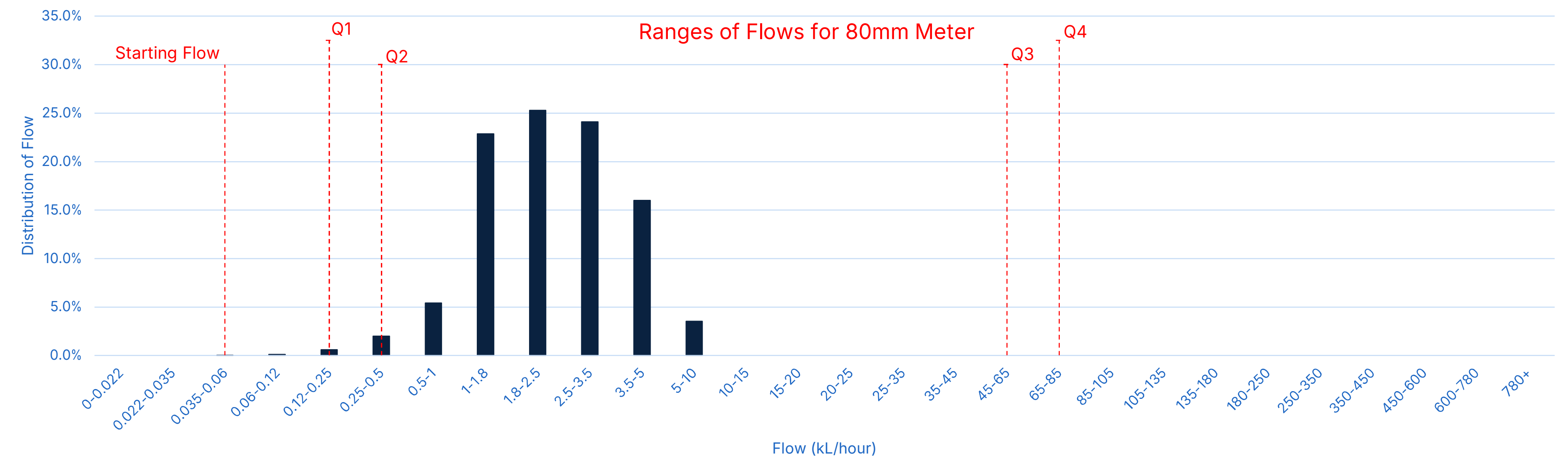
Distribution of Flow

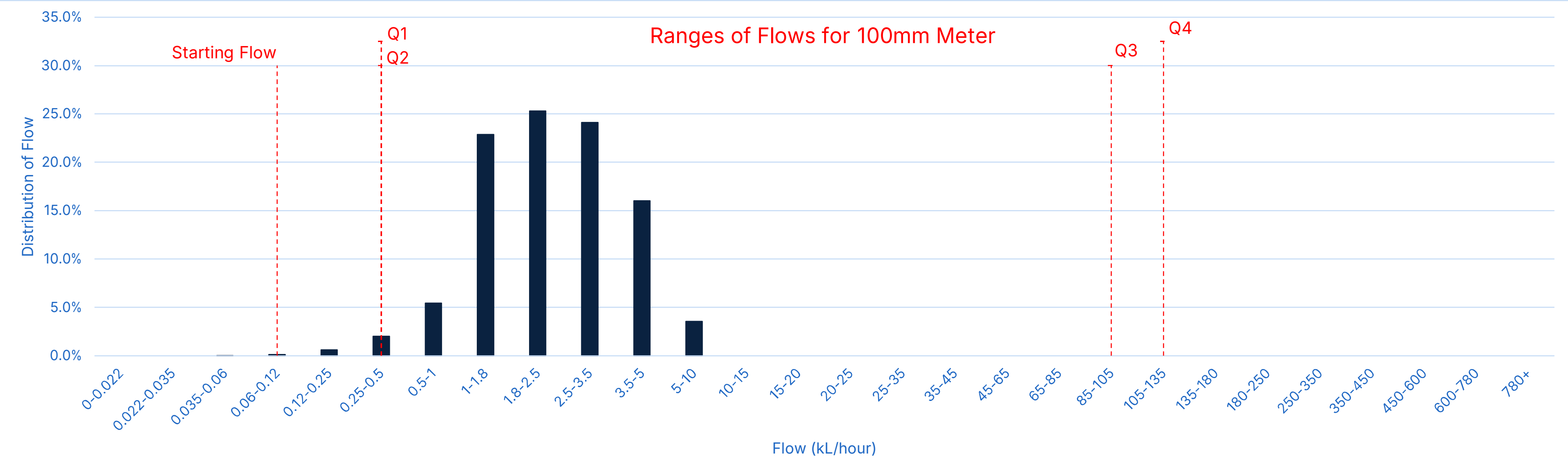


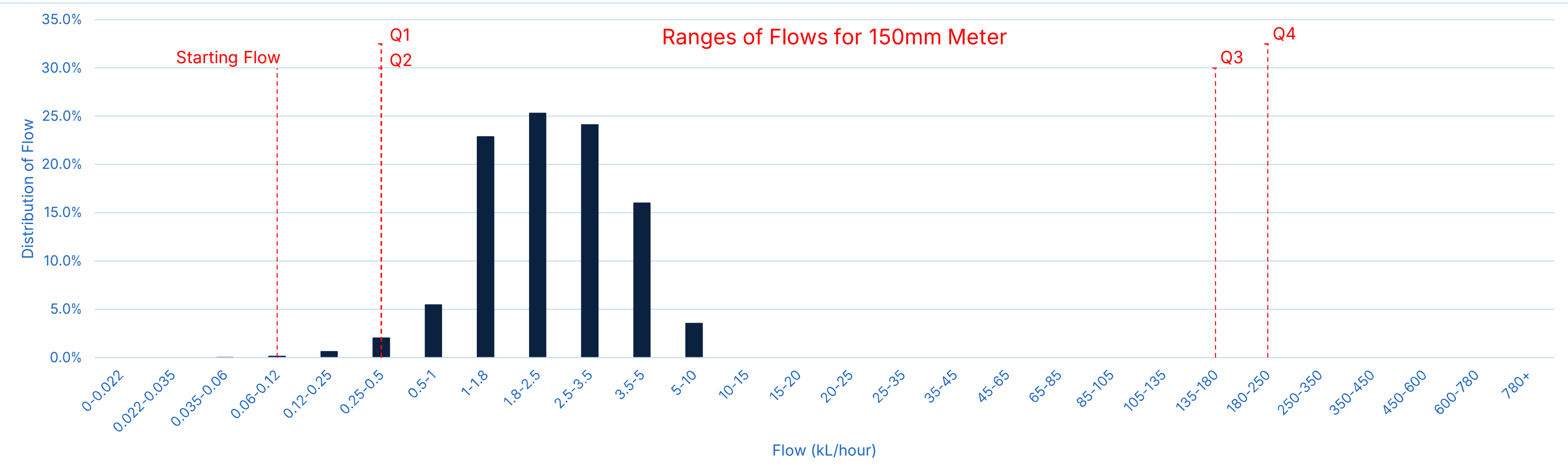
METER SIZING COMPARISON



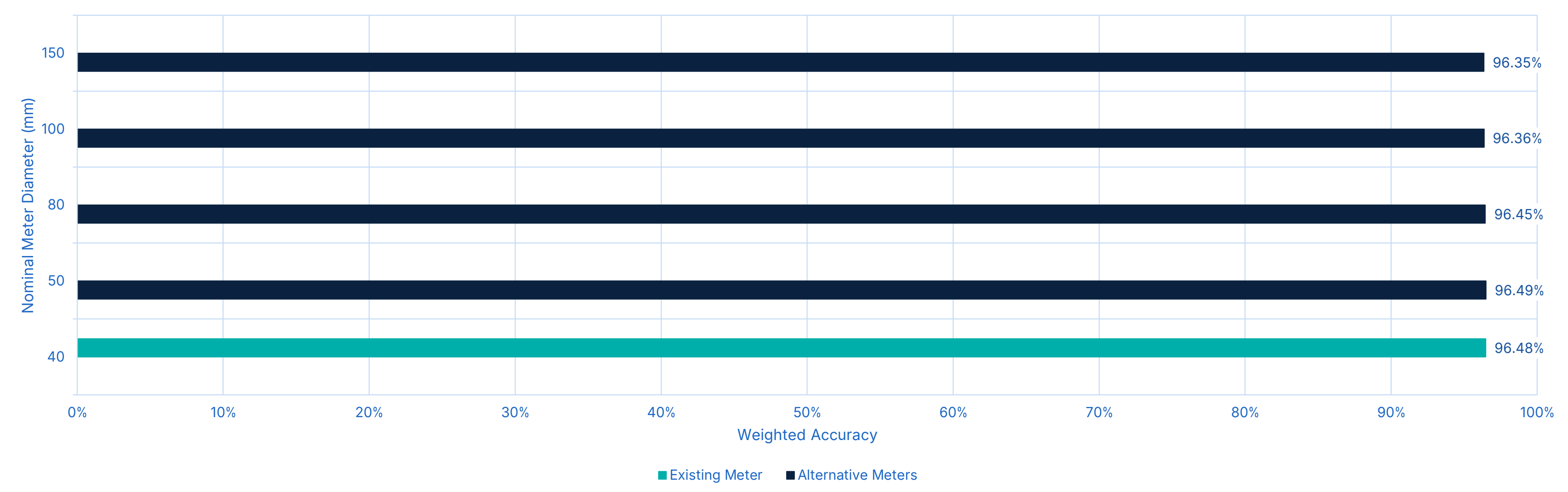








WEIGHTED ACCURACY



ESTIMATED APPARENT LOSSES DUE TO METER SIZE

Installed Meter Size:	40 mm		Alternative Bulk Meter Size:	50 mm	*25mm viable*
Installed Meter Accuracy:	96.48%		Alternative Meter Accuracy:	96.49%	*96.50%*
Apparent Losses Due To Meter Size:	3.52%		Apparent Losses Due To Meter Size:	3.51%	***Reduction in losses: -0.01%***
	1.51	kL/day		1.50	kL/day
	45.26	kL/month		45.10	kL/month
	550.72	kL/year		548.69	kL/year
Installed Meter Comment:	Alternative meter is more suitable		Additional consumption registered:	0.37%	***based on AADD and alternative meter size***

ESTIMATED EFFECT ON MUNICIPAL REVENUE

Billed Consumption:		1 240.65	kL/month	***based on the AADD determined for the existing logged meter***				
Billed Amount (2013/2014):	R	26 787.97	/month	***Using the CoJ rising block tariffs***	Billed Amount (2023/2024):	R	88 731.29	/month ***Using the CoJ rising block tariffs***
Revenue Loss (2013/2014):	R	991.74		***based on the Apparent Lossesdetermined for the existing meter***	Revenue Loss (2013/2014):	R	988.10	***based on the Apparent Lossesdetermined for the existing meter***
Revenue Loss (2023/2024):	R	3 292.98			Revenue Loss (2023/2024):	R	3 280.88	
Additional revenue that would have been generated if the alternative meter was employed:						R	12.10	/month ***comparing 2023/2024***

Diameter:	40 mm	Meter Type:	[redacted]	*Single Bulk*
Meter Reference:	EK-H-1	Estimated Meter Age:	14.1 year(s)	*At time of Ncube's (2019) logging*
Stand Type:	Multi-Residential	No. of Units:	48	
Stand Size:	8944 m^2	AADD (S):	60.97 kL/day	*Based on Swift data*

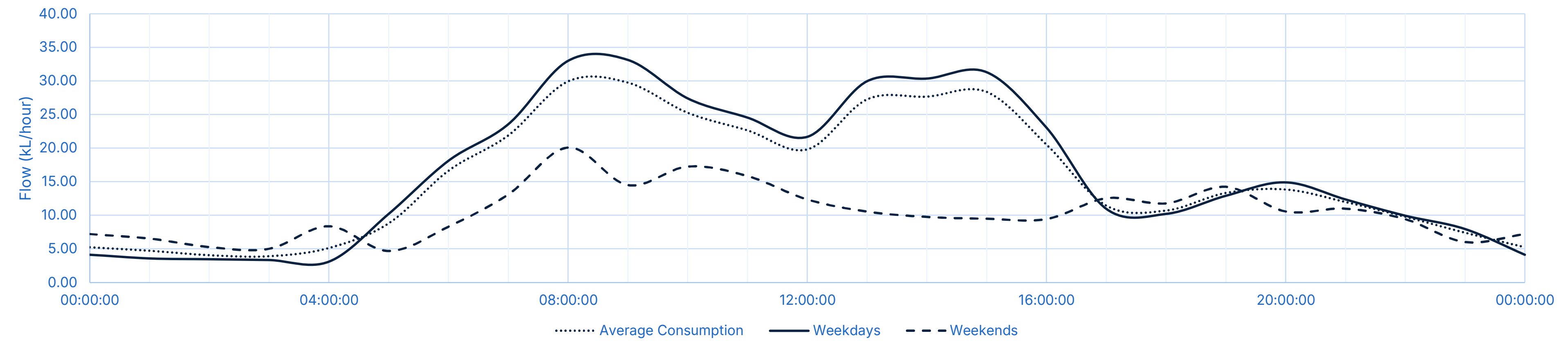
Logging Intervals:	Pulse Based	No. Of Intervals:	31 760	*Observations*
Start Time:	12:54:54	End Time:	16:33:36	
Start Date:	2014/08/05	End Date:	2014/08/19	
Logging Duration:	339.6 hrs	AADD:	486.60 kL/day	

LOGGED CONSUMPTION CHARACTERISTICS

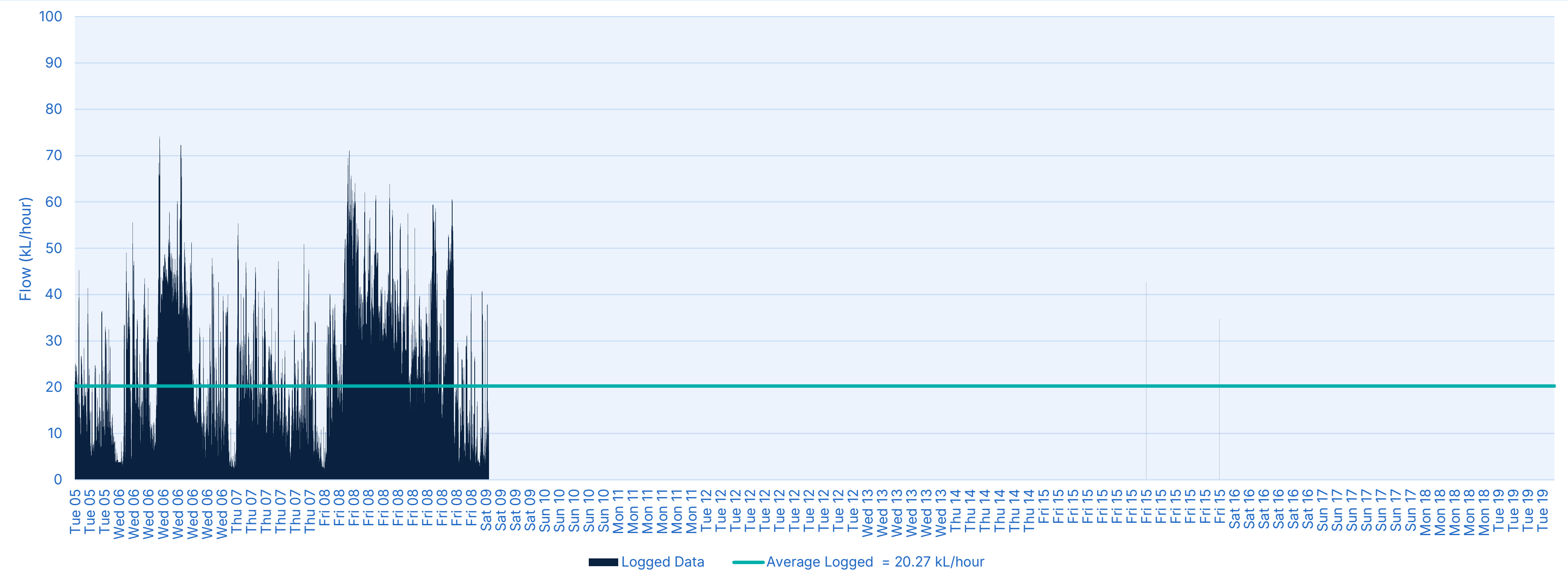
Maximum Flow:	90.00 kL/hour	Average Day Flow:	21.72 kL/hour	*Day Period: 04h00 - 23h00*
Minimum Night Flow:	2.30 kL/hour	Average Night Flow:	5.23 kL/hour	*Night Period: 23h00 - 04h00*
Night Flow Ratio:	11.34%	Average Flow:	20.27 kL/hour	

CONSUMPTION PROFILE

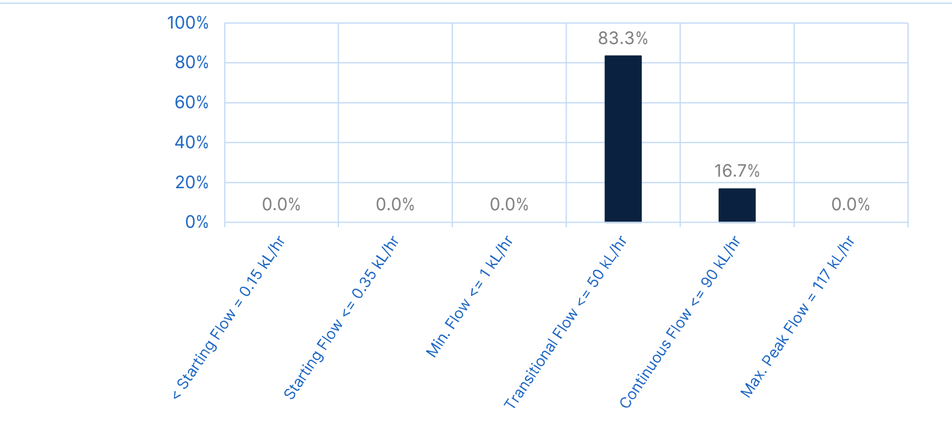
Daily Average



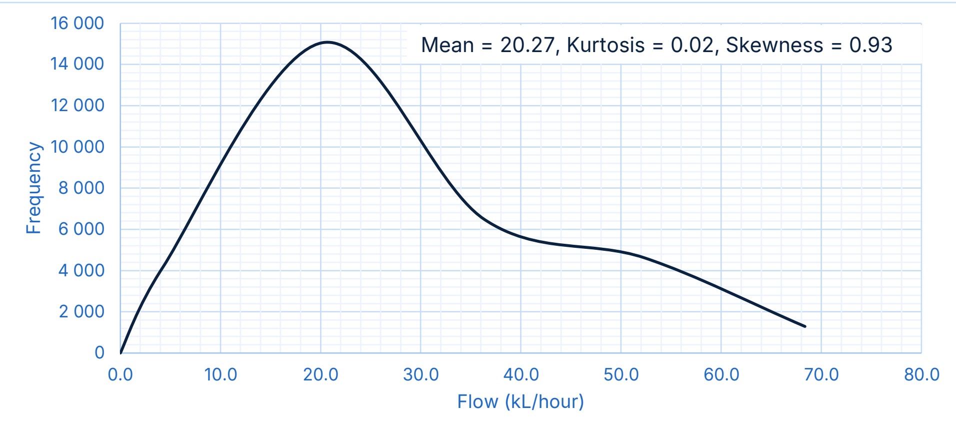
Logged Consumption



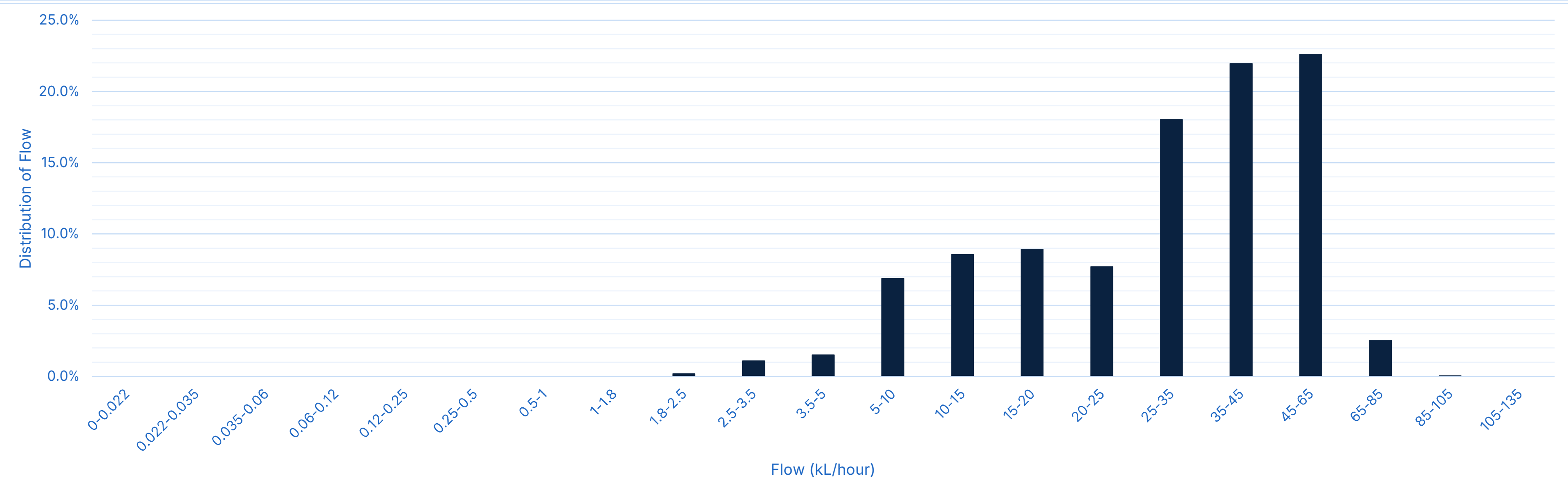
Flow Range



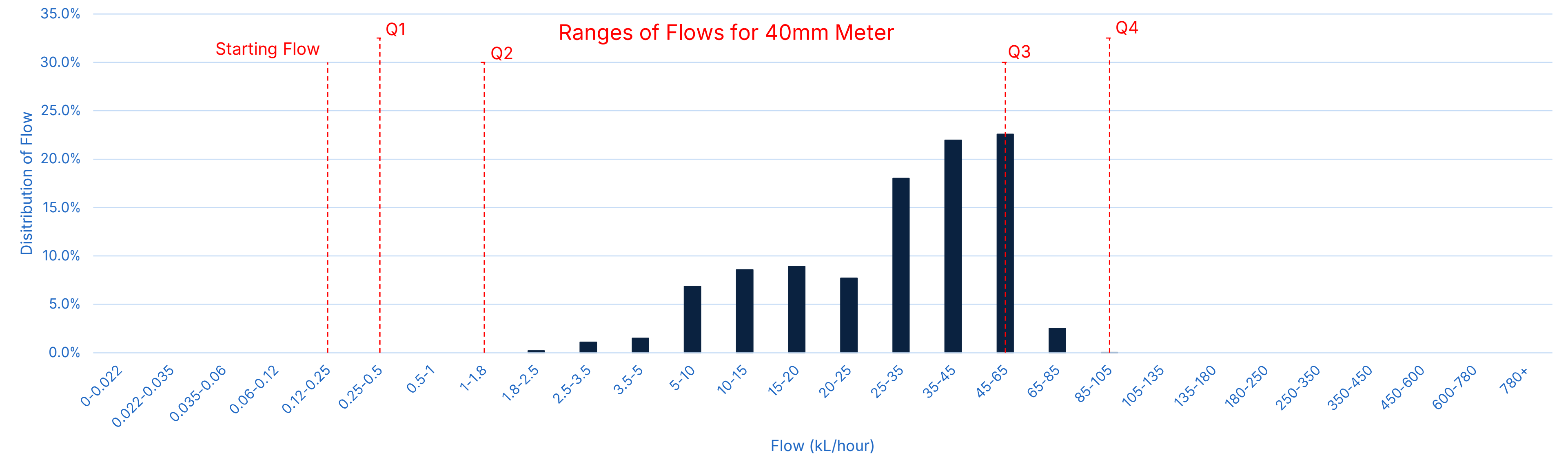
Distribution, Skewness, and Kurtosis

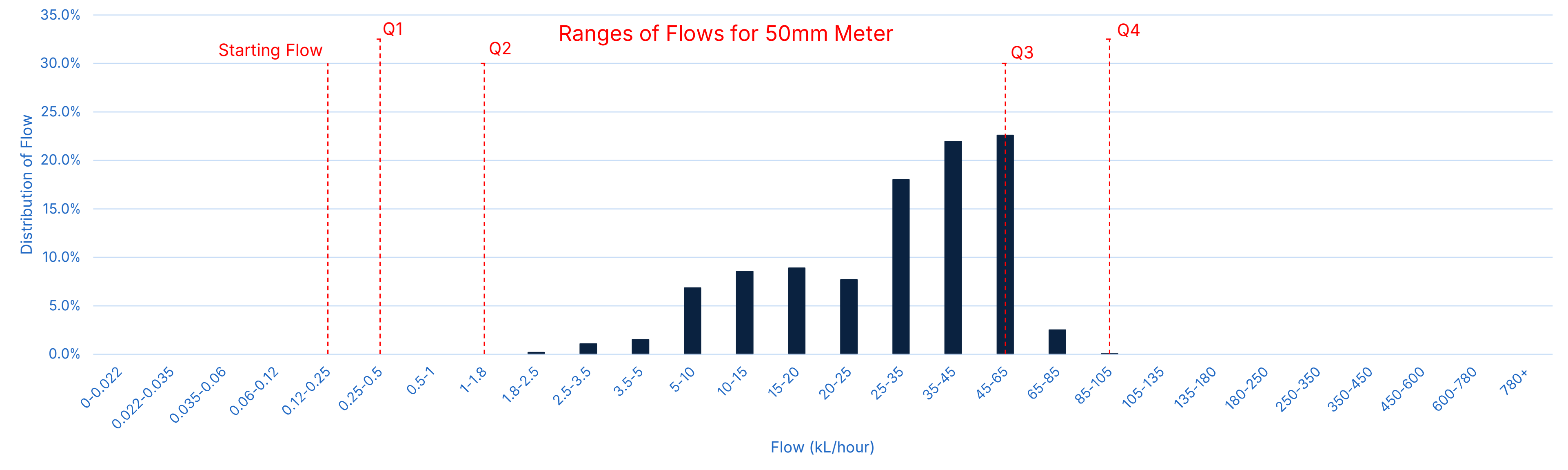


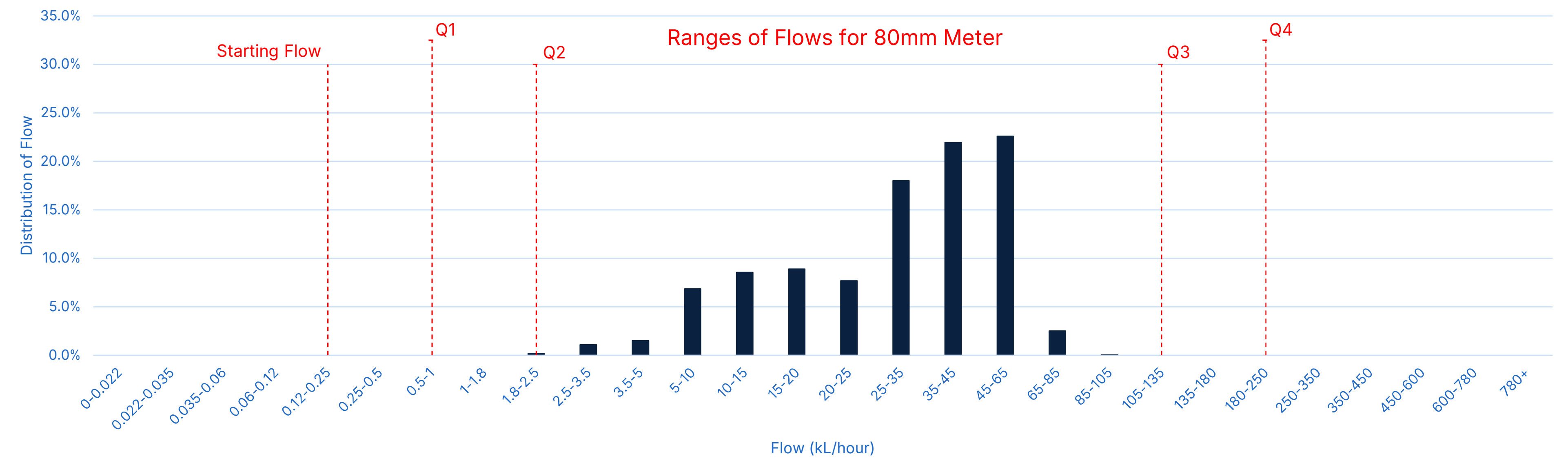
Distribution of Flow

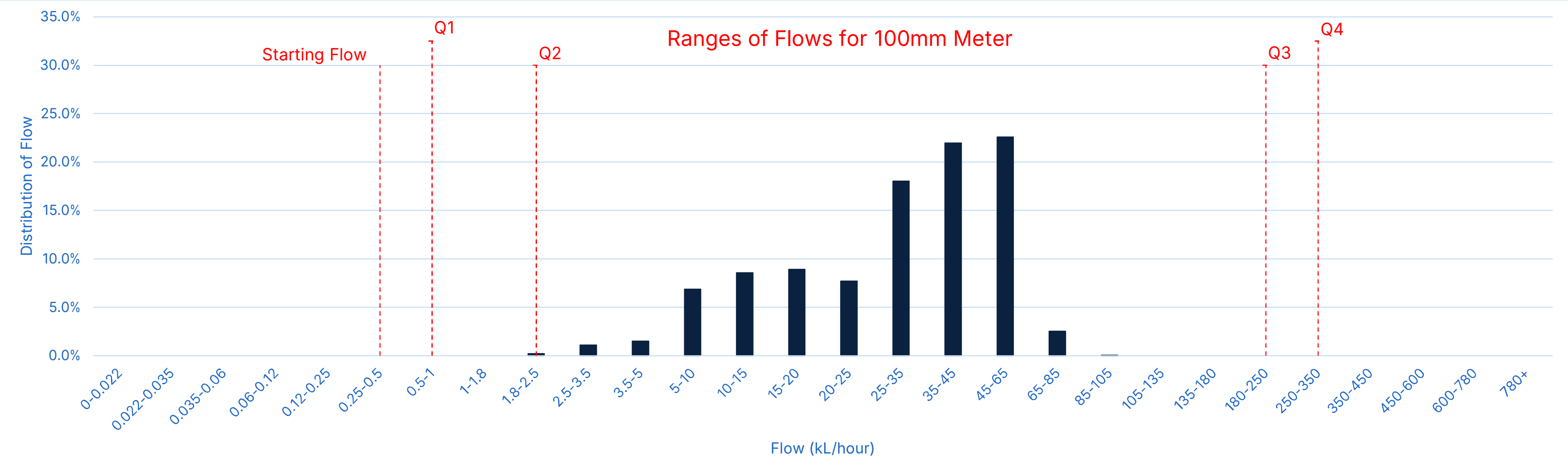


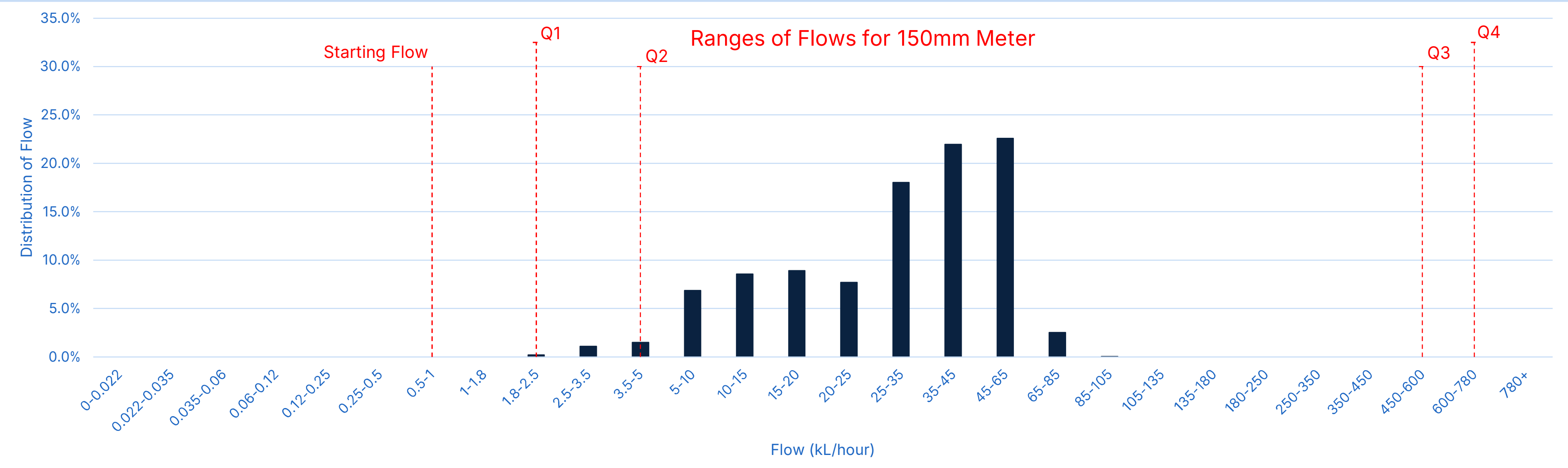
METER SIZING COMPARISON



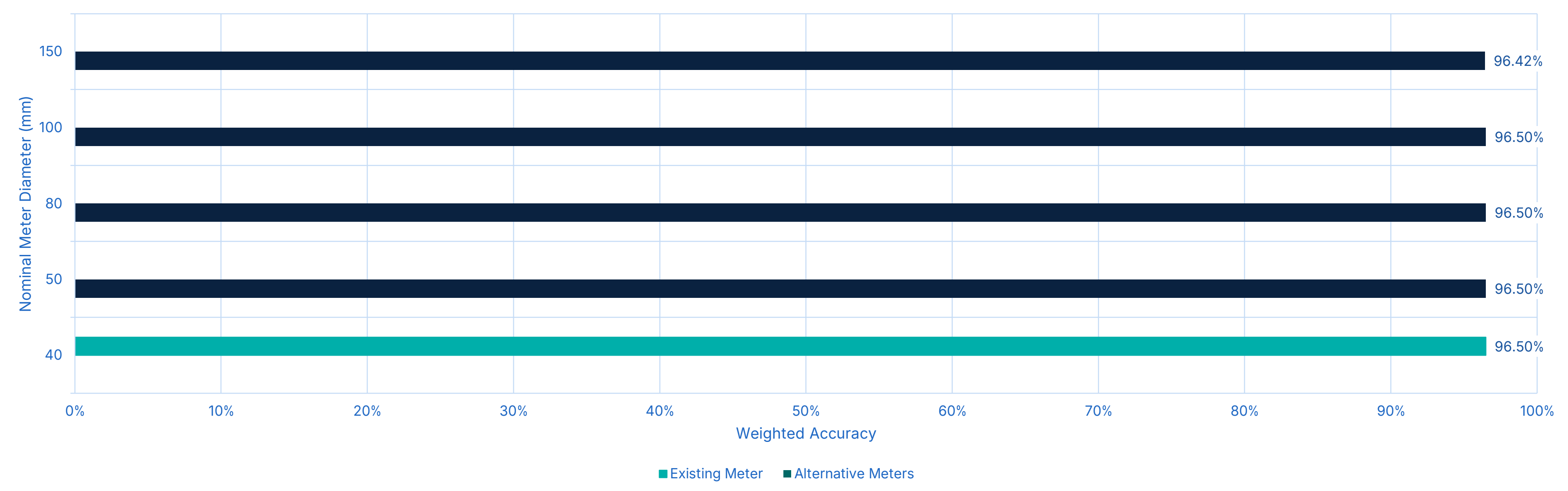








WEIGHTED ACCURACY



ESTIMATED APPARENT LOSSES DUE TO METER SIZE

Existing Meter Size:	40 mm		Alternative Bulk Meter Size:	50 mm	***Domestic size not viable***
Existing Meter Accuracy:	96.50%		Alternative Meter Accuracy:	96.50%	***N/A***
Apparent Losses Due To Meter Size:	3.50%		Apparent Losses Due To Meter Size:	3.50%	***Reduction in losses: 0.00%***
	17.65	kL/day		17.65	kL/day
	529.47	kL/month		529.47	kL/month
	6 441.83	kL/year		6 441.83	kL/year
Existing Meter Comment:	Meter is suitable in comparison		Additional consumption registered:	0.00%	***based on AADD and alternative meter size***

ESTIMATED EFFECT ON MUNICIPAL REVENUE

Billed Consumption:		14 598.12	kL/month	***based on the AADD determined for the existing logged meter***				
Billed Amount (2013/2014):	R	319 450.17	/month	***Using the CoJ rising block tariffs***	Billed Amount (2023/2024):	R	1 060 487.33	/month ***Using the CoJ rising block tariffs***
Revenue Loss (2013/2014):	R	11 600.59		***based on the Apparent Lossesdetermined for the existing meter***	Revenue Loss (2013/2014):	R	11 600.59	***based on the Apparent Lossesdetermined for the existing meter***
Revenue Loss (2023/2024):	R	38 518.63			Revenue Loss (2023/2024):	R	38 518.63	
Additional revenue that would have been generated if the alternative meter was employed:						R	0.00	/month ***comparing 2023/2024***

Diameter:	40 mm	Meter Type:	[redacted] *Single Bulk*
Meter Reference:	AI-F-3	Estimated Meter Age:	3.6 year(s) *At time of Ncube's (2019) logging*
Stand Type:	Multi-Residential	No. of Units:	42
Stand Size:	12745 m^2	AADD (S):	19.77 kL/day *Based on Swift data*

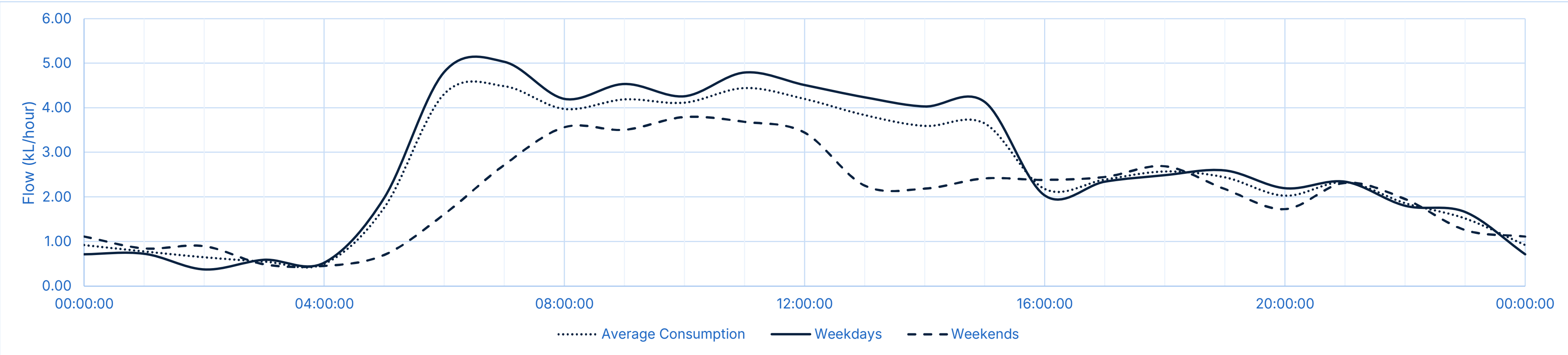
Logging Intervals:	Pulse Based	No. Of Intervals:	245 618 *Observations*
Start Time:	09:41:51	End Time:	16:58:08
Start Date:	2014/08/14	End Date:	2014/08/19
Logging Duration:	127.3 hrs	AADD:	82.36 kL/day

LOGGED CONSUMPTION CHARACTERISTICS

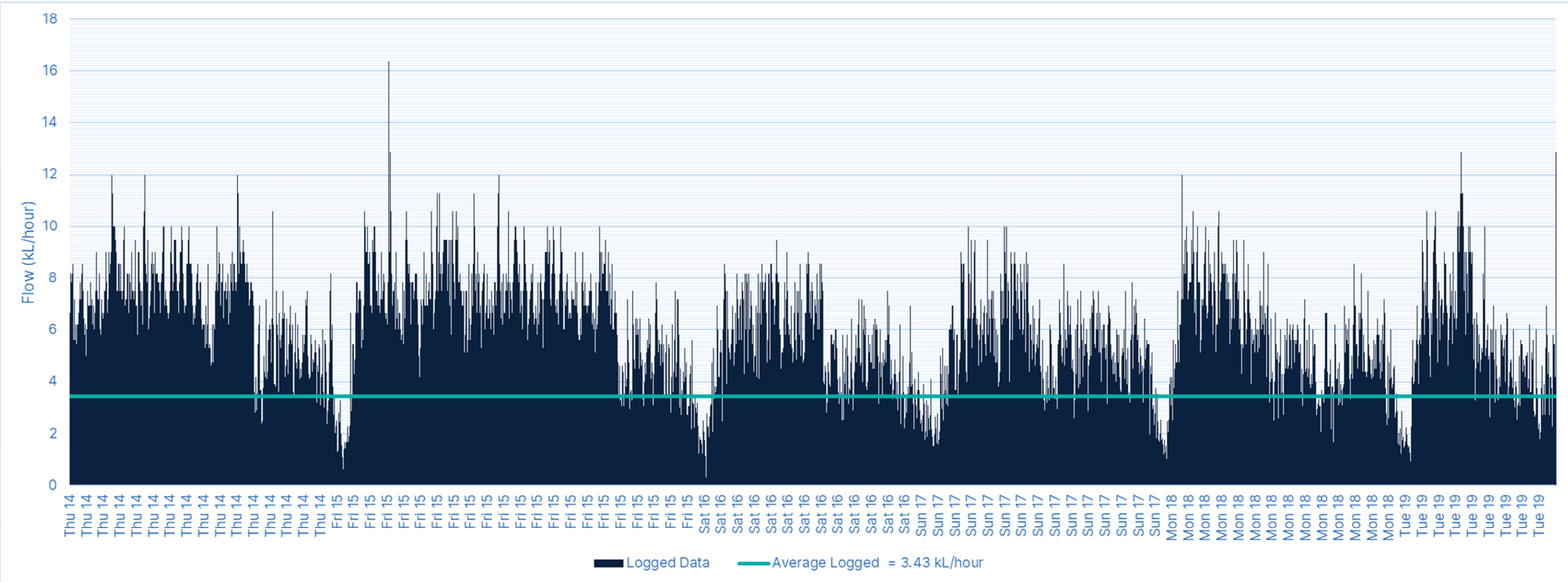
Maximum Flow:	16.36 kL/hour	Average Day Flow:	3.57 kL/hour	*Day Period: 04h00 - 23h00*
Minimum Night Flow:	0.14 kL/hour	Average Night Flow:	1.02 kL/hour	*Night Period: 23h00 - 04h00*
Night Flow Ratio:	3.98%	Average Flow:	3.43 kL/hour	

CONSUMPTION PROFILE

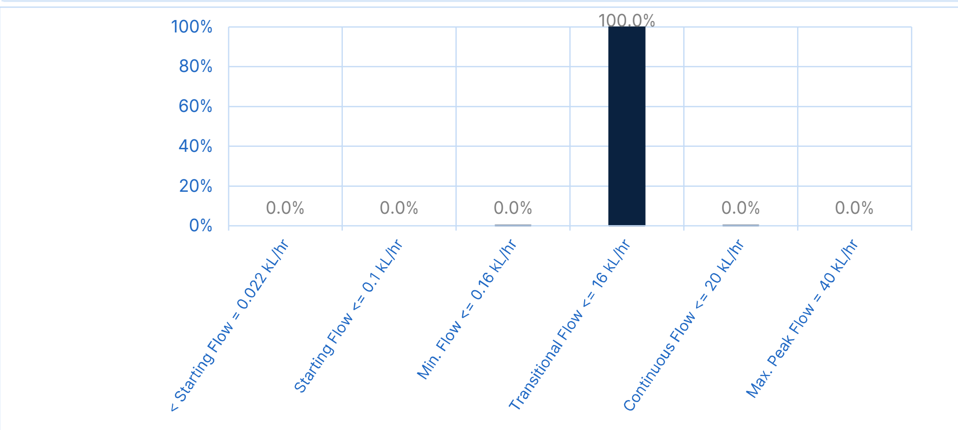
Daily Average



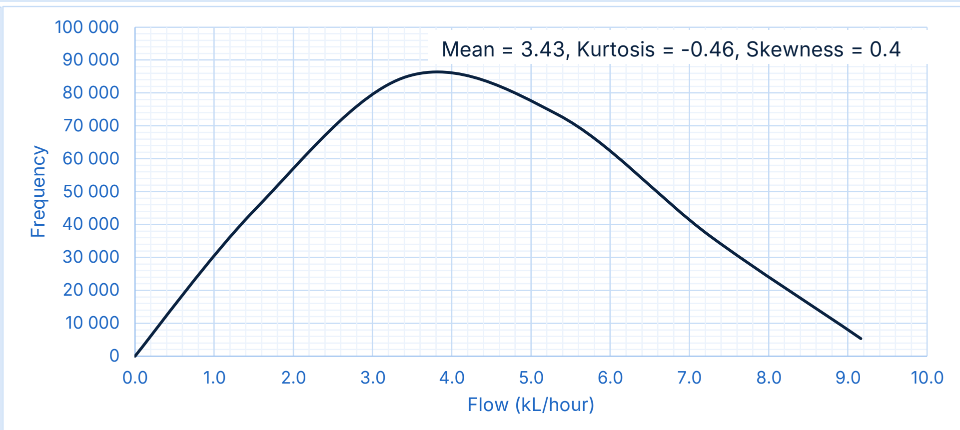
Logged Consumption



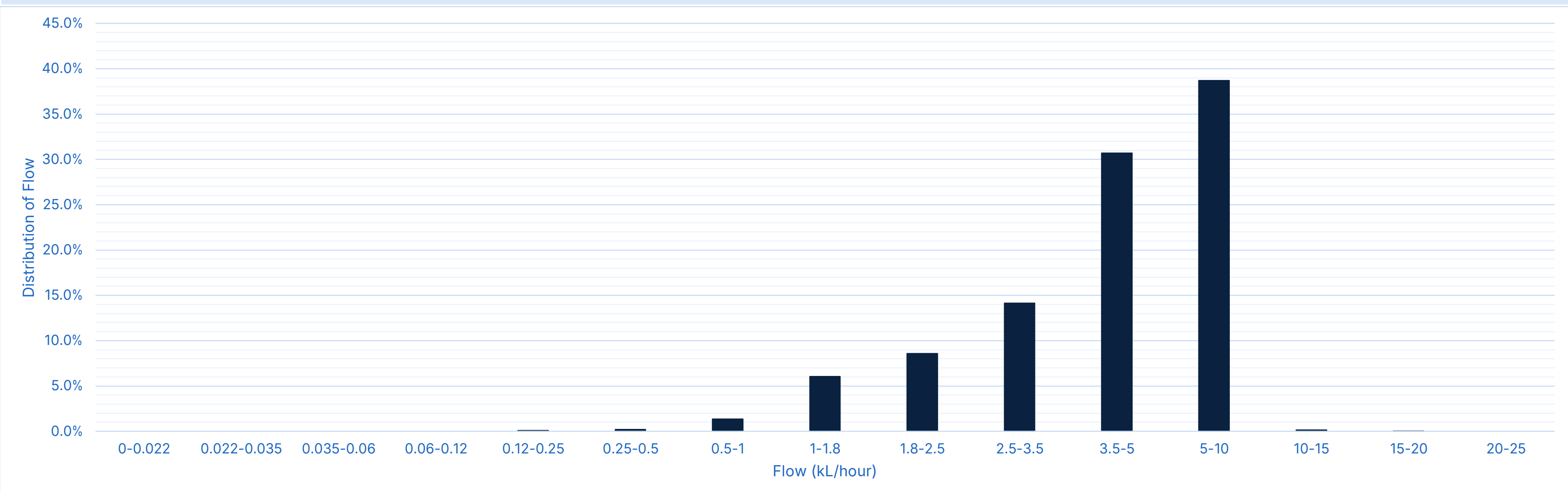
Flow Range



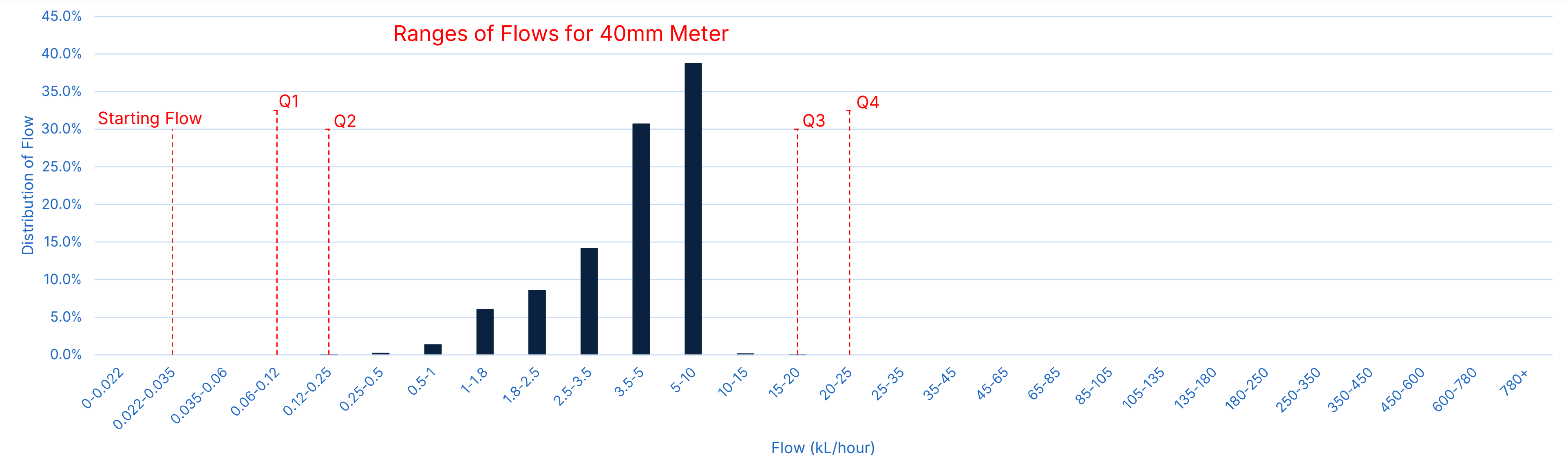
Distribution, Skewness, and Kurtosis

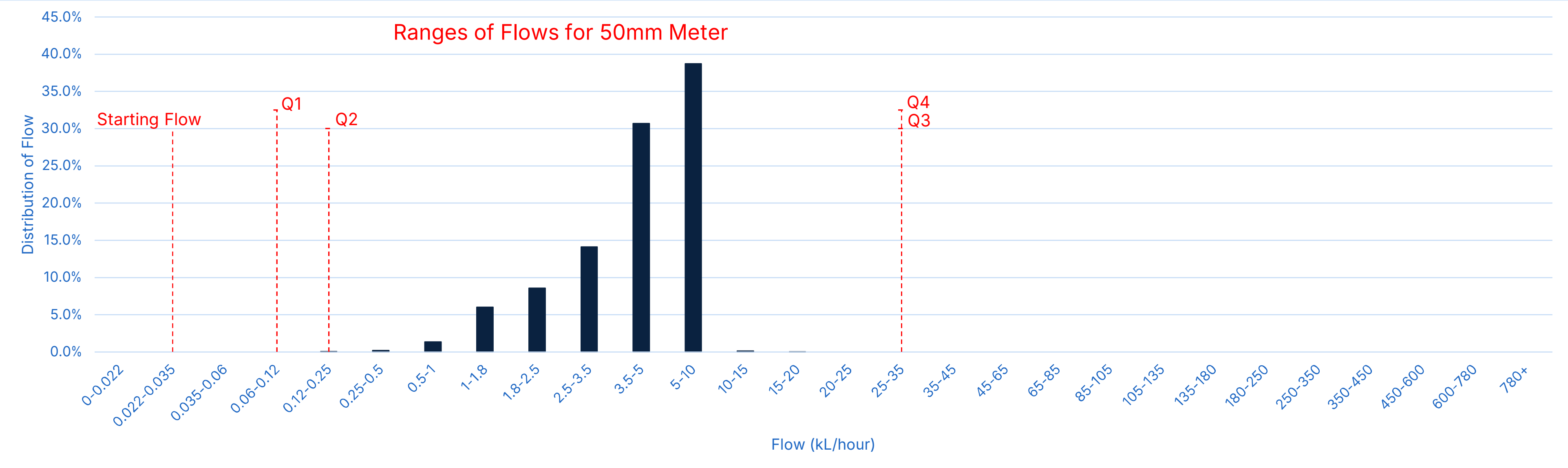


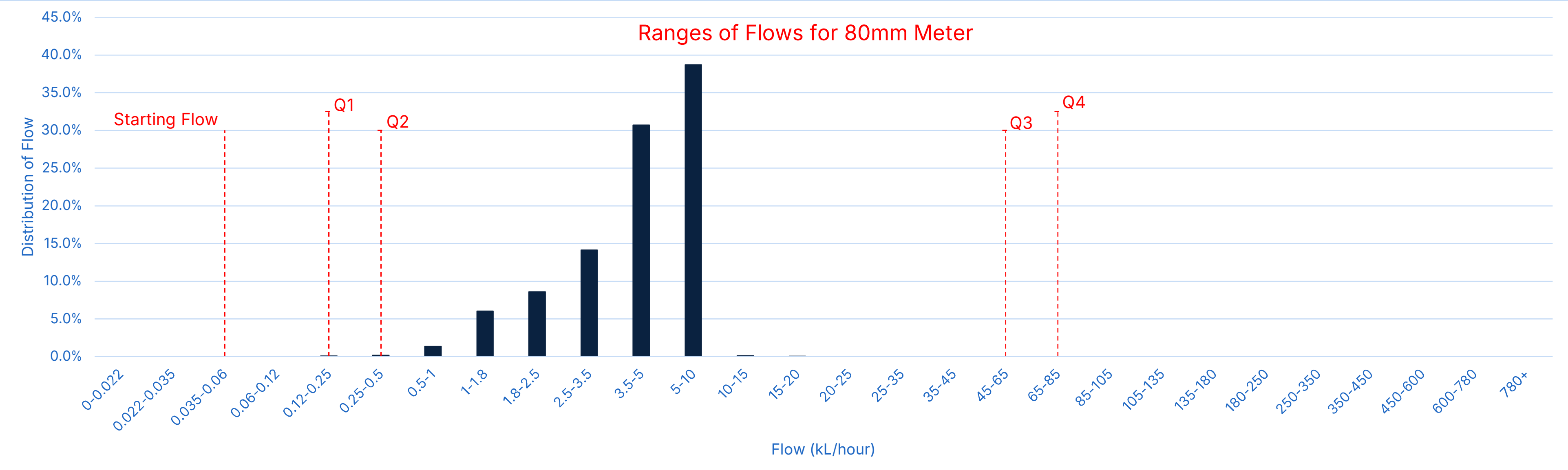
Distribution of Flow

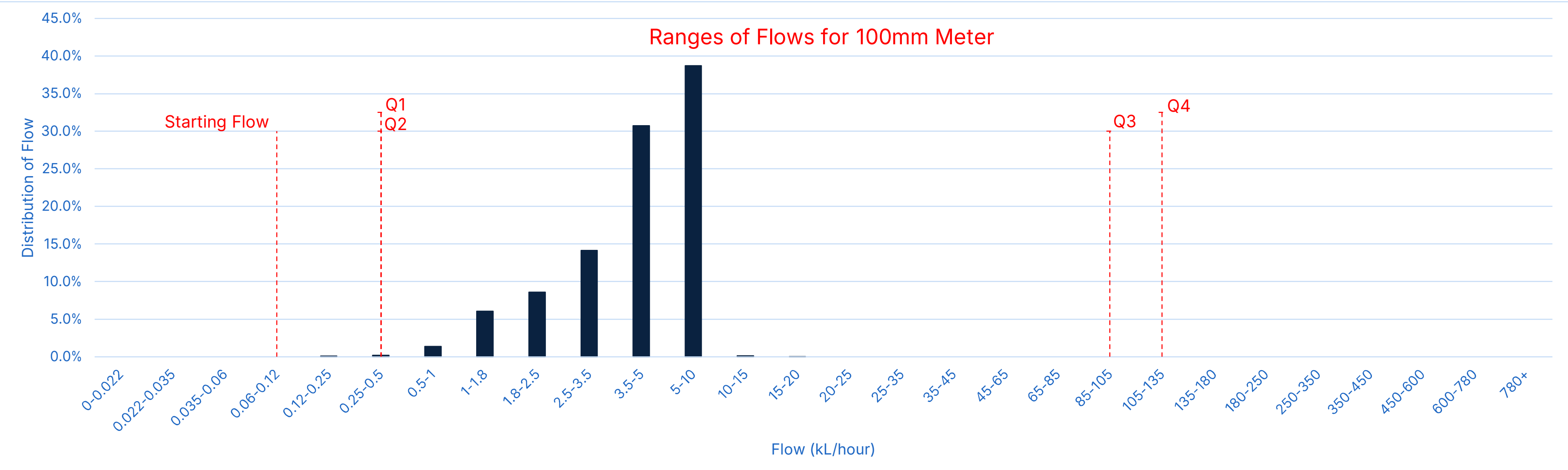


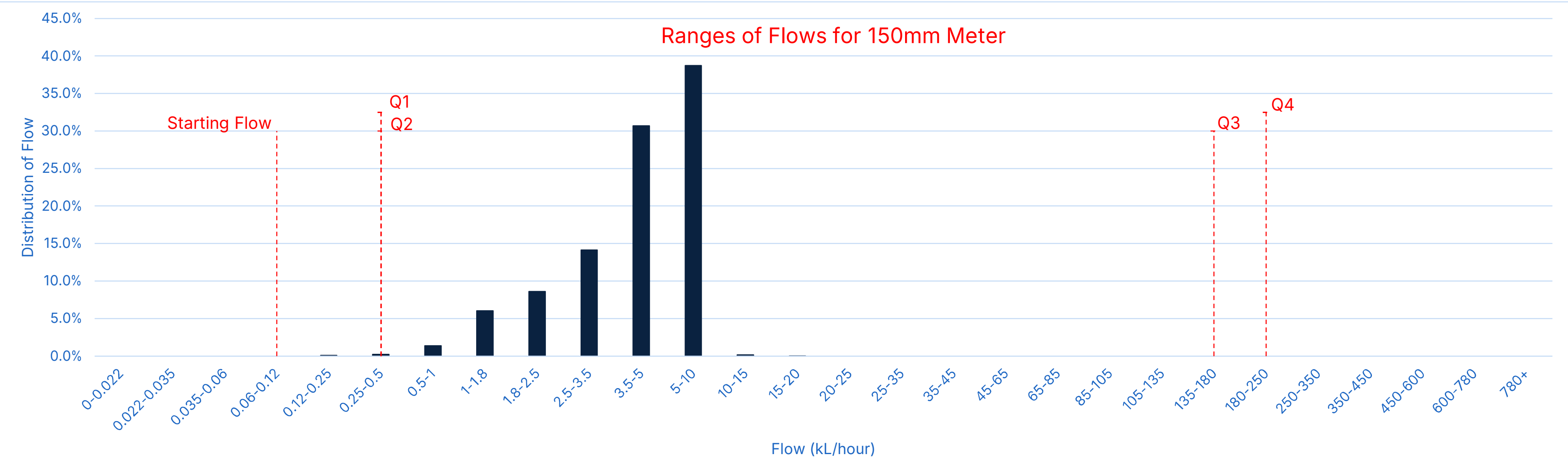
METER SIZING COMPARISON



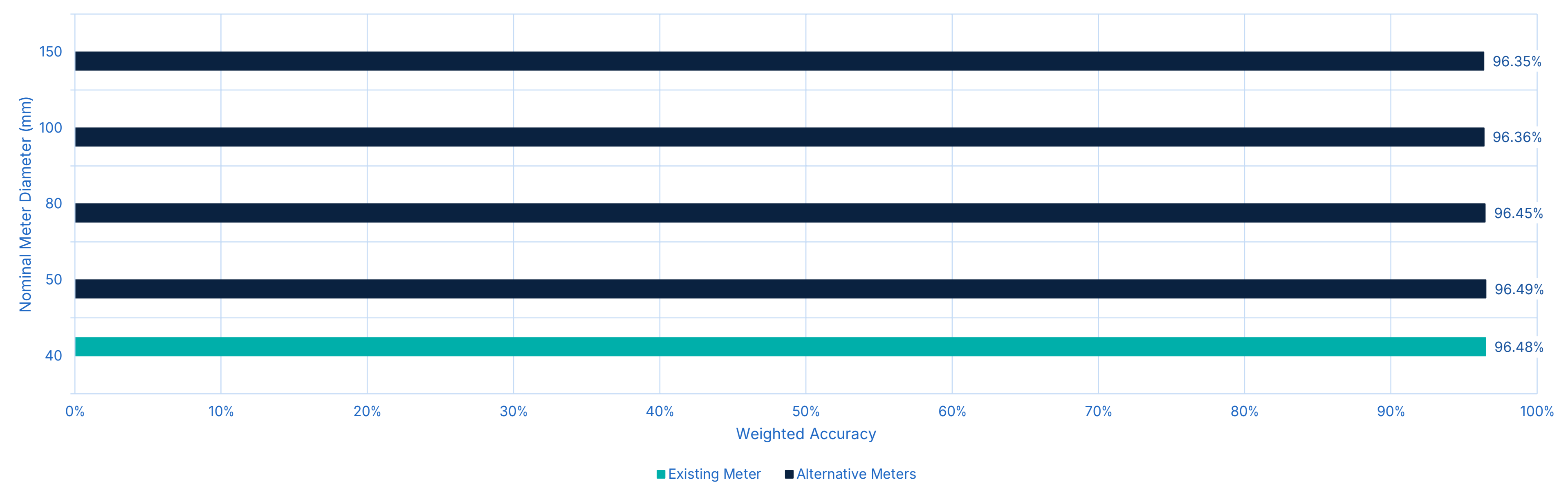








WEIGHTED ACCURACY



ESTIMATED APPARENT LOSSES DUE TO METER SIZE

Installed Meter Size:	40 mm		Alternative Bulk Meter Size:	50 mm		*25mm viable*
Installed Meter Accuracy:	96.48%		Alternative Meter Accuracy:	96.49%		*96.50%*
Apparent Losses Due To Meter Size:	3.52%		Apparent Losses Due To Meter Size:	3.51%		***Reduction in losses: -0.01%***
	1.51	kL/day		1.50	kL/day	
	45.26	kL/month		45.10	kL/month	
	550.72	kL/year		548.69	kL/year	
Installed Meter Comment:	Alternative meter is more suitable		Additional consumption registered:	0.37%	***based on AADD and alternative meter size***	

ESTIMATED EFFECT ON MUNICIPAL REVENUE

Billed Consumption:		2 470.68	kL/month	***based on the AADD determined for the existing logged meter***					
Billed Amount (2013/2014):	R	53 737.93	/month	***Using the CoJ rising block tariffs***	Billed Amount (2023/2024):	R	178 215.98	/month	***Using the CoJ rising block tariffs***
Revenue Loss (2013/2014):	R	991.74	***based on the Apparent Lossesdetermined for the existing meter***		Revenue Loss (2013/2014):	R	988.10	***based on the Apparent Lossesdetermined for the existing meter***	
Revenue Loss (2023/2024):	R	3 292.98			Revenue Loss (2023/2024):	R	3 280.88		
Additional revenue that would have been generated if the alternative meter was employed:						R	12.10	/month	***comparing 2023/2024***

Appendix B ETHICS WAIVER

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

Registration number: REC-101114-044

SCHOOL OF CIVIL AND ENVIRONMENTAL ETHICS COMMITTEE

Ethics clearance / waiver number: CEECC-2519141-2023

2023-06-29

Re: Magdeleen Rabé (2519141)

To whom it may concern,

Magdeleen Rabé (2519141) is currently registered as a Master of Science in Engineering student at the School of Civil and Environmental Engineering, University of the Witwatersrand, Johannesburg. This letter is to confirm that, at the time of writing, Magdeleen Rabé does not need ethical clearance for her study entitled '*The impact of incorrectly sized bulk water meters on water consumption and municipal revenue*'. This decision has been reached based upon a description of the project supplied by Magdeleen Rabé to the School of Civil and Environmental Engineering Ethics Committee, constituted as a subcommittee of the University Human Research Ethics Committee (Non-Medical), which has been evaluated by the subcommittee chair. This decision has then been ratified by the University Human Research Ethics Committee (Non-Medical). If, however, Magdeleen Rabé changes the methods of data collection and analysis for this project, this decision may no longer be valid. If such changes take place, this should be communicated to the School of Civil and Environmental Engineering Ethics Committee.

Please feel free to contact me should you require any further information.

Thank you.

Yours sincerely,

Prof John Ndiritu

Shaun Schoeman (Senior Administrative Officer)
Solomon Mahlangu House, 10th Floor, Room 10004, Jorissen Street, Braamfontein, Johannesburg
Private Bag 3, Wits 2050
T + 27(0)11 717 1408 | **E** Shaun.Schoeman@wits.ac.za | hrecnon-medical@wits.ac.za
www.wits.ac.za/research/about-our-research/ethics-and-research-integrity/

Appendix C **WORKBOOK EXAMPLE**

	Copy this sheet and rename with Meter Reference
	Copy Logging Data; Input meter information and indicate Day-Night period
	AutoFill entries (Calculations)
	Check input data
	Output data - Check if logical

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/15 10:57	0.863930879	2014/07/15	15.45670139	10:57:39		0.863930879	2.11	0.863930879	Weekday	19.38882707	0.863930879		0.863930879
2014/07/15 11:04	0.343741046	2014/07/15	15.46152778	11:04:36	00:06:57	0.343741046	2.11	0.343741046	Weekday	19.38882707	0.343741046		0.343741046
2014/07/15 11:22	0.951575378	2014/07/15	15.47364583	11:22:03	00:17:27	0.951575378	2.11	0.951575378	Weekday	19.38882707	0.951575378		0.951575378
2014/07/15 11:28	0.683890572	2014/07/15	15.47802083	11:28:21	00:06:18	0.683890572	2.11	0.683890572	Weekday	19.38882707	0.683890572		0.683890572
2014/07/15 11:37	1.255930774	2014/07/15	15.48412037	11:37:08	00:08:47	1.255930774	2.11	1.255930774	Weekday	19.38882707	1.255930774		1.255930774
2014/07/15 11:41	0.888450141	2014/07/15	15.48744213	11:41:55	00:04:47	0.888450141	2.11	0.888450141	Weekday	19.38882707	0.888450141		0.888450141
2014/07/15 11:48	0.823346439	2014/07/15	15.49212963	11:48:40	00:06:45	0.823346439	2.11	0.823346439	Weekday	19.38882707	0.823346439		0.823346439
2014/07/15 11:55	1.109330695	2014/07/15	15.4971875	11:55:57	00:07:17	1.109330695	2.11	1.109330695	Weekday	19.38882707	1.109330695		1.109330695
2014/07/15 12:01	1.106194681	2014/07/15	15.5009375	12:01:21	00:05:24	1.106194681	2.11	1.106194681	Weekday	19.38882707	1.106194681		1.106194681
2014/07/15 12:06	0.818889034	2014/07/15	15.50471065	12:06:47	00:05:26	0.818889034	2.11	0.818889034	Weekday	19.38882707	0.818889034		0.818889034
2014/07/15 12:14	0.440000974	2014/07/15	15.50980324	12:14:07	00:07:20	0.440000974	2.11	0.440000974	Weekday	19.38882707	0.440000974		0.440000974
2014/07/15 12:27	0.896146563	2014/07/15	15.51927083	12:27:45	00:13:38	0.896146563	2.11	0.896146563	Weekday	19.38882707	0.896146563		0.896146563
2014/07/15 12:34	1.403180531	2014/07/15	15.52391204	12:34:26	00:06:41	1.403180531	2.11	1.403180531	Weekday	19.38882707	1.403180531		1.403180531
2014/07/15 12:38	1.446945326	2014/07/15	15.52688657	12:38:43	00:04:17	1.446945326	2.11	1.446945326	Weekday	19.38882707	1.446945326		1.446945326
2014/07/15 12:42	1.106942984	2014/07/15	15.52976852	12:42:52	00:04:09	1.106942984	2.11	1.106942984	Weekday	19.38882707	1.106942984		1.106942984
2014/07/15 12:48	0.397728525	2014/07/15	15.53353009	12:48:17	00:05:25	0.397728525	2.11	0.397728525	Weekday	19.38882707	0.397728525		0.397728525
2014/07/15 13:03	0.720288109	2014/07/15	15.54400463	13:03:22	00:15:05	0.720288109	2.11	0.720288109	Weekday	19.38882707	0.720288109		0.720288109
2014/07/15 13:11	0.376632069	2014/07/15	15.54979167	13:11:42	00:08:20	0.376632069	2.11	0.376632069	Weekday	19.38882707	0.376632069		0.376632069
2014/07/15 13:27	0.666666661	2014/07/15	15.56085648	13:27:38	00:15:56	0.666666661	2.11	0.666666661	Weekday	19.38882707	0.666666661		0.666666661
2014/07/15 13:36	1.242750611	2014/07/15	15.56710648	13:36:38	00:09:00	1.242750611	2.11	1.242750611	Weekday	19.38882707	1.242750611		1.242750611
2014/07/15 13:41	0.989990092	2014/07/15	15.57045139	13:41:27	00:04:49	0.989990092	2.11	0.989990092	Weekday	19.38882707	0.989990092		0.989990092
2014/07/15 13:47	1.108033232	2014/07/15	15.57466435	13:47:31	00:06:04	1.108033232	2.11	1.108033232	Weekday	19.38882707	1.108033232		1.108033232
2014/07/15 13:52	1.233383572	2014/07/15	15.57842593	13:52:56	00:05:25	1.233383572	2.11	1.233383572	Weekday	19.38882707	1.233383572		1.233383572
2014/07/15 13:57	1.408450693	2014/07/15	15.58180556	13:57:48	00:04:52	1.408450693	2.11	1.408450693	Weekday	19.38882707	1.408450693		1.408450693
2014/07/15 14:02	1.282599391	2014/07/15	15.58475694	14:02:03	00:04:15	1.282599391	2.11	1.282599391	Weekday	19.38882707	1.282599391		1.282599391
2014/07/15 14:06	1.352874848	2014/07/15	15.58800926	14:06:44	00:04:41	1.352874848	2.11	1.352874848	Weekday	19.38882707	1.352874848		1.352874848
2014/07/15 14:11	1.051217652	2014/07/15	15.59108796	14:11:10	00:04:26	1.051217652	2.11	1.051217652	Weekday	19.38882707	1.051217652		1.051217652
2014/07/15 14:16	1.053987578	2014/07/15	15.59505787	14:16:53	00:05:43	1.053987578	2.11	1.053987578	Weekday	19.38882707	1.053987578		1.053987578
2014/07/15 14:22	1.056586045	2014/07/15	15.59900463	14:22:34	00:05:41	1.056586045	2.11	1.056586045	Weekday	19.38882707	1.056586045		1.056586045
2014/07/15 14:28	1.222576911	2014/07/15	15.60295139	14:28:15	00:05:41	1.222576911	2.11	1.222576911	Weekday	19.38882707	1.222576911		1.222576911
2014/07/15 14:33	0.554272513	2014/07/15	15.60635417	14:33:09	00:04:54	0.554272513	2.11	0.554272513	Weekday	19.38882707	0.554272513		0.554272513
2014/07/15 14:43	0.834763245	2014/07/15	15.61387731	14:43:59	00:10:50	0.834763245	2.11	0.834763245	Weekday	19.38882707	0.834763245		0.834763245
2014/07/15 14:51	0.693080738	2014/07/15	15.61886574	14:51:10	00:07:11	0.693080738	2.11	0.693080738	Weekday	19.38882707	0.693080738		0.693080738
2014/07/15 14:59	0.543855934	2014/07/15	15.62488426	14:59:50	00:08:40	0.543855934	2.11	0.543855934	Weekday	19.38882707	0.543855934		0.543855934
2014/07/15 15:10	0.668275473	2014/07/15	15.6325463	15:10:52	00:11:02	0.668275473	2.11	0.668275473	Weekday	19.38882707	0.668275473		0.668275473
2014/07/15 15:19	0.879808390	2014/07/15	15.63877315	15:19:50	00:08:58	0.87980839	2.11	0.87980839	Weekday	19.38882707	0.87980839		0.87980839
2014/07/15 15:26	0.431851440	2014/07/15	15.64350694	15:26:39	00:06:49	0.43185144	2.11	0.43185144	Weekday	19.38882707	0.43185144		0.43185144
2014/07/15 15:40	0.341290454	2014/07/15	15.65315972	15:40:33	00:13:54	0.341290454	2.11	0.341290454	Weekday	19.38882707	0.341290454		0.341290454
2014/07/15 15:58	0.748752074	2014/07/15	15.66537037	15:58:08	00:17:35	0.748752074	2.11	0.748752074	Weekday	19.38882707	0.748752074		0.748752074
2014/07/15 16:06	0.966962120	2014/07/15	15.6709375	16:06:09	00:08:01	0.96696212	2.11	0.96696212	Weekday	19.38882707	0.96696212		0.96696212
2014/07/15 16:12	0.519390578	2014/07/15	15.67524306	16:12:21	00:06:12	0.519390578	2.11	0.519390578	Weekday	19.38882707	0.519390578		0.519390578
2014/07/15 16:23	0.766903833	2014/07/15	15.68326389	16:23:54	00:11:33	0.766903833	2.11	0.766903833	Weekday	19.38882707	0.766903833		0.766903833
2014/07/15 16:31	0.528634357	2014/07/15	15.6887037	16:31:44	00:07:50	0.528634357	2.11	0.528634357	Weekday	19.38882707	0.528634357		0.528634357
2014/07/15 16:43	0.291474372	2014/07/15	15.69658565	16:43:05	00:11:21	0.291474372	2.11	0.291474372	Weekday	19.38882707	0.291474372		0.291474372
2014/07/15 17:03	0.560904922	2014/07/15	15.71087963	17:03:40	00:20:35	0.560904922	2.11	0.560904922	Weekday	19.38882707	0.560904922		0.560904922
2014/07/15 17:14	0.776062769	2014/07/15	15.71829861	17:14:21	00:10:41	0.776062769	2.11	0.776062769	Weekday	19.38882707	0.776062769		0.776062769
2014/07/15 17:22	0.662446631	2014/07/15	15.72366898	17:22:05	00:07:44	0.662446631	2.11	0.662446631	Weekday	19.38882707	0.662446631		0.662446631
2014/07/15 17:31	1.599431300	2014/07/15	15.72996528	17:31:09	00:09:04	1.5994313	2.11	1.5994313	Weekday	19.38882707	1.5994313		1.5994313
2014/07/15 17:34	0.805729626	2014/07/15	15.73256944	17:34:54	00:03:45	0.805729626	2.11	0.805729626	Weekday	19.38882707	0.805729626		0.805729626
2014/07/15 17:42	1.010838426	2014/07/15	15.73774306	17:42:21	00:07:27	1.010838426	2.11	1.010838426	Weekday	19.38882707	1.010838426		1.010838426
2014/07/15 17:48	0.730460184	2014/07/15	15.74186343	17:48:17	00:05:56	0.730460184	2.11	0.730460184	Weekday	19.38882707	0.730460184		0.730460184
2014/07/15 17:56	1.372055786	2014/07/15	15.74756944	17:56:30	00:08:13	1.372055786	2.11	1.372055786	Weekday	19.38882707	1.372055786		1.372055786
2014/07/15 18:00	0.923977201	2014/07/15	15.75060185	18:00:52	00:04:22	0.923977201	2.11	0.923977201	Weekday	19.38882707	0.923977201		0.923977201
2014/07/15 18:07	0.503355701	2014/07/15	15.75511574	18:07:22	00:06:30	0.503355701	2.11	0.503355701	Weekday	19.38882707	0.503355701		0.503355701
2014/07/15 18:19	0.572046013	2014/07/15	15.7633912	18:19:17	00:11:55	0.572046013	2.11	0.572046013	Weekday	19.38882707	0.572046013		0.572046013
2014/07/15 18:29	0.548446065	2014/07/15	15.7706713	18:29:46	00:10:29	0.548446065	2.11	0.548446065	Weekday	19.38882707	0.548446065		0.548446065
2014/07/15 18:40	0.640204860	2014/07/15	15.77827546	18:40:43	00:10:57	0.64020486	2.11	0.64020486	Weekday	19.38882707	0.64020486		0.64020486
2014/07/15 18:50	0.914634139	2014/07/15	15.78478009	18:50:05	00:09:22	0.914634139	2.11	0.914634139	Weekday	19.38882707	0.914634139		0.914634139
2014/07/15 18:56	1.396106403	2014/07/15	15.7893287	18:56:38	00:06:33	1.396106403	2.11	1.396106403	Weekday	19.38882707	1.396106403		1.396106403
2014/07/15 19:00	1.215805461	2014/07/15	15.79231481	19:00:56	00:04:18	1.215805461	2.11	1.215805461	Weekday	19.38882707	1.215805461		1.215805461
2014/07/15 19:05	0.438821031	2014/07/15	15.79574074	19:05:52	00:04:56	0.438821031	2.11	0.438821031	Weekday	19.38882707	0.438821031		0.438821031
2014/07/15 19:19	1.124859384	2014/07/15	15.80524306	19:19:33	00:13:41	1.124859384	2.11	1.124859384	Weekday	19.38882707	1.124859384		1.124859384
2014/07/15 19:24	1.331952039	2014/07/15	15.80894676	19:24:53	00:05:20	1.331952039	2.11	1.331952039	Weekday	19.38882707	1.331952039		1.331952039
2014/07/15 19:29	0.436363633	2014/07/15	15.81207176	19:29:23	00:04:30	0.436363633	2.11	0.436363633	Weekday	19.38882707	0.436363633		0.436363633
2014/07/15 19:43	0.306158894	2014/07/15	15.82162037	19:43:08	00:13:45	0.306158894	2.11	0.306158894	Weekday	19.38882707	0.306158894		0.306158894
2014/07/15 20:02	0.603925511	2014/07/15	15.83523148	20:02:44	00:19:36	0.603925511	2.11	0.603925511	Weekday	19.38882707	0.603925511		0.603925511
2014/07/15 20:12	1.151484126	2014/07/15	15.84212963	20:12:40	00:09:56	1.151484126	2.11	1.151484126	Weekday	19.38882707	1.151484126		1.151484126
2014/07/15 20:17	0.304883210	2014/07/15	15.84575231	20:17:53	00:05:13	0.30488321	2.11	0.30488321	Weekday	19.38882707	0.30488321		0.30488321
2014/07/15 20:37	0.529583096	2014/07/15	15.8594213	20:37:34	00:19:41	0.529583096	2.11	0.529583096	Weekday	19.38882707	0.529583096		0.529583096
2014/07/15 20:48	1.188982090	2014/07/15	15.86728009	20:48:53	00:11:19	1.18898209	2.11	1.18898209	Weekday	19.38882707	1.18898209		1.18898209
2014/07/15 20:53	1.124086671	2014/07/15	15.87078704	20:53:56	00:05:03	1.124086671	2.11	1.124086671	Weekday	19.38882707	1.124086671		1.124086671
2014/07/15 20:59	0.983123046	2014/07/15	15.87449074	20:59:16	00:05:20	0.983123046	2.11	0.983123046	Weekday	19.38882707	0.983123046		0.983123046
2014/07/15 21:05	0.283303951	2014/07/15	15.87873843	21:05:23	00:06:07	0.283303951	2.11	0.283303951	Weekday	19.38882707	0.283303951		0.283303951
2014/07/15 21:26	0.604513697	2014/07/15	15.8934375	21:26:33	00:21:10	0.604513697	2.11	0.604513697	Weekday	19.38882707	0.604513697		0.604513697
2014/07/15 21:36	0.682826898	2014/07/15	15.90033565	21:36:29	00:09:56	0.682826898	2.11	0.682826898	Weekday	19.38882707	0.682826898		0.682826898
2014/07/15 21:45	0.219659526	2014/07/15	15.90643519	21:45:16	00:08:47	0.219659526	2.11	0.219659526	Weekday	19.38882707	0.219659526		0.219659526
2014/07/15 22:12	0.520833329	2014/07/15	15.92540509	22:12:35	00:27:19	0.520833329	2.11	0.520833329	Weekday	19.38882707	0.520833329		0.520833329
2014/07/15 22:24	0.292141394	2014/07/15	15.93340278	22:24:06	00:11:31	0.292141394	2.11	0.292141394	Weekday	19.38882707	0.292141394		0.292141394
2014/07/15 22:44	0.140049483	2014/07/15	15.94766204	22:44:38	00:20:32	0.140049483	2.11	0.140049483	Weekday	19.38882707	0.140049483		0.140049483
2014/07/15 23:27	0.057789549	2014/07/15	15.97741898	23:27:29	00:42:51	0.057789549	2.11	0.057789549	Weekday	19.38882707	0.057789549	0.057789549	
2014/07/16 01:11	0.035151238	2014/07/16	16.04951389	01:11:18	01:43:49	0.035151238	2.11	0.035151238	Weekday	21.28729687	0.035151238	0.035151238	
2014/07/16 04:02	3.230437878	2014/07/16	16.16805556	04:02:00	02:50:42	3.230437878	2.11	3.230437878	Weekday	21.28729687	3.230437878		3.230437878
2014/07/16 04:03	3.242074902	2014/07/16	16.16934028	04:03:51	00:01:51	3.242074902	2.11	3.242074902	Weekday	21.28729687	3.242074902		3.242074902
2014/07/16 04:05	3.226963043	2014/07/16	16.170625	04:05:42	00:01:51	3.226963043	2.11	3.226963043	Weekday	21.28729687	3.226963043		3.226963043
2014/07/16 04:07	3.205698995	2014/07/16	16.1719213	04:07:34	00:01:52	3.205698995	2.11	3.205698995	Weekday	21.28729687	3.205698995		3.205698995
2014/07/16 04:09	0.099967232	2014/07/16	16.17321759	04:09:26	00:01:52	0.099967232	2.11	0.099967232	Weekday	21.28729687	0.099967232		0.099967232
2014/07/16 05:09	0.755794418	2014/07/16	16.21489583	05:09:27	01:00:01	0.755794418	2.11	0.755794418	Weekday	21.28729687	0.755794418		0.755794418
2014/07/16 05:17	0.188062226	2014/07/16	16.22041667	05:17:24	00:07:57	0.188062226	2.11	0.188062226	Weekday	21.28729687	0.188062226		0.188062226
2014/07/16 05:49	0.012957209	2014/07/16	16.24256944	05:49:18	00:31:54	0.012957209	2.11	0.012957209	Weekday	21.28729687	0.012957209		0.012957209
2014/07/16 13:32	0.614208690	2014/07/16	16.56414352	13:32:22	07:43:04	0.61420869	2.11	0.61420869	Weekday	21.28729687	0.61420869		0.61420869
2014/07/16 13:42	0.704804411	2014/07/16	16.57092593	13:42:08	00:09:46	0.704804411	2.11	0.704804411	Weekday	21.28729687	0.704804411		0.704804411
2014/07/16 13:50	0.629392631	2014/07/16	16.57684028	13:50:39	00:08:31	0.629392631	2.11	0.629392631	Weekday	21.28729687	0.629392631		0.629392631
2014/07/16 14:00	0.404985822	2014/07/16	16.58346065	14:00:11	00:09:32	0.404985822	2.11	0.404985822	Weekday	21.28729687	0.404985822		0.404985822
2014/07/16 14:15	0.359209736	2014/07/16	16.59375	14:15:00	00:14:49	0.359209736	2.11	0.359209736	Weekday	21.28729687	0.359209736		0.359209736
2014/07/16 14:31	0.094173289	2014/07/16	16.60534722	14:31:42	00:16:42	0.094173289	2.11	0.094173289	Weekday	21.28729687	0.094173289		0.094173289
2014/07/16 15:35	1.378465298	2014/07/16	16.64958333	15:35:24	01:03:42	1.378465298	2.11	1.378465298	Weekday	21.28729687	1.378465298		1.378465298
2014/07/16 15:39	0.621697228	2014/07/16	16.65261574	15:39:46	00:04:22	0.621697228	2.11	0.621697228	Weekday	21.28729687	0.621697228		0.621697228
2014/07/16 15:49	0.633111739	2014/07/16	16.65931713	15:49:25	00:09:39	0.633111739	2.11	0.633111739	Weekday	21.28729687	0.633111739		0.633111739
2014/07/16 15:58	0.704060074	2014/07/16	16.6658912	15:58:53	00:09:28	0.704060074	2.11	0.704060074	Weekday	21.28729687	0.704060074		0.704060074
2014/07/16 16:07	0.400864082	2014/07/16	16.67181713	16:07:25	00:08:32	0.400864082	2.11	0.400864082	Weekday	21.28729687	0.400864082		0.400864082
2014/07/16 16:22	0.578945671	2014/07/16	16.68221065	16:22:23	00:14:58	0.578945671	2.11	0.578945671	Weekday	21.28729687	0.578945671		0.578945671
2014/07/16 16:32	0.600500412	2014/07/16	16.68939815	16:32:44	00:10:21	0.600500412	2.11	0.600500412	Weekday	21.28729687	0.600500412		0.600500412
2014/07/16 16:42	0.516247450	2014/07/16	16.69634259	16:42:44	00:10:00	0.51624745	2.11	0.51624745	Weekday	21.28729687	0.51624745		0.51624745
2014/07/16 16:54	0.592631609	2014/07/16	16.70440972	16:54:21	00:11:37	0.592631609	2.11	0.592631609	Weekday	21.28729687	0.592631609		0.592631609
2014/07/16 17:04	0.758885276	2014/07/16	16.71144676	17:04:29	00:10:08	0.758885276	2.11	0.758885276	Weekday	21.28729687	0.758885276		0.758885276
2014/07/16 17:12	0.740131573	2014/07/16	16.71693287	17:12:23	00:07:54	0.740131573	2.11	0.740131573	Weekday	21.28729687	0.740131573		0.740131573
2014/07/16 17:20	1.152959253	2014/07/16	16.72256944	17:20:30	00:08:07	1.152959253	2.11	1.152959253	Weekday	21.28729687	1.152959253		1.152959253
2014/07/16 17:25	1.184132613	2014/07/16	16.72618056	17:25:42	00:05:12	1.184132613	2.11	1.184132613	Weekday	21.28729687	1.184132613		1.184132613
2014/07/16 17:30	0.467605337	2014/07/16	16.72969907	17:30:46	00:05:04	0.467605337	2.11	0.467605337	Weekday	21.28729687	0.467605337		0.467605337
2014/07/16 17:43	0.699572478	2014/07/16	16.73861111	17:43:36	00:12:50	0.699572478	2.11	0.699572478	Weekday	21.28729687	0.699572478		0.699572478
2014/07/16 17:52	1.119124587	2014/07/16	16.74456019	17:52:10	00:08:34	1.119124587	2.11	1.119124587	Weekday	21.28729687	1.119124587		1.119124587
2014/07/16 17:57	1.680829196	2014/07/16	16.74828704	17:57:32	00:05:22	1.680829196	2.11	1.680829196	Weekday	21.28729687	1.680829196		1.680829196
2014/07/16 18:01	1.567534604	2014/07/16	16.75076389	18:01:06	00:03:34	1.567534604	2.11	1.567534604	Weekday	21.28729687	1.567534604		1.567534604
2014/07/16 18:04	0.863060983	2014/07/16	16.75342593	18:04:56	00:03:50	0.863060983	2.11	0.863060983	Weekday	21.28729687	0.863060983		0.863060983
2014/07/16 18:11	1.122964618	2014/07/16	16.75825231	18:11:53	00:06:57	1.122964618	2.11	1.122964618	Weekday	21.28729687	1.122964618		1.122964618
2014/07/16 18:17	1.726453084	2014/07/16	16.76196759	18:17:14	00:05:21	1.726453084	2.11	1.726453084	Weekday	21.28729687	1.726453084		1.726453084
2014/07/16 18:20	1.747912202	2014/07/16	16.764375	18:20:42	00:03:28	1.747912202	2.11	1.747912202	Weekday	21.28729687	1.747912202		1.747912202
2014/07/16 18:24	1.937358719	2014/07/16	16.76675926	18:24:08	00:03:26	1.937358719	2.11	1.937358719	Weekday	21.28729687	1.937358719		1.937358719
2014/07/16 18:27	0.768935019	2014/07/16	16.76891204	18:27:14	00:03:06	0.768935019	2.11	0.768935019	Weekday	21.28729687	0.768935019		0.768935019
2014/07/16 18:35	0.651536535	2014/07/16	16.7743287	18:35:02	00:07:48	0.651536535	2.11	0.651536535	Weekday	21.28729687	0.651536535		0.651536535

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/16 18:44	0.619813362	2014/07/16	16.78072917	18:44:15	00:09:13	0.619813362	2.11	0.619813362	Weekday	21.28729687	0.619813362		0.619813362
2014/07/16 18:53	0.309805336	2014/07/16	16.78744213	18:53:55	00:09:40	0.309805336	2.11	0.309805336	Weekday	21.28729687	0.309805336		0.309805336
2014/07/16 19:13	0.519375591	2014/07/16	16.8008912	19:13:17	00:19:22	0.519375591	2.11	0.519375591	Weekday	21.28729687	0.519375591		0.519375591
2014/07/16 19:24	0.965043955	2014/07/16	16.80892361	19:24:51	00:11:34	0.965043955	2.11	0.965043955	Weekday	21.28729687	0.965043955		0.965043955
2014/07/16 19:31	0.504555006	2014/07/16	16.81324074	19:31:04	00:06:13	0.504555006	2.11	0.504555006	Weekday	21.28729687	0.504555006		0.504555006
2014/07/16 19:42	1.190397451	2014/07/16	16.82149306	19:42:57	00:11:53	1.190397451	2.11	1.190397451	Weekday	21.28729687	1.190397451		1.190397451
2014/07/16 19:47	1.318874550	2014/07/16	16.82498843	19:47:59	00:05:02	1.31887455	2.11	1.31887455	Weekday	21.28729687	1.31887455		1.31887455
2014/07/16 19:52	1.247660626	2014/07/16	16.82814815	19:52:32	00:04:33	1.247660626	2.11	1.247660626	Weekday	21.28729687	1.247660626		1.247660626
2014/07/16 19:57	0.930857933	2014/07/16	16.83149306	19:57:21	00:04:49	0.930857933	2.11	0.930857933	Weekday	21.28729687	0.930857933		0.930857933
2014/07/16 20:03	1.312144617	2014/07/16	16.83597222	20:03:48	00:06:27	1.312144617	2.11	1.312144617	Weekday	21.28729687	1.312144617		1.312144617
2014/07/16 20:08	0.769329395	2014/07/16	16.83914352	20:08:22	00:04:34	0.769329395	2.11	0.769329395	Weekday	21.28729687	0.769329395		0.769329395
2014/07/16 20:16	1.033769806	2014/07/16	16.84456019	20:16:10	00:07:48	1.033769806	2.11	1.033769806	Weekday	21.28729687	1.033769806		1.033769806
2014/07/16 20:21	0.399405327	2014/07/16	16.84858796	20:21:58	00:05:48	0.399405327	2.11	0.399405327	Weekday	21.28729687	0.399405327		0.399405327
2014/07/16 20:37	0.592085782	2014/07/16	16.85902778	20:37:00	00:15:02	0.592085782	2.11	0.592085782	Weekday	21.28729687	0.592085782		0.592085782
2014/07/16 20:47	0.348600753	2014/07/16	16.86606481	20:47:08	00:10:08	0.348600753	2.11	0.348600753	Weekday	21.28729687	0.348600753		0.348600753
2014/07/16 21:04	0.667061957	2014/07/16	16.87800926	21:04:20	00:17:12	0.667061957	2.11	0.667061957	Weekday	21.28729687	0.667061957		0.667061957
2014/07/16 21:13	0.517390050	2014/07/16	16.88425926	21:13:20	00:09:00	0.51739005	2.11	0.51739005	Weekday	21.28729687	0.51739005		0.51739005
2014/07/16 21:24	0.428000757	2014/07/16	16.89231481	21:24:56	00:11:36	0.428000757	2.11	0.428000757	Weekday	21.28729687	0.428000757		0.428000757
2014/07/16 21:38	1.353281697	2014/07/16	16.90204861	21:38:57	00:14:01	1.353281697	2.11	1.353281697	Weekday	21.28729687	1.353281697		1.353281697
2014/07/16 21:43	0.484626564	2014/07/16	16.90512731	21:43:23	00:04:26	0.484626564	2.11	0.484626564	Weekday	21.28729687	0.484626564		0.484626564
2014/07/16 21:55	0.333444479	2014/07/16	16.91372685	21:55:46	00:12:23	0.333444479	2.11	0.333444479	Weekday	21.28729687	0.333444479		0.333444479
2014/07/16 22:13	0.415320717	2014/07/16	16.92621528	22:13:45	00:17:59	0.415320717	2.11	0.415320717	Weekday	21.28729687	0.415320717		0.415320717
2014/07/16 22:28	0.109826412	2014/07/16	16.93625	22:28:12	00:14:27	0.109826412	2.11	0.109826412	Weekday	21.28729687	0.109826412		0.109826412
2014/07/16 23:22	0.201646780	2014/07/16	16.97418981	23:22:50	00:54:38	0.20164678	2.11	0.20164678	Weekday	21.28729687	0.20164678	0.20164678	
2014/07/16 23:52	0.061375423	2014/07/16	16.99484954	23:52:35	00:29:45	0.061375423	2.11	0.061375423	Weekday	21.28729687	0.061375423	0.061375423	
2014/07/17 01:30	0.039536630	2014/07/17	17.06274306	01:30:21	01:37:46	0.03953663	2.11	0.03953663	Weekday	124.5665517	0.03953663	0.03953663	
2014/07/17 04:02	3.202277149	2014/07/17	17.168125	04:02:06	02:31:45	3.202277149	2.11	3.202277149	Weekday	124.5665517	3.202277149		3.202277149
2014/07/17 04:03	3.207412661	2014/07/17	17.16943287	04:03:59	00:01:53	3.207412661	2.11	3.207412661	Weekday	124.5665517	3.207412661		3.207412661
2014/07/17 04:05	3.226384631	2014/07/17	17.17072917	04:05:51	00:01:52	3.226384631	2.11	3.226384631	Weekday	124.5665517	3.226384631		3.226384631
2014/07/17 04:07	0.227275595	2014/07/17	17.17202546	04:07:43	00:01:52	0.227275595	2.11	0.227275595	Weekday	124.5665517	0.227275595		0.227275595
2014/07/17 04:34	0.017451262	2014/07/17	17.1903588	04:34:07	00:26:24	0.017451262	2.11	0.017451262	Weekday	124.5665517	0.017451262		0.017451262
2014/07/17 10:17	3.394305083	2014/07/17	17.42912037	10:17:56	05:43:49	3.394305083	2.11	3.394305083	Weekday	124.5665517	3.394305083		3.394305083
2014/07/17 10:19	3.060703937	2014/07/17	17.43034722	10:19:42	00:01:46	3.060703937	2.11	3.060703937	Weekday	124.5665517	3.060703937		3.060703937
2014/07/17 10:21	3.846975819	2014/07/17	17.43170139	10:21:39	00:01:57	3.846975819	2.11	3.846975819	Weekday	124.5665517	3.846975819		3.846975819
2014/07/17 10:23	3.497182797	2014/07/17	17.43278935	10:23:13	00:01:34	3.497182797	2.11	3.497182797	Weekday	124.5665517	3.497182797		3.497182797
2014/07/17 10:24	3.448275835	2014/07/17	17.43398148	10:24:56	00:01:43	3.448275835	2.11	3.448275835	Weekday	124.5665517	3.448275835		3.448275835
2014/07/17 10:26	3.408445343	2014/07/17	17.43518519	10:26:40	00:01:44	3.408445343	2.11	3.408445343	Weekday	124.5665517	3.408445343		3.408445343
2014/07/17 10:28	3.441682573	2014/07/17	17.43641204	10:28:26	00:01:46	3.441682573	2.11	3.441682573	Weekday	124.5665517	3.441682573		3.441682573
2014/07/17 10:30	3.669724741	2014/07/17	17.43761574	10:30:10	00:01:44	3.669724741	2.11	3.669724741	Weekday	124.5665517	3.669724741		3.669724741
2014/07/17 10:31	0.047284677	2014/07/17	17.43875	10:31:48	00:01:38	0.047284677	2.11	0.047284677	Weekday	124.5665517	0.047284677		0.047284677
2014/07/17 12:38	3.297307173	2014/07/17	17.526875	12:38:42	02:06:54	3.297307173	2.11	3.297307173	Weekday	124.5665517	3.297307173		3.297307173
2014/07/17 12:40	3.644462413	2014/07/17	17.52813657	12:40:31	00:01:49	3.644462413	2.11	3.644462413	Weekday	124.5665517	3.644462413		3.644462413
2014/07/17 12:42	3.420102576	2014/07/17	17.52928241	12:42:10	00:01:39	3.420102576	2.11	3.420102576	Weekday	124.5665517	3.420102576		3.420102576
2014/07/17 12:43	3.418803391	2014/07/17	17.53049769	12:43:55	00:01:45	3.418803391	2.11	3.418803391	Weekday	124.5665517	3.418803391		3.418803391
2014/07/17 12:45	3.421402748	2014/07/17	17.53171296	12:45:40	00:01:45	3.421402748	2.11	3.421402748	Weekday	124.5665517	3.421402748		3.421402748
2014/07/17 12:47	3.707517993	2014/07/17	17.53293981	12:47:26	00:01:46	3.707517993	2.11	3.707517993	Weekday	124.5665517	3.707517993		3.707517993
2014/07/17 12:49	3.880983151	2014/07/17	17.5340625	12:49:03	00:01:37	3.880983151	2.11	3.880983151	Weekday	124.5665517	3.880983151		3.880983151
2014/07/17 12:50	3.610832469	2014/07/17	17.53513889	12:50:36	00:01:33	3.610832469	2.11	3.610832469	Weekday	124.5665517	3.610832469		3.610832469
2014/07/17 12:52	4.105839383	2014/07/17	17.53628472	12:52:15	00:01:39	4.105839383	2.11	4.105839383	Weekday	124.5665517	4.105839383		4.105839383
2014/07/17 12:53	4.489897694	2014/07/17	17.53730324	12:53:43	00:01:28	4.489897694	2.11	4.489897694	Weekday	124.5665517	4.489897694		4.489897694
2014/07/17 12:55	4.254313367	2014/07/17	17.53822917	12:55:03	00:01:20	4.254313367	2.11	4.254313367	Weekday	124.5665517	4.254313367		4.254313367
2014/07/17 12:56	3.893575569	2014/07/17	17.53921296	12:56:28	00:01:25	3.893575569	2.11	3.893575569	Weekday	124.5665517	3.893575569		3.893575569
2014/07/17 12:58	3.870967711	2014/07/17	17.54027778	12:58:00	00:01:32	3.870967711	2.11	3.870967711	Weekday	124.5665517	3.870967711		3.870967711
2014/07/17 12:59	4.027746667	2014/07/17	17.54135417	12:59:33	00:01:33	4.027746667	2.11	4.027746667	Weekday	124.5665517	4.027746667		4.027746667
2014/07/17 13:01	4.322766536	2014/07/17	17.54239583	13:01:03	00:01:30	4.322766536	2.11	4.322766536	Weekday	124.5665517	4.322766536		4.322766536
2014/07/17 13:02	4.185073206	2014/07/17	17.54335648	13:02:26	00:01:23	4.185073206	2.11	4.185073206	Weekday	124.5665517	4.185073206		4.185073206
2014/07/17 13:03	4.304160654	2014/07/17	17.54435185	13:03:52	00:01:26	4.304160654	2.11	4.304160654	Weekday	124.5665517	4.304160654		4.304160654
2014/07/17 13:05	4.090909058	2014/07/17	17.5453125	13:05:15	00:01:23	4.090909058	2.11	4.090909058	Weekday	124.5665517	4.090909058		4.090909058
2014/07/17 13:06	3.992015936	2014/07/17	17.54633102	13:06:43	00:01:28	3.992015936	2.11	3.992015936	Weekday	124.5665517	3.992015936		3.992015936
2014/07/17 13:08	4.433497501	2014/07/17	17.54738426	13:08:14	00:01:31	4.433497501	2.11	4.433497501	Weekday	124.5665517	4.433497501		4.433497501
2014/07/17 13:09	4.215456641	2014/07/17	17.54832176	13:09:35	00:01:21	4.215456641	2.11	4.215456641	Weekday	124.5665517	4.215456641		4.215456641
2014/07/17 13:11	3.707517993	2014/07/17	17.54930556	13:11:00	00:01:25	3.707517993	2.11	3.707517993	Weekday	124.5665517	3.707517993		3.707517993
2014/07/17 13:12	3.877638918	2014/07/17	17.55042824	13:12:37	00:01:37	3.877638918	2.11	3.877638918	Weekday	124.5665517	3.877638918		3.877638918
2014/07/17 13:14	3.825717291	2014/07/17	17.55150463	13:14:10	00:01:33	3.825717291	2.11	3.825717291	Weekday	124.5665517	3.825717291		3.825717291
2014/07/17 13:15	4.158004125	2014/07/17	17.55259259	13:15:44	00:01:34	4.158004125	2.11	4.158004125	Weekday	124.5665517	4.158004125		4.158004125
2014/07/17 13:17	3.824091748	2014/07/17	17.55359954	13:17:11	00:01:27	3.824091748	2.11	3.824091748	Weekday	124.5665517	3.824091748		3.824091748
2014/07/17 13:18	6.739048991	2014/07/17	17.5546875	13:18:45	00:01:34	6.739048991	2.11	6.739048991	Weekday	124.5665517	6.739048991		6.739048991
2014/07/17 13:19	7.374026979	2014/07/17	17.55530093	13:19:38	00:00:53	7.374026979	2.11	7.374026979	Weekday	124.5665517	7.374026979		7.374026979
2014/07/17 13:20	6.524102884	2014/07/17	17.55586806	13:20:27	00:00:49	6.524102884	2.11	6.524102884	Weekday	124.5665517	6.524102884		6.524102884
2014/07/17 13:21	7.802340640	2014/07/17	17.55650463	13:21:22	00:00:55	7.80234064	2.11	7.80234064	Weekday	124.5665517	7.80234064		7.80234064
2014/07/17 13:22	8.241758176	2014/07/17	17.55704861	13:22:09	00:00:47	8.241758176	2.11	8.241758176	Weekday	124.5665517	8.241758176		8.241758176
2014/07/17 13:22	8.245533603	2014/07/17	17.5575463	13:22:52	00:00:43	8.245533603	2.11	8.245533603	Weekday	124.5665517	8.245533603		8.245533603
2014/07/17 13:23	8.222932780	2014/07/17	17.55805556	13:23:36	00:00:44	8.22293278	2.11	8.22293278	Weekday	124.5665517	8.22293278		8.22293278
2014/07/17 13:24	8.767657017	2014/07/17	17.55856481	13:24:20	00:00:44	8.767657017	2.11	8.767657017	Weekday	124.5665517	8.767657017		8.767657017
2014/07/17 13:25	8.658008589	2014/07/17	17.55903935	13:25:01	00:00:41	8.658008589	2.11	8.658008589	Weekday	124.5665517	8.658008589		8.658008589
2014/07/17 13:25	8.608321309	2014/07/17	17.55951389	13:25:42	00:00:41	8.608321309	2.11	8.608321309	Weekday	124.5665517	8.608321309		8.608321309
2014/07/17 13:26	8.341056467	2014/07/17	17.56	13:26:24	00:00:42	8.341056467	2.11	8.341056467	Weekday	124.5665517	8.341056467		8.341056467
2014/07/17 13:27	8.283478995	2014/07/17	17.56049769	13:27:07	00:00:43	8.283478995	2.11	8.283478995	Weekday	124.5665517	8.283478995		8.283478995
2014/07/17 13:27	8.446738553	2014/07/17	17.56100694	13:27:51	00:00:44	8.446738553	2.11	8.446738553	Weekday	124.5665517	8.446738553		8.446738553
2014/07/17 13:28	8.325624355	2014/07/17	17.56149306	13:28:33	00:00:42	8.325624355	2.11	8.325624355	Weekday	124.5665517	8.325624355		8.325624355
2014/07/17 13:29	8.534850572	2014/07/17	17.56200231	13:29:17	00:00:44	8.534850572	2.11	8.534850572	Weekday	124.5665517	8.534850572		8.534850572
2014/07/17 13:29	9.068010003	2014/07/17	17.56248843	13:29:59	00:00:42	9.068010003	2.11	9.068010003	Weekday	124.5665517	9.068010003		9.068010003
2014/07/17 13:30	9.488666239	2014/07/17	17.56295139	13:30:39	00:00:40	9.488666239	2.11	9.488666239	Weekday	124.5665517	9.488666239		9.488666239
2014/07/17 13:31	9.483666942	2014/07/17	17.56337963	13:31:16	00:00:37	9.483666942	2.11	9.483666942	Weekday	124.5665517	9.483666942		9.483666942
2014/07/17 13:31	8.624820247	2014/07/17	17.56381944	13:31:54	00:00:38	8.624820247	2.11	8.624820247	Weekday	124.5665517	8.624820247		8.624820247
2014/07/17 13:32	9.072580573	2014/07/17	17.56430556	13:32:36	00:00:42	9.072580573	2.11	9.072580573	Weekday	124.5665517	9.072580573		9.072580573
2014/07/17 13:33	8.845208774	2014/07/17	17.56476852	13:33:16	00:00:40	8.845208774	2.11	8.845208774	Weekday	124.5665517	8.845208774		8.845208774
2014/07/17 13:33	8.906481868	2014/07/17	17.56524306	13:33:57	00:00:41	8.906481868	2.11	8.906481868	Weekday	124.5665517	8.906481868		8.906481868
2014/07/17 13:34	7.922535148	2014/07/17	17.56570602	13:34:37	00:00:40	7.922535148	2.11	7.922535148	Weekday	124.5665517	7.922535148		7.922535148
2014/07/17 13:35	8.344923438	2014/07/17	17.56622685	13:35:22	00:00:45	8.344923438	2.11	8.344923438	Weekday	124.5665517	8.344923438		8.344923438
2014/07/17 13:36	9.013520209	2014/07/17	17.56673611	13:36:06	00:00:44	9.013520209	2.11	9.013520209	Weekday	124.5665517	9.013520209		9.013520209
2014/07/17 13:36	10.055865841	2014/07/17	17.5671875	13:36:45	00:00:39	10.05586584	2.11	10.05586584	Weekday	124.5665517	10.05586584		10.05586584
2014/07/17 13:37	10.843373407	2014/07/17	17.56760417	13:37:21	00:00:36	10.84337341	2.11	10.84337341	Weekday	124.5665517	10.84337341		10.84337341
2014/07/17 13:37	10.452961589	2014/07/17	17.56798611	13:37:54	00:00:33	10.45296159	2.11	10.45296159	Weekday	124.5665517	10.45296159		10.45296159
2014/07/17 13:38	9.379885282	2014/07/17	17.5683912	13:38:29	00:00:35	9.379885282	2.11	9.379885282	Weekday	124.5665517	9.379885282		9.379885282
2014/07/17 13:39	8.750607612	2014/07/17	17.56883102	13:39:07	00:00:38	8.750607612	2.11	8.750607612	Weekday	124.5665517	8.750607612		8.750607612
2014/07/17 13:39	9.399477731	2014/07/17	17.56930556	13:39:48	00:00:41	9.399477731	2.11	9.399477731	Weekday	124.5665517	9.399477731		9.399477731
2014/07/17 13:40	9.787928143	2014/07/17	17.56975694	13:40:27	00:00:39	9.787928143	2.11	9.787928143	Weekday	124.5665517	9.787928143		9.787928143
2014/07/17 13:41	9.677419277	2014/07/17	17.57018519	13:41:04	00:00:37	9.677419277	2.11	9.677419277	Weekday	124.5665517	9.677419277		9.677419277
2014/07/17 13:41	9.077155752	2014/07/17	17.57061343	13:41:41	00:00:37	9.077155752	2.11	9.077155752	Weekday	124.5665517	9.077155752		9.077155752
2014/07/17 13:42	9.027081172	2014/07/17	17.57106481	13:42:20	00:00:39	9.027081172	2.11	9.027081172	Weekday	124.5665517	9.027081172		9.027081172
2014/07/17 13:43	8.754863743	2014/07/17	17.57152778	13:43:00	00:00:40	8.754863743	2.11	8.754863743	Weekday	124.5665517	8.754863743		8.754863743
2014/07/17 13:43	8.823529341	2014/07/17	17.57200231	13:43:41	00:00:41	8.823529341	2.11	8.823529341	Weekday	124.5665517	8.823529341		8.823529341
2014/07/17 13:44	8.450704158	2014/07/17	17.57247685	13:44:22	00:00:41	8.450704158	2.11	8.450704158	Weekday	124.5665517	8.450704158		8.450704158
2014/07/17 13:45	8.364312201	2014/07/17	17.57297454	13:45:05	00:00:43	8.364312201	2.11	8.364312201	Weekday	124.5665517	8.364312201		8.364312201
2014/07/17 13:45	8.294930810	2014/07/17	17.57347222	13:45:48	00:00:43	8.29493081	2.11	8.29493081	Weekday	124.5665517	8.29493081		8.29493081
2014/07/17 13:46	8.137432123	2014/07/17	17.57396991	13:46:31	00:00:43	8.137432123	2.11	8.137432123	Weekday	124.5665517	8.137432123		8.137432123
2014/07/17 13:47	8.344923438	2014/07/17	17.57447917	13:47:15	00:00:44	8.344923438	2.11	8.344923438	Weekday	124.5665517	8.344923438		8.344923438
2014/07/17 13:47	8.399439970	2014/07/17	17.57498843	13:47:59	00:00:44	8.39943997	2.11	8.39943997	Weekday	124.5665517	8.39943997		8.39943997
2014/07/17 13:48	8.897676646	2014/07/17	17.57547454	13:48:41	00:00:42	8.897676646	2.11	8.897676646	Weekday	124.5665517	8.897676646		8.897676646
2014/07/17 13:49	9.127788974	2014/07/17	17.57594907	13:49:22	00:00:41	9.127788974	2.11	9.127788974	Weekday	124.5665517	9.127788974		9.127788974
2014/07/17 13:50	8.823529341	2014/07/17	17.57640046	13:50:01	00:00:39	8.823529341	2.11	8.823529341	Weekday	124.5665517	8.823529341		8.823529341
2014/07/17 13:50	8.733624384	2014/07/17	17.576875	13:50:42	00:00:41	8.733624384	2.11	8.733624384	Weekday	124.5665517	8.733624384		8.733624384
2014/07/17 13:51	8.678881319	2014/07/17	17.57734954	13:51:23	00:00:41	8.678881319	2.11	8.678881319	Weekday	124.5665517	8.678881319		8.678881319
2014/07/17 13:52	8.955223809	2014/07/17	17.57783565	13:52:05	00:00:42	8.955223809	2.11	8.955223809	Weekday	124.5665517	8.955223809		8.955223809
2014/07/17 13:52	8.115419232	2014/07/17	17.57829861	13:52:45	00:00:40	8.115419232	2.11	8.115419232	Weekday	124.5665517	8.115419232		8.115419232
2014/07/17 13:53	8.256880668	2014/07/17	17.57880787	13:53:29	00:00:44	8.256880668	2.11	8.256880668	Weekday	124.5665517	8.256880668		8.256880668
2014/07/17 13:54	9.273570250	2014/07/17	17.57931713	13:54:13	00:00:44	9.27357025	2.11	9.27357025	Weekday	124.5665517	9.27357025		9.27357025
2014/07/17 13:54	##########	2014/07/17	17.57976852	13:54:52	00:00:39	12.25323339	2.11	12.25323339	Weekday	124.5665517	12.25323339		12.25323339
2014/07/17 13:55	11.703510960	2014/07/17	17.58010417	13:55:21	00:00:29	11.70351096	2.11	11.70351096	Weekday	124.5665517	11.70351096		11.70351096
2014/07/17 13:55	11.605415769	2014/07/17	17.58046296	13:55:52	00:00:31	11.60541577	2.11	11.60541577	Weekday	124.5665517	11.60541577		11.60541577
2014/07/17 13:56	11.414077271	2014/07/17	17.58082176	13:56:23	00:00:31	11.41407727	2.11	11.41407727	Weekday	124.5665517	11.41407727		11.41407727
2014/07/17 13:56	11.457670182	2014/07/17	17.58119213	13:56:55	00:00:32	11.45767018	2.11	11.45767018	Weekday	124.5665517	11.45767018		11.45767018
2014/07/17 13:57	11.780104618	2014/07/17	17.58155093	13:57:26	00:00:31	11.78010462	2.11	11.78010462	Weekday	124.5665517	11.78010462		11.78010462
2014/07/17 13:57	11.590469965	2014/07/17	17.58190972	13:57:57	00:00:31	11.59046997	2.11	11.59046997	Weekday	124.5665517	11.59046997		11.59046997

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/17 13:58	11.583011491	2014/07/17	17.58226852	13:58:28	00:00:31	11.58301149	2.11	11.58301149	Weekday	124.5665517	11.58301149		11.58301149
2014/07/17 13:58	11.620400165	2014/07/17	17.58262731	13:58:59	00:00:31	11.62040017	2.11	11.62040017	Weekday	124.5665517	11.62040017		11.62040017
2014/07/17 13:59	11.235954966	2014/07/17	17.58298611	13:59:30	00:00:31	11.23595497	2.11	11.23595497	Weekday	124.5665517	11.23595497		11.23595497
2014/07/17 14:00	11.896893494	2014/07/17	17.58335648	14:00:02	00:00:32	11.89689349	2.11	11.89689349	Weekday	124.5665517	11.89689349		11.89689349
2014/07/17 14:00	11.605415768	2014/07/17	17.5837037	14:00:32	00:00:30	11.60541577	2.11	11.60541577	Weekday	124.5665517	11.60541577		11.60541577
2014/07/17 14:01	12.121212025	2014/07/17	17.5840625	14:01:03	00:00:31	12.12121202	2.11	12.12121202	Weekday	124.5665517	12.12121202		12.12121202
2014/07/17 14:01	12.236573661	2014/07/17	17.58440972	14:01:33	00:00:30	12.23657366	2.11	12.23657366	Weekday	124.5665517	12.23657366		12.23657366
2014/07/17 14:02	12.543553906	2014/07/17	17.58474537	14:02:02	00:00:29	12.54355391	2.11	12.54355391	Weekday	124.5665517	12.54355391		12.54355391
2014/07/17 14:02	12.286689321	2014/07/17	17.58508102	14:02:31	00:00:29	12.28668932	2.11	12.28668932	Weekday	124.5665517	12.28668932		12.28668932
2014/07/17 14:03	12.286689321	2014/07/17	17.58541667	14:03:00	00:00:29	12.28668932	2.11	12.28668932	Weekday	124.5665517	12.28668932		12.28668932
2014/07/17 14:03	12.080536817	2014/07/17	17.58575231	14:03:29	00:00:29	12.08053682	2.11	12.08053682	Weekday	124.5665517	12.08053682		12.08053682
2014/07/17 14:03	11.590469965	2014/07/17	17.58609954	14:03:59	00:00:30	11.59046997	2.11	11.59046997	Weekday	124.5665517	11.59046997		11.59046997
2014/07/17 14:04	11.968085010	2014/07/17	17.58645833	14:04:30	00:00:31	11.96808501	2.11	11.96808501	Weekday	124.5665517	11.96808501		11.96808501
2014/07/17 14:05	11.749347164	2014/07/17	17.58680556	14:05:00	00:00:30	11.74934716	2.11	11.74934716	Weekday	124.5665517	11.74934716		11.74934716
2014/07/17 14:05	11.620400165	2014/07/17	17.58716435	14:05:31	00:00:31	11.62040017	2.11	11.62040017	Weekday	124.5665517	11.62040017		11.62040017
2014/07/17 14:06	11.944260025	2014/07/17	17.58752315	14:06:02	00:00:31	11.94426002	2.11	11.94426002	Weekday	124.5665517	11.94426002		11.94426002
2014/07/17 14:06	12.508686488	2014/07/17	17.58787037	14:06:32	00:00:30	12.50868649	2.11	12.50868649	Weekday	124.5665517	12.50868649		12.50868649
2014/07/17 14:07	12.354152269	2014/07/17	17.58820602	14:07:01	00:00:29	12.35415227	2.11	12.35415227	Weekday	124.5665517	12.35415227		12.35415227
2014/07/17 14:07	12.261580283	2014/07/17	17.58854167	14:07:30	00:00:29	12.26158028	2.11	12.26158028	Weekday	124.5665517	12.26158028		12.26158028
2014/07/17 14:07	11.928429328	2014/07/17	17.58887731	14:07:59	00:00:29	11.92842933	2.11	11.92842933	Weekday	124.5665517	11.92842933		11.92842933
2014/07/17 14:08	11.399619922	2014/07/17	17.58923611	14:08:30	00:00:31	11.39961992	2.11	11.39961992	Weekday	124.5665517	11.39961992		11.39961992
2014/07/17 14:09	10.791366820	2014/07/17	17.58959491	14:09:01	00:00:31	10.79136682	2.11	10.79136682	Weekday	124.5665517	10.79136682		10.79136682
2014/07/17 14:09	10.471204105	2014/07/17	17.58997685	14:09:34	00:00:33	10.4712041	2.11	10.4712041	Weekday	124.5665517	10.4712041		10.4712041
2014/07/17 14:10	10.459035361	2014/07/17	17.59038194	14:10:09	00:00:35	10.45903536	2.11	10.45903536	Weekday	124.5665517	10.45903536		10.45903536
2014/07/17 14:10	11.002444900	2014/07/17	17.59077546	14:10:43	00:00:34	11.0024449	2.11	11.0024449	Weekday	124.5665517	11.0024449		11.0024449
2014/07/17 14:11	10.863005345	2014/07/17	17.59115741	14:11:16	00:00:33	10.86300535	2.11	10.86300535	Weekday	124.5665517	10.86300535		10.86300535
2014/07/17 14:11	10.315186164	2014/07/17	17.59153935	14:11:49	00:00:33	10.31518616	2.11	10.31518616	Weekday	124.5665517	10.31518616		10.31518616
2014/07/17 14:12	10.613207462	2014/07/17	17.59194444	14:12:24	00:00:35	10.61320746	2.11	10.61320746	Weekday	124.5665517	10.61320746		10.61320746
2014/07/17 14:12	10.386612727	2014/07/17	17.59233796	14:12:58	00:00:34	10.38661273	2.11	10.38661273	Weekday	124.5665517	10.38661273		10.38661273
2014/07/17 14:13	10.526315705	2014/07/17	17.59274306	14:13:33	00:00:35	10.52631571	2.11	10.52631571	Weekday	124.5665517	10.52631571		10.52631571
2014/07/17 14:14	10.268111727	2014/07/17	17.59313657	14:14:07	00:00:34	10.26811173	2.11	10.26811173	Weekday	124.5665517	10.26811173		10.26811173
2014/07/17 14:14	6.607929462	2014/07/17	17.59354167	14:14:42	00:00:35	6.607929462	2.11	6.607929462	Weekday	124.5665517	6.607929462		6.607929462
2014/07/17 14:15	3.544004697	2014/07/17	17.59416667	14:15:36	00:00:54	3.544004697	2.11	3.544004697	Weekday	124.5665517	3.544004697		3.544004697
2014/07/17 14:17	2.084056948	2014/07/17	17.59534722	14:17:18	00:01:42	2.084056948	2.11	2.084056948	Weekday	124.5665517	2.084056948		2.084056948
2014/07/17 14:20	2.430461768	2014/07/17	17.59734954	14:20:11	00:02:53	2.430461768	2.11	2.430461768	Weekday	124.5665517	2.430461768		2.430461768
2014/07/17 14:22	2.785515298	2014/07/17	17.5990625	14:22:39	00:02:28	2.785515298	2.11	2.785515298	Weekday	124.5665517	2.785515298		2.785515298
2014/07/17 14:24	2.157755917	2014/07/17	17.60055556	14:24:48	00:02:09	2.157755917	2.11	2.157755917	Weekday	124.5665517	2.157755917		2.157755917
2014/07/17 14:27	1.955034197	2014/07/17	17.60248843	14:27:35	00:02:47	1.955034197	2.11	1.955034197	Weekday	124.5665517	1.955034197		1.955034197
2014/07/17 14:30	1.817814568	2014/07/17	17.60461806	14:30:39	00:03:04	1.817814568	2.11	1.817814568	Weekday	124.5665517	1.817814568		1.817814568
2014/07/17 14:33	1.612036527	2014/07/17	17.60690972	14:33:57	00:03:18	1.612036527	2.11	1.612036527	Weekday	124.5665517	1.612036527		1.612036527
2014/07/17 14:37	2.049646989	2014/07/17	17.60949074	14:37:40	00:03:43	2.049646989	2.11	2.049646989	Weekday	124.5665517	2.049646989		2.049646989
2014/07/17 14:40	1.739130421	2014/07/17	17.61152778	14:40:36	00:02:56	1.739130421	2.11	1.739130421	Weekday	124.5665517	1.739130421		1.739130421
2014/07/17 14:44	1.601851015	2014/07/17	17.61392361	14:44:03	00:03:27	1.601851015	2.11	1.601851015	Weekday	124.5665517	1.601851015		1.601851015
2014/07/17 14:47	1.781120112	2014/07/17	17.61652778	14:47:48	00:03:45	1.781120112	2.11	1.781120112	Weekday	124.5665517	1.781120112		1.781120112
2014/07/17 14:51	2.177858422	2014/07/17	17.61886574	14:51:10	00:03:22	2.177858422	2.11	2.177858422	Weekday	124.5665517	2.177858422		2.177858422
2014/07/17 14:53	2.303557699	2014/07/17	17.62077546	14:53:55	00:02:45	2.303557699	2.11	2.303557699	Weekday	124.5665517	2.303557699		2.303557699
2014/07/17 14:56	2.086230859	2014/07/17	17.62258102	14:56:31	00:02:36	2.086230859	2.11	2.086230859	Weekday	124.5665517	2.086230859		2.086230859
2014/07/17 14:59	1.832620633	2014/07/17	17.62458333	14:59:24	00:02:53	1.832620633	2.11	1.832620633	Weekday	124.5665517	1.832620633		1.832620633
2014/07/17 15:02	1.905366768	2014/07/17	17.62685185	15:02:40	00:03:16	1.905366768	2.11	1.905366768	Weekday	124.5665517	1.905366768		1.905366768
2014/07/17 15:05	1.841432210	2014/07/17	17.62903935	15:05:49	00:03:09	1.84143221	2.11	1.84143221	Weekday	124.5665517	1.84143221		1.84143221
2014/07/17 15:09	1.661589574	2014/07/17	17.63130787	15:09:05	00:03:16	1.661589574	2.11	1.661589574	Weekday	124.5665517	1.661589574		1.661589574
2014/07/17 15:12	1.616814862	2014/07/17	17.63381944	15:12:42	00:03:37	1.616814862	2.11	1.616814862	Weekday	124.5665517	1.616814862		1.616814862
2014/07/17 15:16	2.132701405	2014/07/17	17.63638889	15:16:24	00:03:42	2.132701405	2.11	2.132701405	Weekday	124.5665517	2.132701405		2.132701405
2014/07/17 15:19	1.807954988	2014/07/17	17.63834491	15:19:13	00:02:49	1.807954988	2.11	1.807954988	Weekday	124.5665517	1.807954988		1.807954988
2014/07/17 15:22	1.883830440	2014/07/17	17.64064815	15:22:32	00:03:19	1.88383044	2.11	1.88383044	Weekday	124.5665517	1.88383044		1.88383044
2014/07/17 15:25	1.996229329	2014/07/17	17.6428588	15:25:43	00:03:11	1.996229329	2.11	1.996229329	Weekday	124.5665517	1.996229329		1.996229329
2014/07/17 15:28	2.100595152	2014/07/17	17.6449537	15:28:44	00:03:01	2.100595152	2.11	2.100595152	Weekday	124.5665517	2.100595152		2.100595152
2014/07/17 15:31	1.766091038	2014/07/17	17.64693287	15:31:35	00:02:51	1.766091038	2.11	1.766091038	Weekday	124.5665517	1.766091038		1.766091038
2014/07/17 15:34	1.799999986	2014/07/17	17.64929398	15:34:59	00:03:24	1.799999986	2.11	1.799999986	Weekday	124.5665517	1.799999986		1.799999986
2014/07/17 15:38	1.801982166	2014/07/17	17.6516088	15:38:19	00:03:20	1.801982166	2.11	1.801982166	Weekday	124.5665517	1.801982166		1.801982166
2014/07/17 15:41	1.838047570	2014/07/17	17.65392361	15:41:39	00:03:20	1.83804757	2.11	1.83804757	Weekday	124.5665517	1.83804757		1.83804757
2014/07/17 15:44	1.756440267	2014/07/17	17.65618056	15:44:54	00:03:15	1.756440267	2.11	1.756440267	Weekday	124.5665517	1.756440267		1.756440267
2014/07/17 15:48	1.766437670	2014/07/17	17.65855324	15:48:19	00:03:25	1.76643767	2.11	1.76643767	Weekday	124.5665517	1.76643767		1.76643767
2014/07/17 15:51	1.925339593	2014/07/17	17.66091435	15:51:43	00:03:24	1.925339593	2.11	1.925339593	Weekday	124.5665517	1.925339593		1.925339593
2014/07/17 15:54	1.889763764	2014/07/17	17.6630787	15:54:50	00:03:07	1.889763764	2.11	1.889763764	Weekday	124.5665517	1.889763764		1.889763764
2014/07/17 15:58	2.032979428	2014/07/17	17.66528935	15:58:01	00:03:11	2.032979428	2.11	2.032979428	Weekday	124.5665517	2.032979428		2.032979428
2014/07/17 16:00	1.889763764	2014/07/17	17.66733796	16:00:58	00:02:57	1.889763764	2.11	1.889763764	Weekday	124.5665517	1.889763764		1.889763764
2014/07/17 16:04	2.309468804	2014/07/17	17.66953704	16:04:08	00:03:10	2.309468804	2.11	2.309468804	Weekday	124.5665517	2.309468804		2.309468804
2014/07/17 16:06	2.082851175	2014/07/17	17.67134259	16:06:44	00:02:36	2.082851175	2.11	2.082851175	Weekday	124.5665517	2.082851175		2.082851175
2014/07/17 16:09	1.963136640	2014/07/17	17.67334491	16:09:37	00:02:53	1.96313664	2.11	1.96313664	Weekday	124.5665517	1.96313664		1.96313664
2014/07/17 16:12	2.121640719	2014/07/17	17.67546296	16:12:40	00:03:03	2.121640719	2.11	2.121640719	Weekday	124.5665517	2.121640719		2.121640719
2014/07/17 16:15	1.805416234	2014/07/17	17.67743056	16:15:30	00:02:50	1.805416234	2.11	1.805416234	Weekday	124.5665517	1.805416234		1.805416234
2014/07/17 16:18	1.804873143	2014/07/17	17.6797338	16:18:49	00:03:19	1.804873143	2.11	1.804873143	Weekday	124.5665517	1.804873143		1.804873143
2014/07/17 16:22	1.624402117	2014/07/17	17.68204861	16:22:09	00:03:20	1.624402117	2.11	1.624402117	Weekday	124.5665517	1.624402117		1.624402117
2014/07/17 16:25	2.188715936	2014/07/17	17.68461806	16:25:51	00:03:42	2.188715936	2.11	2.188715936	Weekday	124.5665517	2.188715936		2.188715936
2014/07/17 16:28	1.556554813	2014/07/17	17.6865162	16:28:35	00:02:44	1.556554813	2.11	1.556554813	Weekday	124.5665517	1.556554813		1.556554813
2014/07/17 16:32	1.668520565	2014/07/17	17.68918981	16:32:26	00:03:51	1.668520565	2.11	1.668520565	Weekday	124.5665517	1.668520565		1.668520565
2014/07/17 16:36	2.288620452	2014/07/17	17.69168981	16:36:02	00:03:36	2.288620452	2.11	2.288620452	Weekday	124.5665517	2.288620452		2.288620452
2014/07/17 16:38	1.894338019	2014/07/17	17.69350694	16:38:39	00:02:37	1.894338019	2.11	1.894338019	Weekday	124.5665517	1.894338019		1.894338019
2014/07/17 16:41	1.910219660	2014/07/17	17.69570602	16:41:49	00:03:10	1.91021966	2.11	1.91021966	Weekday	124.5665517	1.91021966		1.91021966
2014/07/17 16:44	1.786245892	2014/07/17	17.69789352	16:44:58	00:03:09	1.786245892	2.11	1.786245892	Weekday	124.5665517	1.786245892		1.786245892
2014/07/17 16:48	1.954185198	2014/07/17	17.70021991	16:48:19	00:03:21	1.954185198	2.11	1.954185198	Weekday	124.5665517	1.954185198		1.954185198
2014/07/17 16:51	2.139800268	2014/07/17	17.70236111	16:51:24	00:03:05	2.139800268	2.11	2.139800268	Weekday	124.5665517	2.139800268		2.139800268
2014/07/17 16:54	1.702771720	2014/07/17	17.70430556	16:54:12	00:02:48	1.70277172	2.11	1.70277172	Weekday	124.5665517	1.70277172		1.70277172
2014/07/17 16:57	1.643985739	2014/07/17	17.70674769	16:57:43	00:03:31	1.643985739	2.11	1.643985739	Weekday	124.5665517	1.643985739		1.643985739
2014/07/17 17:01	2.474226784	2014/07/17	17.70928241	17:01:22	00:03:39	2.474226784	2.11	2.474226784	Weekday	124.5665517	2.474226784		2.474226784
2014/07/17 17:03	2.382843508	2014/07/17	17.71097222	17:03:48	00:02:26	2.382843508	2.11	2.382843508	Weekday	124.5665517	2.382843508		2.382843508
2014/07/17 17:06	2.506963768	2014/07/17	17.71271991	17:06:19	00:02:31	2.506963768	2.11	2.506963768	Weekday	124.5665517	2.506963768		2.506963768
2014/07/17 17:08	2.150023872	2014/07/17	17.714375	17:08:42	00:02:23	2.150023872	2.11	2.150023872	Weekday	124.5665517	2.150023872		2.150023872
2014/07/17 17:11	1.722158425	2014/07/17	17.71631944	17:11:30	00:02:48	1.722158425	2.11	1.722158425	Weekday	124.5665517	1.722158425		1.722158425
2014/07/17 17:14	2.024519161	2014/07/17	17.71873843	17:14:59	00:03:29	2.024519161	2.11	2.024519161	Weekday	124.5665517	2.024519161		2.024519161
2014/07/17 17:17	2.505219187	2014/07/17	17.72079861	17:17:57	00:02:58	2.505219187	2.11	2.505219187	Weekday	124.5665517	2.505219187		2.505219187
2014/07/17 17:20	1.147008211	2014/07/17	17.7224537	17:20:20	00:02:23	1.147008211	2.11	1.147008211	Weekday	124.5665517	1.147008211		1.147008211
2014/07/17 17:25	0.919258457	2014/07/17	17.72608796	17:25:34	00:05:14	0.919258457	2.11	0.919258457	Weekday	124.5665517	0.919258457		0.919258457
2014/07/17 17:32	0.474671023	2014/07/17	17.730625	17:32:06	00:06:32	0.474671023	2.11	0.474671023	Weekday	124.5665517	0.474671023		0.474671023
2014/07/17 17:44	0.817847238	2014/07/17	17.73939815	17:44:44	00:12:38	0.817847238	2.11	0.817847238	Weekday	124.5665517	0.817847238		0.817847238
2014/07/17 17:52	1.078813297	2014/07/17	17.74450231	17:52:05	00:07:21	1.078813297	2.11	1.078813297	Weekday	124.5665517	1.078813297		1.078813297
2014/07/17 17:57	1.376041576	2014/07/17	17.74835648	17:57:38	00:05:33	1.376041576	2.11	1.376041576	Weekday	124.5665517	1.376041576		1.376041576
2014/07/17 18:02	1.417881044	2014/07/17	17.75138889	18:02:00	00:04:22	1.417881044	2.11	1.417881044	Weekday	124.5665517	1.417881044		1.417881044
2014/07/17 18:06	1.617977515	2014/07/17	17.7543287	18:06:14	00:04:14	1.617977515	2.11	1.617977515	Weekday	124.5665517	1.617977515		1.617977515
2014/07/17 18:09	1.251216451	2014/07/17	17.75689815	18:09:56	00:03:42	1.251216451	2.11	1.251216451	Weekday	124.5665517	1.251216451		1.251216451
2014/07/17 18:14	1.209189833	2014/07/17	17.76023148	18:14:44	00:04:48	1.209189833	2.11	1.209189833	Weekday	124.5665517	1.209189833		1.209189833
2014/07/17 18:19	1.066856321	2014/07/17	17.76368056	18:19:42	00:04:58	1.066856321	2.11	1.066856321	Weekday	124.5665517	1.066856321		1.066856321
2014/07/17 18:25	0.542609950	2014/07/17	17.76758102	18:25:19	00:05:37	0.54260995	2.11	0.54260995	Weekday	124.5665517	0.54260995		0.54260995
2014/07/17 18:36	0.313403208	2014/07/17	17.7752662	18:36:23	00:11:04	0.313403208	2.11	0.313403208	Weekday	124.5665517	0.313403208		0.313403208
2014/07/17 18:55	0.427776982	2014/07/17	17.78855324	18:55:31	00:19:08	0.427776982	2.11	0.427776982	Weekday	124.5665517	0.427776982		0.427776982
2014/07/17 19:09	1.017293990	2014/07/17	17.79829861	19:09:33	00:14:02	1.01729399	2.11	1.01729399	Weekday	124.5665517	1.01729399		1.01729399
2014/07/17 19:15	1.791936272	2014/07/17	17.80239583	19:15:27	00:05:54	1.791936272	2.11	1.791936272	Weekday	124.5665517	1.791936272		1.791936272
2014/07/17 19:18	1.908599285	2014/07/17	17.80472222	19:18:48	00:03:21	1.908599285	2.11	1.908599285	Weekday	124.5665517	1.908599285		1.908599285
2014/07/17 19:21	1.854140900	2014/07/17	17.80689815	19:21:56	00:03:08	1.8541409	2.11	1.8541409	Weekday	124.5665517	1.8541409		1.8541409
2014/07/17 19:25	0.873871243	2014/07/17	17.80914352	19:25:10	00:03:14	0.873871243	2.11	0.873871243	Weekday	124.5665517	0.873871243		0.873871243
2014/07/17 19:32	0.686891809	2014/07/17	17.81391204	19:32:02	00:06:52	0.686891809	2.11	0.686891809	Weekday	124.5665517	0.686891809		0.686891809
2014/07/17 19:40	1.751654326	2014/07/17	17.81997685	19:40:46	00:08:44	1.751654326	2.11	1.751654326	Weekday	124.5665517	1.751654326		1.751654326
2014/07/17 19:44	1.172332933	2014/07/17	17.82236111	19:44:12	00:03:26	1.172332933	2.11	1.172332933	Weekday	124.5665517	1.172332933		1.172332933
2014/07/17 19:49	0.568343275	2014/07/17	17.82591435	19:49:19	00:05:07	0.568343275	2.11	0.568343275	Weekday	124.5665517	0.568343275		0.568343275
2014/07/17 19:59	0.594432147	2014/07/17	17.83324074	19:59:52	00:10:33	0.594432147	2.11	0.594432147	Weekday	124.5665517	0.594432147		0.594432147
2014/07/17 20:09	0.425019477	2014/07/17	17.84025463	20:09:58	00:10:06	0.425019477	2.11	0.425019477	Weekday	124.5665517	0.425019477		0.425019477
2014/07/17 20:24	0.255409718	2014/07/17	17.85005787	20:24:05	00:14:07	0.255409718	2.11	0.255409718	Weekday	124.5665517	0.255409718		0.255409718
2014/07/17 20:47	0.499763996	2014/07/17	17.86637731	20:47:35	00:23:30	0.499763996	2.11	0.499763996	Weekday	124.5665517	0.499763996		0.499763996
2014/07/17 20:59	0.809388905	2014/07/17	17.87471065	20:59:35	00:12:00	0.809388905	2.11	0.809388905	Weekday	124.5665517	0.809388905		0.809388905
2014/07/17 21:07	0.339879151	2014/07/17	17.87986111	21:07:00	00:07:25	0.339879151	2.11	0.339879151	Weekday	124.5665517	0.339879151		0.339879151
2014/07/17 21:24	0.278387823	2014/07/17	17.89211806	21:24:39	00:17:39	0.278387823	2.11	0.278387823	Weekday	124.5665517	0.278387823		0.278387823
2014/07/17 21:46	0.687810464	2014/07/17	17.90708333	21:46:12	00:21:33	0.687810464	2.11	0.687810464	Weekday	124.5665517	0.687810464		0.687810464
2014/07/17 21:54	0.662056784	2014/07/17	17.91313657	21:54:55	00:08:43	0.662056784	2.11	0.662056784	Weekday	124.5665517	0.662056784		0.662056784
2014/07/17 22:03	0.278435192	2014/07/17	17.91943287	22:03:59	00:09:04	0.278435192	2.11	0.278435192	Weekday	124.5665517	0.278435192		0.278435192

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/17 22:25	0.934773570	2014/07/17	17.93439815	22:25:32	00:21:33	0.93477357	2.11	0.93477357	Weekday	124.5665517	0.93477357		0.93477357
2014/07/17 22:31	0.222924018	2014/07/17	17.93885417	22:31:57	00:06:25	0.222924018	2.11	0.222924018	Weekday	124.5665517	0.222924018		0.222924018
2014/07/17 22:58	0.184280843	2014/07/17	17.9575463	22:58:52	00:26:55	0.184280843	2.11	0.184280843	Weekday	124.5665517	0.184280843		0.184280843
2014/07/17 23:31	0.113815277	2014/07/17	17.98016204	23:31:26	00:32:34	0.113815277	2.11	0.113815277	Weekday	124.5665517	0.113815277	0.113815277	
2014/07/18 00:24	0.049739283	2014/07/18	18.01677083	00:24:09	00:52:43	0.049739283	2.11	0.049739283	Weekday	35.41475537	0.049739283	0.049739283	
2014/07/18 02:24	0.061513645	2014/07/18	18.10053241	02:24:46	02:00:37	0.061513645	2.11	0.061513645	Weekday	35.41475537	0.061513645	0.061513645	
2014/07/18 04:02	3.285271009	2014/07/18	18.16827546	04:02:19	01:37:33	3.285271009	2.11	3.285271009	Weekday	35.41475537	3.285271009		3.285271009
2014/07/18 04:04	3.310649229	2014/07/18	18.16953704	04:04:08	00:01:49	3.310649229	2.11	3.310649229	Weekday	35.41475537	3.310649229		3.310649229
2014/07/18 04:05	3.246753221	2014/07/18	18.17079861	04:05:57	00:01:49	3.246753221	2.11	3.246753221	Weekday	35.41475537	3.246753221		3.246753221
2014/07/18 04:07	3.220611890	2014/07/18	18.17208333	04:07:48	00:01:51	3.22061189	2.11	3.22061189	Weekday	35.41475537	3.22061189		3.22061189
2014/07/18 04:09	0.126549350	2014/07/18	18.17337963	04:09:40	00:01:52	0.12654935	2.11	0.12654935	Weekday	35.41475537	0.12654935		0.12654935
2014/07/18 04:57	0.309933362	2014/07/18	18.20630787	04:57:05	00:47:25	0.309933362	2.11	0.309933362	Weekday	35.41475537	0.309933362		0.309933362
2014/07/18 05:16	0.293212137	2014/07/18	18.21974537	05:16:26	00:19:21	0.293212137	2.11	0.293212137	Weekday	35.41475537	0.293212137		0.293212137
2014/07/18 05:36	0.450281422	2014/07/18	18.23395833	05:36:54	00:20:28	0.450281422	2.11	0.450281422	Weekday	35.41475537	0.450281422		0.450281422
2014/07/18 05:50	1.122404431	2014/07/18	18.24320602	05:50:13	00:13:19	1.122404431	2.11	1.122404431	Weekday	35.41475537	1.122404431		1.122404431
2014/07/18 05:55	1.228920588	2014/07/18	18.2469213	05:55:34	00:05:21	1.228920588	2.11	1.228920588	Weekday	35.41475537	1.228920588		1.228920588
2014/07/18 06:00	0.765729351	2014/07/18	18.2503125	06:00:27	00:04:53	0.765729351	2.11	0.765729351	Weekday	35.41475537	0.765729351		0.765729351
2014/07/18 06:08	1.069391626	2014/07/18	18.25575231	06:08:17	00:07:50	1.069391626	2.11	1.069391626	Weekday	35.41475537	1.069391626		1.069391626
2014/07/18 06:13	0.954805848	2014/07/18	18.25965278	06:13:54	00:05:37	0.954805848	2.11	0.954805848	Weekday	35.41475537	0.954805848		0.954805848
2014/07/18 06:20	0.320924259	2014/07/18	18.2640162	06:20:11	00:06:17	0.320924259	2.11	0.320924259	Weekday	35.41475537	0.320924259		0.320924259
2014/07/18 06:38	1.256983230	2014/07/18	18.27700231	06:38:53	00:18:42	1.25698323	2.11	1.25698323	Weekday	35.41475537	1.25698323		1.25698323
2014/07/18 06:43	1.585065151	2014/07/18	18.2803125	06:43:39	00:04:46	1.585065151	2.11	1.585065151	Weekday	35.41475537	1.585065151		1.585065151
2014/07/18 06:47	2.443660040	2014/07/18	18.28293981	06:47:26	00:03:47	2.44366004	2.11	2.44366004	Weekday	35.41475537	2.44366004		2.44366004
2014/07/18 06:49	1.434720218	2014/07/18	18.2846412	06:49:53	00:02:27	1.434720218	2.11	1.434720218	Weekday	35.41475537	1.434720218		1.434720218
2014/07/18 06:54	0.569223953	2014/07/18	18.2875463	06:54:04	00:04:11	0.569223953	2.11	0.569223953	Weekday	35.41475537	0.569223953		0.569223953
2014/07/18 07:04	1.362810407	2014/07/18	18.29487269	07:04:37	00:10:33	1.362810407	2.11	1.362810407	Weekday	35.41475537	1.362810407		1.362810407
2014/07/18 07:09	0.768114699	2014/07/18	18.29792824	07:09:01	00:04:24	0.768114699	2.11	0.768114699	Weekday	35.41475537	0.768114699		0.768114699
2014/07/18 07:16	0.791521914	2014/07/18	18.30335648	07:16:50	00:07:49	0.791521914	2.11	0.791521914	Weekday	35.41475537	0.791521914		0.791521914
2014/07/18 07:24	1.079784035	2014/07/18	18.30862269	07:24:25	00:07:35	1.079784035	2.11	1.079784035	Weekday	35.41475537	1.079784035		1.079784035
2014/07/18 07:29	1.537672976	2014/07/18	18.31247685	07:29:58	00:05:33	1.537672976	2.11	1.537672976	Weekday	35.41475537	1.537672976		1.537672976
2014/07/18 07:33	2.061383401	2014/07/18	18.31518519	07:33:52	00:03:54	2.061383401	2.11	2.061383401	Weekday	35.41475537	2.061383401		2.061383401
2014/07/18 07:36	2.904162610	2014/07/18	18.31721065	07:36:47	00:02:55	2.90416261	2.11	2.90416261	Weekday	35.41475537	2.90416261		2.90416261
2014/07/18 07:38	3.764115403	2014/07/18	18.31864583	07:38:51	00:02:04	3.764115403	2.11	3.764115403	Weekday	35.41475537	3.764115403		3.764115403
2014/07/18 07:40	3.028263771	2014/07/18	18.31974537	07:40:26	00:01:35	3.028263771	2.11	3.028263771	Weekday	35.41475537	3.028263771		3.028263771
2014/07/18 07:42	1.865671627	2014/07/18	18.32112269	07:42:25	00:01:59	1.865671627	2.11	1.865671627	Weekday	35.41475537	1.865671627		1.865671627
2014/07/18 07:45	1.713306668	2014/07/18	18.32335648	07:45:38	00:03:13	1.713306668	2.11	1.713306668	Weekday	35.41475537	1.713306668		1.713306668
2014/07/18 07:49	1.260504192	2014/07/18	18.32578704	07:49:08	00:03:30	1.260504192	2.11	1.260504192	Weekday	35.41475537	1.260504192		1.260504192
2014/07/18 07:53	1.489080067	2014/07/18	18.32909722	07:53:54	00:04:46	1.489080067	2.11	1.489080067	Weekday	35.41475537	1.489080067		1.489080067
2014/07/18 07:57	1.551322921	2014/07/18	18.33189815	07:57:56	00:04:02	1.551322921	2.11	1.551322921	Weekday	35.41475537	1.551322921		1.551322921
2014/07/18 08:01	2.012747384	2014/07/18	18.33458333	08:01:48	00:03:52	2.012747384	2.11	2.012747384	Weekday	35.41475537	2.012747384		2.012747384
2014/07/18 08:04	2.274162964	2014/07/18	18.33665509	08:04:47	00:02:59	2.274162964	2.11	2.274162964	Weekday	35.41475537	2.274162964		2.274162964
2014/07/18 08:07	2.683363127	2014/07/18	18.3384838	08:07:25	00:02:38	2.683363127	2.11	2.683363127	Weekday	35.41475537	2.683363127		2.683363127
2014/07/18 08:09	2.537355491	2014/07/18	18.34003472	08:09:39	00:02:14	2.537355491	2.11	2.537355491	Weekday	35.41475537	2.537355491		2.537355491
2014/07/18 08:12	2.122140987	2014/07/18	18.34167824	08:12:01	00:02:22	2.122140987	2.11	2.122140987	Weekday	35.41475537	2.122140987		2.122140987
2014/07/18 08:14	1.401650822	2014/07/18	18.34363426	08:14:50	00:02:49	1.401650822	2.11	1.401650822	Weekday	35.41475537	1.401650822		1.401650822
2014/07/18 08:19	0.724550169	2014/07/18	18.3466088	08:19:07	00:04:17	0.724550169	2.11	0.724550169	Weekday	35.41475537	0.724550169		0.724550169
2014/07/18 08:27	0.879464497	2014/07/18	18.35236111	08:27:24	00:08:17	0.879464497	2.11	0.879464497	Weekday	35.41475537	0.879464497		0.879464497
2014/07/18 08:34	2.271579992	2014/07/18	18.35710648	08:34:14	00:06:50	2.271579992	2.11	2.271579992	Weekday	35.41475537	2.271579992		2.271579992
2014/07/18 08:36	2.950335987	2014/07/18	18.35893519	08:36:52	00:02:38	2.950335987	2.11	2.950335987	Weekday	35.41475537	2.950335987		2.950335987
2014/07/18 08:38	1.345392022	2014/07/18	18.36034722	08:38:54	00:02:02	1.345392022	2.11	1.345392022	Weekday	35.41475537	1.345392022		1.345392022
2014/07/18 08:43	1.112347043	2014/07/18	18.36344907	08:43:22	00:04:28	1.112347043	2.11	1.112347043	Weekday	35.41475537	1.112347043		1.112347043
2014/07/18 08:48	1.263423869	2014/07/18	18.3671875	08:48:45	00:05:23	1.263423869	2.11	1.263423869	Weekday	35.41475537	1.263423869		1.263423869
2014/07/18 08:53	1.474684570	2014/07/18	18.37048611	08:53:30	00:04:45	1.47468457	2.11	1.47468457	Weekday	35.41475537	1.47468457		1.47468457
2014/07/18 08:57	1.550521135	2014/07/18	18.37331019	08:57:34	00:04:04	1.550521135	2.11	1.550521135	Weekday	35.41475537	1.550521135		1.550521135
2014/07/18 09:01	1.954821878	2014/07/18	18.37599537	09:01:26	00:03:52	1.954821878	2.11	1.954821878	Weekday	35.41475537	1.954821878		1.954821878
2014/07/18 09:04	1.836547277	2014/07/18	18.37813657	09:04:31	00:03:05	1.836547277	2.11	1.836547277	Weekday	35.41475537	1.836547277		1.836547277
2014/07/18 09:07	1.531784517	2014/07/18	18.38040509	09:07:47	00:03:16	1.531784517	2.11	1.531784517	Weekday	35.41475537	1.531784517		1.531784517
2014/07/18 09:11	1.653499895	2014/07/18	18.383125	09:11:42	00:03:55	1.653499895	2.11	1.653499895	Weekday	35.41475537	1.653499895		1.653499895
2014/07/18 09:15	1.919590472	2014/07/18	18.38563657	09:15:19	00:03:37	1.919590472	2.11	1.919590472	Weekday	35.41475537	1.919590472		1.919590472
2014/07/18 09:18	1.437584846	2014/07/18	18.3878125	09:18:27	00:03:08	1.437584846	2.11	1.437584846	Weekday	35.41475537	1.437584846		1.437584846
2014/07/18 09:22	1.889367047	2014/07/18	18.39070602	09:22:37	00:04:10	1.889367047	2.11	1.889367047	Weekday	35.41475537	1.889367047		1.889367047
2014/07/18 09:25	2.405452339	2014/07/18	18.39291667	09:25:48	00:03:11	2.405452339	2.11	2.405452339	Weekday	35.41475537	2.405452339		2.405452339
2014/07/18 09:28	1.665895405	2014/07/18	18.39465278	09:28:18	00:02:30	1.665895405	2.11	1.665895405	Weekday	35.41475537	1.665895405		1.665895405
2014/07/18 09:31	1.279863471	2014/07/18	18.39715278	09:31:54	00:03:36	1.279863471	2.11	1.279863471	Weekday	35.41475537	1.279863471		1.279863471
2014/07/18 09:36	0.856164377	2014/07/18	18.40040509	09:36:35	00:04:41	0.856164377	2.11	0.856164377	Weekday	35.41475537	0.856164377		0.856164377
2014/07/18 09:43	1.402306003	2014/07/18	18.4052662	09:43:35	00:07:00	1.402306003	2.11	1.402306003	Weekday	35.41475537	1.402306003		1.402306003
2014/07/18 09:47	2.009825799	2014/07/18	18.40824074	09:47:52	00:04:17	2.009825799	2.11	2.009825799	Weekday	35.41475537	2.009825799		2.009825799
2014/07/18 09:50	1.430501459	2014/07/18	18.4103125	09:50:51	00:02:59	1.430501459	2.11	1.430501459	Weekday	35.41475537	1.430501459		1.430501459
2014/07/18 09:55	2.520302416	2014/07/18	18.41322917	09:55:03	00:04:12	2.520302416	2.11	2.520302416	Weekday	35.41475537	2.520302416		2.520302416
2014/07/18 09:57	1.974983526	2014/07/18	18.41488426	09:57:26	00:02:23	1.974983526	2.11	1.974983526	Weekday	35.41475537	1.974983526		1.974983526
2014/07/18 10:00	1.909814308	2014/07/18	18.41699074	10:00:28	00:03:02	1.909814308	2.11	1.909814308	Weekday	35.41475537	1.909814308		1.909814308
2014/07/18 10:03	1.978239351	2014/07/18	18.41917824	10:03:37	00:03:09	1.978239351	2.11	1.978239351	Weekday	35.41475537	1.978239351		1.978239351
2014/07/18 10:06	2.660360605	2014/07/18	18.42128472	10:06:39	00:03:02	2.660360605	2.11	2.660360605	Weekday	35.41475537	2.660360605		2.660360605
2014/07/18 10:08	1.705191347	2014/07/18	18.42284722	10:08:54	00:02:15	1.705191347	2.11	1.705191347	Weekday	35.41475537	1.705191347		1.705191347
2014/07/18 10:12	1.495761996	2014/07/18	18.42528935	10:12:25	00:03:31	1.495761996	2.11	1.495761996	Weekday	35.41475537	1.495761996		1.495761996
2014/07/18 10:16	0.724346071	2014/07/18	18.4280787	10:16:26	00:04:01	0.724346071	2.11	0.724346071	Weekday	35.41475537	0.724346071		0.724346071
2014/07/18 10:24	1.009477868	2014/07/18	18.43383102	10:24:43	00:08:17	1.009477868	2.11	1.009477868	Weekday	35.41475537	1.009477868		1.009477868
2014/07/18 10:30	1.522713802	2014/07/18	18.43795139	10:30:39	00:05:56	1.522713802	2.11	1.522713802	Weekday	35.41475537	1.522713802		1.522713802
2014/07/18 10:34	1.341481581	2014/07/18	18.44069444	10:34:36	00:03:57	1.341481581	2.11	1.341481581	Weekday	35.41475537	1.341481581		1.341481581
2014/07/18 10:39	1.225657079	2014/07/18	18.4437963	10:39:04	00:04:28	1.225657079	2.11	1.225657079	Weekday	35.41475537	1.225657079		1.225657079
2014/07/18 10:43	1.112759635	2014/07/18	18.44719907	10:43:58	00:04:54	1.112759635	2.11	1.112759635	Weekday	35.41475537	1.112759635		1.112759635
2014/07/18 10:49	1.265199962	2014/07/18	18.4509375	10:49:21	00:05:23	1.265199962	2.11	1.265199962	Weekday	35.41475537	1.265199962		1.265199962
2014/07/18 10:54	2.198339015	2014/07/18	18.45423611	10:54:06	00:04:45	2.198339015	2.11	2.198339015	Weekday	35.41475537	2.198339015		2.198339015
2014/07/18 10:56	1.914486264	2014/07/18	18.45613426	10:56:50	00:02:44	1.914486264	2.11	1.914486264	Weekday	35.41475537	1.914486264		1.914486264
2014/07/18 10:59	0.760616939	2014/07/18	18.45831019	10:59:58	00:03:08	0.760616939	2.11	0.760616939	Weekday	35.41475537	0.760616939		0.760616939
2014/07/18 11:07	2.346499786	2014/07/18	18.46378472	11:07:51	00:07:53	2.346499786	2.11	2.346499786	Weekday	35.41475537	2.346499786		2.346499786
2014/07/18 11:10	0.864055293	2014/07/18	18.46555556	11:10:24	00:02:33	0.864055293	2.11	0.864055293	Weekday	35.41475537	0.864055293		0.864055293
2014/07/18 11:17	1.808681658	2014/07/18	18.47038194	11:17:21	00:06:57	1.808681658	2.11	1.808681658	Weekday	35.41475537	1.808681658		1.808681658
2014/07/18 11:20	2.551020388	2014/07/18	18.47268519	11:20:40	00:03:19	2.551020388	2.11	2.551020388	Weekday	35.41475537	2.551020388		2.551020388
2014/07/18 11:23	1.415650795	2014/07/18	18.47431713	11:23:01	00:02:21	1.415650795	2.11	1.415650795	Weekday	35.41475537	1.415650795		1.415650795
2014/07/18 11:27	0.980552370	2014/07/18	18.47725694	11:27:15	00:04:14	0.98055237	2.11	0.98055237	Weekday	35.41475537	0.98055237		0.98055237
2014/07/18 11:33	1.164596264	2014/07/18	18.4815162	11:33:23	00:06:08	1.164596264	2.11	1.164596264	Weekday	35.41475537	1.164596264		1.164596264
2014/07/18 11:38	0.522208357	2014/07/18	18.48509259	11:38:32	00:05:09	0.522208357	2.11	0.522208357	Weekday	35.41475537	0.522208357		0.522208357
2014/07/18 11:50	0.465368801	2014/07/18	18.49306713	11:50:01	00:11:29	0.465368801	2.11	0.465368801	Weekday	35.41475537	0.465368801		0.465368801
2014/07/18 12:02	0.865551061	2014/07/18	18.50202546	12:02:55	00:12:54	0.865551061	2.11	0.865551061	Weekday	35.41475537	0.865551061		0.865551061
2014/07/18 12:09	0.009921521	2014/07/18	18.50684028	12:09:51	00:06:56	0.009921521	2.11	0.009921521	Weekday	35.41475537	0.009921521		0.009921521
2014/07/18 22:14	0.225019687	2014/07/18	18.92679398	22:14:35	10:04:44	0.225019687	2.11	0.225019687	Weekday	35.41475537	0.225019687		0.225019687
2014/07/18 22:41	0.304084871	2014/07/18	18.9453125	22:41:15	00:26:40	0.304084871	2.11	0.304084871	Weekday	35.41475537	0.304084871		0.304084871
2014/07/18 23:00	0.720316934	2014/07/18	18.9590162	23:00:59	00:19:44	0.720316934	2.11	0.720316934	Weekday	35.41475537	0.720316934	0.720316934	
2014/07/18 23:09	0.380952378	2014/07/18	18.96480324	23:09:19	00:08:20	0.380952378	2.11	0.380952378	Weekday	35.41475537	0.380952378	0.380952378	
2014/07/18 23:25	0.426277645	2014/07/18	18.97574074	23:25:04	00:15:45	0.426277645	2.11	0.426277645	Weekday	35.41475537	0.426277645	0.426277645	
2014/07/18 23:39	0.078778754	2014/07/18	18.98550926	23:39:08	00:14:04	0.078778754	2.11	0.078778754	Weekday	35.41475537	0.078778754	0.078778754	
2014/07/19 00:55	0.045440316	2014/07/19	19.03840278	00:55:18	01:16:10	0.045440316	2.11	0.045440316	Weekend	29.68129218	0.045440316	0.045440316	
2014/07/19 03:07	0.035648717	2014/07/19	19.13010417	03:07:21	02:12:03	0.035648717	2.11	0.035648717	Weekend	29.68129218	0.035648717	0.035648717	
2014/07/19 05:55	0.183669720	2014/07/19	19.24697917	05:55:39	02:48:18	0.18366972	2.11	0.18366972	Weekend	29.68129218	0.18366972		0.18366972
2014/07/19 06:28	0.646064386	2014/07/19	19.26966435	06:28:19	00:32:40	0.646064386	2.11	0.646064386	Weekend	29.68129218	0.646064386		0.646064386
2014/07/19 06:37	0.529240536	2014/07/19	19.27611111	06:37:36	00:09:17	0.529240536	2.11	0.529240536	Weekend	29.68129218	0.529240536		0.529240536
2014/07/19 06:48	0.786816447	2014/07/19	19.28399306	06:48:57	00:11:21	0.786816447	2.11	0.786816447	Weekend	29.68129218	0.786816447		0.786816447
2014/07/19 06:56	0.963184924	2014/07/19	19.28928241	06:56:34	00:07:37	0.963184924	2.11	0.963184924	Weekend	29.68129218	0.963184924		0.963184924
2014/07/19 07:02	0.926307115	2014/07/19	19.29361111	07:02:48	00:06:14	0.926307115	2.11	0.926307115	Weekend	29.68129218	0.926307115		0.926307115
2014/07/19 07:09	0.996732923	2014/07/19	19.29811343	07:09:17	00:06:29	0.996732923	2.11	0.996732923	Weekend	29.68129218	0.996732923		0.996732923
2014/07/19 07:15	1.149425278	2014/07/19	19.30229167	07:15:18	00:06:01	1.149425278	2.11	1.149425278	Weekend	29.68129218	1.149425278		1.149425278
2014/07/19 07:20	1.152590117	2014/07/19	19.30591435	07:20:31	00:05:13	1.152590117	2.11	1.152590117	Weekend	29.68129218	1.152590117		1.152590117
2014/07/19 07:25	0.845983920	2014/07/19	19.30952546	07:25:43	00:05:12	0.84598392	2.11	0.84598392	Weekend	29.68129218	0.84598392		0.84598392
2014/07/19 07:32	1.349426483	2014/07/19	19.31445602	07:32:49	00:07:06	1.349426483	2.11	1.349426483	Weekend	29.68129218	1.349426483		1.349426483
2014/07/19 07:37	0.917150711	2014/07/19	19.3175463	07:37:16	00:04:27	0.917150711	2.11	0.917150711	Weekend	29.68129218	0.917150711		0.917150711
2014/07/19 07:43	1.485516205	2014/07/19	19.32208333	07:43:48	00:06:32	1.485516205	2.11	1.485516205	Weekend	29.68129218	1.485516205		1.485516205
2014/07/19 07:47	1.236858370	2014/07/19	19.32488426	07:47:50	00:04:02	1.23685837	2.11	1.23685837	Weekend	29.68129218	1.23685837		1.23685837
2014/07/19 07:52	0.946820254	2014/07/19	19.32826389	07:52:42	00:04:52	0.946820254	2.11	0.946820254	Weekend	29.68129218	0.946820254		0.946820254
2014/07/19 07:59	0.704859610	2014/07/19	19.33266204	07:59:02	00:06:20	0.70485961	2.11	0.70485961	Weekend	29.68129218	0.70485961		0.70485961
2014/07/19 08:07	0.671616725	2014/07/19	19.33857639	08:07:33	00:08:31	0.671616725	2.11	0.671616725	Weekend	29.68129218	0.671616725		0.671616725
2014/07/19 08:16	1.519500241	2014/07/19	19.34478009	08:16:29	00:08:56	1.519500241	2.11	1.519500241	Weekend	29.68129218	1.519500241		1.519500241
2014/07/19 08:20	2.444323718	2014/07/19	19.34751157	08:20:25	00:03:56	2.444323718	2.11	2.444323718	Weekend	29.68129218	2.444323718		2.444323718
2014/07/19 08:22	1.520527104	2014/07/19	19.34922454	08:22:53	00:02:28	1.520527104	2.11	1.520527104	Weekend	29.68129218	1.520527104		1.520527104
2014/07/19 08:26	1.335807039	2014/07/19	19.35195602	08:26:49	00:03:56	1.335807039	2.11	1.335807039	Weekend	29.68129218	1.335807039		1.335807039

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/19 08:31	1.304631431	2014/07/19	19.35508102	08:31:19	00:04:30	1.304631431	2.11	1.304631431	Weekend	29.68129218	1.304631431		1.304631431
2014/07/19 08:35	1.366223898	2014/07/19	19.35827546	08:35:55	00:04:36	1.366223898	2.11	1.366223898	Weekend	29.68129218	1.366223898		1.366223898
2014/07/19 08:40	1.609873880	2014/07/19	19.36131944	08:40:18	00:04:23	1.60987388	2.11	1.60987388	Weekend	29.68129218	1.60987388		1.60987388
2014/07/19 08:44	1.406030296	2014/07/19	19.36391204	08:44:02	00:03:44	1.406030296	2.11	1.406030296	Weekend	29.68129218	1.406030296		1.406030296
2014/07/19 08:48	1.069455163	2014/07/19	19.366875	08:48:18	00:04:16	1.069455163	2.11	1.069455163	Weekend	29.68129218	1.069455163		1.069455163
2014/07/19 08:53	1.287277398	2014/07/19	19.37077546	08:53:55	00:05:37	1.287277398	2.11	1.287277398	Weekend	29.68129218	1.287277398		1.287277398
2014/07/19 08:58	0.958415412	2014/07/19	19.37400463	08:58:34	00:04:39	0.958415412	2.11	0.958415412	Weekend	29.68129218	0.958415412		0.958415412
2014/07/19 09:04	0.674157298	2014/07/19	19.37835648	09:04:50	00:06:16	0.674157298	2.11	0.674157298	Weekend	29.68129218	0.674157298		0.674157298
2014/07/19 09:13	1.646391645	2014/07/19	19.38453704	09:13:44	00:08:54	1.646391645	2.11	1.646391645	Weekend	29.68129218	1.646391645		1.646391645
2014/07/19 09:17	1.632208910	2014/07/19	19.38707176	09:17:23	00:03:39	1.63220891	2.11	1.63220891	Weekend	29.68129218	1.63220891		1.63220891
2014/07/19 09:21	1.842563196	2014/07/19	19.38961806	09:21:03	00:03:40	1.842563196	2.11	1.842563196	Weekend	29.68129218	1.842563196		1.842563196
2014/07/19 09:24	2.234636854	2014/07/19	19.39188657	09:24:19	00:03:16	2.234636854	2.11	2.234636854	Weekend	29.68129218	2.234636854		2.234636854
2014/07/19 09:27	1.076555015	2014/07/19	19.39375	09:27:00	00:02:41	1.076555015	2.11	1.076555015	Weekend	29.68129218	1.076555015		1.076555015
2014/07/19 09:32	0.818181812	2014/07/19	19.39761574	09:32:34	00:05:34	0.818181812	2.11	0.818181812	Weekend	29.68129218	0.818181812		0.818181812
2014/07/19 09:39	0.691908509	2014/07/19	19.40270833	09:39:54	00:07:20	0.691908509	2.11	0.691908509	Weekend	29.68129218	0.691908509		0.691908509
2014/07/19 09:48	1.271455807	2014/07/19	19.40872685	09:48:34	00:08:40	1.271455807	2.11	1.271455807	Weekend	29.68129218	1.271455807		1.271455807
2014/07/19 09:53	2.336448579	2014/07/19	19.41201389	09:53:18	00:04:44	2.336448579	2.11	2.336448579	Weekend	29.68129218	2.336448579		2.336448579
2014/07/19 09:55	1.429252013	2014/07/19	19.4137963	09:55:52	00:02:34	1.429252013	2.11	1.429252013	Weekend	29.68129218	1.429252013		1.429252013
2014/07/19 10:00	1.675509621	2014/07/19	19.41670139	10:00:03	00:04:11	1.675509621	2.11	1.675509621	Weekend	29.68129218	1.675509621		1.675509621
2014/07/19 10:03	2.300613478	2014/07/19	19.41918981	10:03:38	00:03:35	2.300613478	2.11	2.300613478	Weekend	29.68129218	2.300613478		2.300613478
2014/07/19 10:06	2.916396607	2014/07/19	19.42100694	10:06:15	00:02:37	2.916396607	2.11	2.916396607	Weekend	29.68129218	2.916396607		2.916396607
2014/07/19 10:08	4.922067229	2014/07/19	19.42243056	10:08:18	00:02:03	4.922067229	2.11	4.922067229	Weekend	29.68129218	4.922067229		4.922067229
2014/07/19 10:09	4.041311149	2014/07/19	19.42327546	10:09:31	00:01:13	4.041311149	2.11	4.041311149	Weekend	29.68129218	4.041311149		4.041311149
2014/07/19 10:11	2.763703340	2014/07/19	19.42430556	10:11:00	00:01:29	2.76370334	2.11	2.76370334	Weekend	29.68129218	2.76370334		2.76370334
2014/07/19 10:13	3.083775888	2014/07/19	19.42582176	10:13:11	00:02:11	3.083775888	2.11	3.083775888	Weekend	29.68129218	3.083775888		3.083775888
2014/07/19 10:15	2.670226948	2014/07/19	19.42716435	10:15:07	00:01:56	2.670226948	2.11	2.670226948	Weekend	29.68129218	2.670226948		2.670226948
2014/07/19 10:17	1.011861254	2014/07/19	19.42872685	10:17:22	00:02:15	1.011861254	2.11	1.011861254	Weekend	29.68129218	1.011861254		1.011861254
2014/07/19 10:23	2.048247594	2014/07/19	19.43284722	10:23:18	00:05:56	2.048247594	2.11	2.048247594	Weekend	29.68129218	2.048247594		2.048247594
2014/07/19 10:26	4.069635961	2014/07/19	19.43488426	10:26:14	00:02:56	4.069635961	2.11	4.069635961	Weekend	29.68129218	4.069635961		4.069635961
2014/07/19 10:27	3.618817824	2014/07/19	19.43590278	10:27:42	00:01:28	3.618817824	2.11	3.618817824	Weekend	29.68129218	3.618817824		3.618817824
2014/07/19 10:29	2.105016940	2014/07/19	19.43706019	10:29:22	00:01:40	2.10501694	2.11	2.10501694	Weekend	29.68129218	2.10501694		2.10501694
2014/07/19 10:32	1.172180246	2014/07/19	19.43903935	10:32:13	00:02:51	1.172180246	2.11	1.172180246	Weekend	29.68129218	1.172180246		1.172180246
2014/07/19 10:37	1.509813778	2014/07/19	19.44259259	10:37:20	00:05:07	1.509813778	2.11	1.509813778	Weekend	29.68129218	1.509813778		1.509813778
2014/07/19 10:41	1.167542314	2014/07/19	19.44534722	10:41:18	00:03:58	1.167542314	2.11	1.167542314	Weekend	29.68129218	1.167542314		1.167542314
2014/07/19 10:46	1.215230884	2014/07/19	19.44892361	10:46:27	00:05:09	1.215230884	2.11	1.215230884	Weekend	29.68129218	1.215230884		1.215230884
2014/07/19 10:51	0.912223792	2014/07/19	19.45234954	10:51:23	00:04:56	0.912223792	2.11	0.912223792	Weekend	29.68129218	0.912223792		0.912223792
2014/07/19 10:57	1.074883546	2014/07/19	19.4569213	10:57:58	00:06:35	1.074883546	2.11	1.074883546	Weekend	29.68129218	1.074883546		1.074883546
2014/07/19 11:03	0.879980438	2014/07/19	19.46079861	11:03:33	00:05:35	0.879980438	2.11	0.879980438	Weekend	29.68129218	0.879980438		0.879980438
2014/07/19 11:10	1.487111687	2014/07/19	19.46553241	11:10:22	00:06:49	1.487111687	2.11	1.487111687	Weekend	29.68129218	1.487111687		1.487111687
2014/07/19 11:14	1.778656112	2014/07/19	19.46833333	11:14:24	00:04:02	1.778656112	2.11	1.778656112	Weekend	29.68129218	1.778656112		1.778656112
2014/07/19 11:17	1.308234600	2014/07/19	19.4706713	11:17:46	00:03:22	1.3082346	2.11	1.3082346	Weekend	29.68129218	1.3082346		1.3082346
2014/07/19 11:22	0.897487029	2014/07/19	19.47385417	11:22:21	00:04:35	0.897487029	2.11	0.897487029	Weekend	29.68129218	0.897487029		0.897487029
2014/07/19 11:29	0.617305115	2014/07/19	19.47849537	11:29:02	00:06:41	0.617305115	2.11	0.617305115	Weekend	29.68129218	0.617305115		0.617305115
2014/07/19 11:38	1.705029824	2014/07/19	19.48525463	11:38:46	00:09:44	1.705029824	2.11	1.705029824	Weekend	29.68129218	1.705029824		1.705029824
2014/07/19 11:42	1.371324079	2014/07/19	19.48769676	11:42:17	00:03:31	1.371324079	2.11	1.371324079	Weekend	29.68129218	1.371324079		1.371324079
2014/07/19 11:46	1.141697314	2014/07/19	19.49072917	11:46:39	00:04:22	1.141697314	2.11	1.141697314	Weekend	29.68129218	1.141697314		1.141697314
2014/07/19 11:51	1.448925369	2014/07/19	19.49438657	11:51:55	00:05:16	1.448925369	2.11	1.448925369	Weekend	29.68129218	1.448925369		1.448925369
2014/07/19 11:56	3.408445343	2014/07/19	19.49725694	11:56:03	00:04:08	3.408445343	2.11	3.408445343	Weekend	29.68129218	3.408445343		3.408445343
2014/07/19 11:57	0.018531597	2014/07/19	19.4984838	11:57:49	00:01:46	0.018531597	2.11	0.018531597	Weekend	29.68129218	0.018531597		0.018531597
2014/07/19 17:21	0.757193331	2014/07/19	19.72332176	17:21:35	05:23:46	0.757193331	2.11	0.757193331	Weekend	29.68129218	0.757193331		0.757193331
2014/07/19 17:29	0.454763646	2014/07/19	19.72881944	17:29:30	00:07:55	0.454763646	2.11	0.454763646	Weekend	29.68129218	0.454763646		0.454763646
2014/07/19 17:42	0.103681857	2014/07/19	19.73798611	17:42:42	00:13:12	0.103681857	2.11	0.103681857	Weekend	29.68129218	0.103681857		0.103681857
2014/07/19 18:40	0.432006909	2014/07/19	19.7781713	18:40:34	00:57:52	0.432006909	2.11	0.432006909	Weekend	29.68129218	0.432006909		0.432006909
2014/07/19 18:54	0.432245512	2014/07/19	19.7878125	18:54:27	00:13:53	0.432245512	2.11	0.432245512	Weekend	29.68129218	0.432245512		0.432245512
2014/07/19 19:08	1.150968723	2014/07/19	19.7974537	19:08:20	00:13:53	1.150968723	2.11	1.150968723	Weekend	29.68129218	1.150968723		1.150968723
2014/07/19 19:13	0.634383586	2014/07/19	19.80107639	19:13:33	00:05:13	0.634383586	2.11	0.634383586	Weekend	29.68129218	0.634383586		0.634383586
2014/07/19 19:23	1.009364653	2014/07/19	19.80765046	19:23:01	00:09:28	1.009364653	2.11	1.009364653	Weekend	29.68129218	1.009364653		1.009364653
2014/07/19 19:28	0.568486873	2014/07/19	19.81177083	19:28:57	00:05:56	0.568486873	2.11	0.568486873	Weekend	29.68129218	0.568486873		0.568486873
2014/07/19 19:39	0.670765786	2014/07/19	19.81909722	19:39:30	00:10:33	0.670765786	2.11	0.670765786	Weekend	29.68129218	0.670765786		0.670765786
2014/07/19 19:48	0.563539021	2014/07/19	19.8253125	19:48:27	00:08:57	0.563539021	2.11	0.563539021	Weekend	29.68129218	0.563539021		0.563539021
2014/07/19 19:59	0.412673664	2014/07/19	19.83270833	19:59:06	00:10:39	0.412673664	2.11	0.412673664	Weekend	29.68129218	0.412673664		0.412673664
2014/07/19 20:13	0.258877333	2014/07/19	19.84280093	20:13:38	00:14:32	0.258877333	2.11	0.258877333	Weekend	29.68129218	0.258877333		0.258877333
2014/07/19 20:36	0.196198115	2014/07/19	19.85890046	20:36:49	00:23:11	0.196198115	2.11	0.196198115	Weekend	29.68129218	0.196198115		0.196198115
2014/07/19 21:07	0.283781864	2014/07/19	19.88013889	21:07:24	00:30:35	0.283781864	2.11	0.283781864	Weekend	29.68129218	0.283781864		0.283781864
2014/07/19 21:28	0.322864161	2014/07/19	19.89481481	21:28:32	00:21:08	0.322864161	2.11	0.322864161	Weekend	29.68129218	0.322864161		0.322864161
2014/07/19 21:47	0.273885057	2014/07/19	19.90771991	21:47:07	00:18:35	0.273885057	2.11	0.273885057	Weekend	29.68129218	0.273885057		0.273885057
2014/07/19 22:09	1.275239097	2014/07/19	19.92293981	22:09:02	00:21:55	1.275239097	2.11	1.275239097	Weekend	29.68129218	1.275239097		1.275239097
2014/07/19 22:13	0.938771245	2014/07/19	19.9262037	22:13:44	00:04:42	0.938771245	2.11	0.938771245	Weekend	29.68129218	0.938771245		0.938771245
2014/07/19 22:20	0.426247362	2014/07/19	19.93064815	22:20:08	00:06:24	0.426247362	2.11	0.426247362	Weekend	29.68129218	0.426247362		0.426247362
2014/07/19 22:34	0.414078672	2014/07/19	19.94041667	22:34:12	00:14:04	0.414078672	2.11	0.414078672	Weekend	29.68129218	0.414078672		0.414078672
2014/07/19 22:48	0.272384726	2014/07/19	19.95048611	22:48:42	00:14:30	0.272384726	2.11	0.272384726	Weekend	29.68129218	0.272384726		0.272384726
2014/07/19 23:10	0.428591834	2014/07/19	19.96577546	23:10:43	00:22:01	0.428591834	2.11	0.428591834	Weekend	29.68129218	0.428591834	0.428591834	
2014/07/19 23:24	0.219892984	2014/07/19	19.97549769	23:24:43	00:14:00	0.219892984	2.11	0.219892984	Weekend	29.68129218	0.219892984	0.219892984	
2014/07/19 23:52	0.070038365	2014/07/19	19.99444444	23:52:00	00:27:17	0.070038365	2.11	0.070038365	Weekend	29.68129218	0.070038365	0.070038365	
2014/07/20 01:17	0.205876632	2014/07/20	20.05393519	01:17:40	01:25:40	0.205876632	2.11	0.205876632	Weekend	29.92809694	0.205876632	0.205876632	
2014/07/20 01:46	0.042290351	2014/07/20	20.07417824	01:46:49	00:29:09	0.042290351	2.11	0.042290351	Weekend	29.92809694	0.042290351	0.042290351	
2014/07/20 04:08	0.037487035	2014/07/20	20.17270833	04:08:42	02:21:53	0.037487035	2.11	0.037487035	Weekend	29.92809694	0.037487035		0.037487035
2014/07/20 06:48	0.884260162	2014/07/20	20.28385417	06:48:45	02:40:03	0.884260162	2.11	0.884260162	Weekend	29.92809694	0.884260162		0.884260162
2014/07/20 06:55	0.349250080	2014/07/20	20.28856481	06:55:32	00:06:47	0.34925008	2.11	0.34925008	Weekend	29.92809694	0.34925008		0.34925008
2014/07/20 07:12	0.573668606	2014/07/20	20.30049769	07:12:43	00:17:11	0.573668606	2.11	0.573668606	Weekend	29.92809694	0.573668606		0.573668606
2014/07/20 07:23	1.066666658	2014/07/20	20.30775463	07:23:10	00:10:27	1.066666658	2.11	1.066666658	Weekend	29.92809694	1.066666658		1.066666658
2014/07/20 07:28	0.307981861	2014/07/20	20.31166667	07:28:48	00:05:38	0.307981861	2.11	0.307981861	Weekend	29.92809694	0.307981861		0.307981861
2014/07/20 07:48	0.558156838	2014/07/20	20.32519676	07:48:17	00:19:29	0.558156838	2.11	0.558156838	Weekend	29.92809694	0.558156838		0.558156838
2014/07/20 07:59	1.190476181	2014/07/20	20.33266204	07:59:02	00:10:45	1.190476181	2.11	1.190476181	Weekend	29.92809694	1.190476181		1.190476181
2014/07/20 08:04	0.838613486	2014/07/20	20.33615741	08:04:04	00:05:02	0.838613486	2.11	0.838613486	Weekend	29.92809694	0.838613486		0.838613486
2014/07/20 08:11	0.644168481	2014/07/20	20.34112269	08:11:13	00:07:09	0.644168481	2.11	0.644168481	Weekend	29.92809694	0.644168481		0.644168481
2014/07/20 08:20	1.481237644	2014/07/20	20.34759259	08:20:32	00:09:19	1.481237644	2.11	1.481237644	Weekend	29.92809694	1.481237644		1.481237644
2014/07/20 08:24	1.245847166	2014/07/20	20.35040509	08:24:35	00:04:03	1.245847166	2.11	1.245847166	Weekend	29.92809694	1.245847166		1.245847166
2014/07/20 08:29	1.271545624	2014/07/20	20.35375	08:29:24	00:04:49	1.271545624	2.11	1.271545624	Weekend	29.92809694	1.271545624		1.271545624
2014/07/20 08:34	0.474220825	2014/07/20	20.35702546	08:34:07	00:04:43	0.474220825	2.11	0.474220825	Weekend	29.92809694	0.474220825		0.474220825
2014/07/20 08:46	0.722514344	2014/07/20	20.36582176	08:46:47	00:12:40	0.722514344	2.11	0.722514344	Weekend	29.92809694	0.722514344		0.722514344
2014/07/20 08:55	0.875656736	2014/07/20	20.37158565	08:55:05	00:08:18	0.875656736	2.11	0.875656736	Weekend	29.92809694	0.875656736		0.875656736
2014/07/20 09:01	0.863350753	2014/07/20	20.37634259	09:01:56	00:06:51	0.863350753	2.11	0.863350753	Weekend	29.92809694	0.863350753		0.863350753
2014/07/20 09:08	1.047668928	2014/07/20	20.38116898	09:08:53	00:06:57	1.047668928	2.11	1.047668928	Weekend	29.92809694	1.047668928		1.047668928
2014/07/20 09:14	1.318971192	2014/07/20	20.38515046	09:14:37	00:05:44	1.318971192	2.11	1.318971192	Weekend	29.92809694	1.318971192		1.318971192
2014/07/20 09:19	0.710255292	2014/07/20	20.38831019	09:19:10	00:04:33	0.710255292	2.11	0.710255292	Weekend	29.92809694	0.710255292		0.710255292
2014/07/20 09:27	1.168300114	2014/07/20	20.39416667	09:27:36	00:08:26	1.168300114	2.11	1.168300114	Weekend	29.92809694	1.168300114		1.168300114
2014/07/20 09:32	0.518224214	2014/07/20	20.39774306	09:32:45	00:05:09	0.518224214	2.11	0.518224214	Weekend	29.92809694	0.518224214		0.518224214
2014/07/20 09:44	0.375610364	2014/07/20	20.40577546	09:44:19	00:11:34	0.375610364	2.11	0.375610364	Weekend	29.92809694	0.375610364		0.375610364
2014/07/20 10:00	0.637077931	2014/07/20	20.416875	10:00:18	00:15:59	0.637077931	2.11	0.637077931	Weekend	29.92809694	0.637077931		0.637077931
2014/07/20 10:09	2.169720330	2014/07/20	20.42341435	10:09:43	00:09:25	2.16972033	2.11	2.16972033	Weekend	29.92809694	2.16972033		2.16972033
2014/07/20 10:12	2.728099402	2014/07/20	20.42533565	10:12:29	00:02:46	2.728099402	2.11	2.728099402	Weekend	29.92809694	2.728099402		2.728099402
2014/07/20 10:14	2.570326982	2014/07/20	20.42686343	10:14:41	00:02:12	2.570326982	2.11	2.570326982	Weekend	29.92809694	2.570326982		2.570326982
2014/07/20 10:17	2.391073307	2014/07/20	20.4284838	10:17:01	00:02:20	2.391073307	2.11	2.391073307	Weekend	29.92809694	2.391073307		2.391073307
2014/07/20 10:19	2.389803486	2014/07/20	20.43021991	10:19:31	00:02:30	2.389803486	2.11	2.389803486	Weekend	29.92809694	2.389803486		2.389803486
2014/07/20 10:22	2.339485295	2014/07/20	20.43196759	10:22:02	00:02:31	2.339485295	2.11	2.339485295	Weekend	29.92809694	2.339485295		2.339485295
2014/07/20 10:24	2.193784260	2014/07/20	20.43375	10:24:36	00:02:34	2.19378426	2.11	2.19378426	Weekend	29.92809694	2.19378426		2.19378426
2014/07/20 10:27	2.133459743	2014/07/20	20.43564815	10:27:20	00:02:44	2.133459743	2.11	2.133459743	Weekend	29.92809694	2.133459743		2.133459743
2014/07/20 10:30	1.849948598	2014/07/20	20.43760417	10:30:09	00:02:49	1.849948598	2.11	1.849948598	Weekend	29.92809694	1.849948598		1.849948598
2014/07/20 10:33	1.451261780	2014/07/20	20.43984954	10:33:23	00:03:14	1.45126178	2.11	1.45126178	Weekend	29.92809694	1.45126178		1.45126178
2014/07/20 10:37	1.195377863	2014/07/20	20.44271991	10:37:31	00:04:08	1.195377863	2.11	1.195377863	Weekend	29.92809694	1.195377863		1.195377863
2014/07/20 10:42	0.637438907	2014/07/20	20.4462037	10:42:32	00:05:01	0.637438907	2.11	0.637438907	Weekend	29.92809694	0.637438907		0.637438907
2014/07/20 10:51	1.825557795	2014/07/20	20.45274306	10:51:57	00:09:25	1.825557795	2.11	1.825557795	Weekend	29.92809694	1.825557795		1.825557795
2014/07/20 10:55	2.660753859	2014/07/20	20.45502315	10:55:14	00:03:17	2.660753859	2.11	2.660753859	Weekend	29.92809694	2.660753859		2.660753859
2014/07/20 10:57	1.780767694	2014/07/20	20.45659722	10:57:30	00:02:16	1.780767694	2.11	1.780767694	Weekend	29.92809694	1.780767694		1.780767694
2014/07/20 11:00	2.842703705	2014/07/20	20.45893519	11:00:52	00:03:22	2.842703705	2.11	2.842703705	Weekend	29.92809694	2.842703705		2.842703705
2014/07/20 11:02	1.924721969	2014/07/20	20.46039352	11:02:58	00:02:06	1.924721969	2.11	1.924721969	Weekend	29.92809694	1.924721969		1.924721969
2014/07/20 11:06	2.401921518	2014/07/20	20.46256944	11:06:06	00:03:08	2.401921518	2.11	2.401921518	Weekend	29.92809694	2.401921518		2.401921518
2014/07/20 11:08	2.334024878	2014/07/20	20.46429398	11:08:35	00:02:29	2.334024878	2.11	2.334024878	Weekend	29.92809694	2.334024878		2.334024878
2014/07/20 11:11	2.329192528	2014/07/20	20.46608796	11:11:10	00:02:35	2.329192528	2.11	2.329192528	Weekend	29.92809694	2.329192528		2.329192528
2014/07/20 11:13	2.455661645	2014/07/20	20.46787037	11:13:44	00:02:34	2.455661645	2.11	2.455661645	Weekend	29.92809694	2.455661645		2.455661645
2014/07/20 11:16	2.863506181	2014/07/20	20.46957176	11:16:11	00:02:27	2.863506181	2.11	2.863506181	Weekend	29.92809694	2.863506181		2.863506181
2014/07/20 11:18	1.778480373	2014/07/20	20.47103009	11:18:17	00:02:06	1.778480373	2.11	1.778480373	Weekend	29.92809694	1.778480373		1.778480373
2014/07/20 11:21	0.626261215	2014/07/20	20.47336806	11:21:39	00:03:22	0.626261215	2.11	0.626261215	Weekend	29.92809694	0.626261215		0.626261215
2014/07/20 11:31	2.208859965	2014/07/20	20.48002315	11:31:14	00:09:35	2.208859965	2.11	2.208859965	Weekend	29.92809694	2.208859965		2.208859965

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/20 11:33	2.096924494	2014/07/20	20.48190972	11:33:57	00:02:43	2.096924494	2.11	2.096924494	Weekend	29.92809694	2.096924494		2.096924494
2014/07/20 11:36	2.927305229	2014/07/20	20.48388889	11:36:48	00:02:51	2.927305229	2.11	2.927305229	Weekend	29.92809694	2.927305229		2.927305229
2014/07/20 11:38	2.446649430	2014/07/20	20.4853125	11:38:51	00:02:03	2.44664943	2.11	2.44664943	Weekend	29.92809694	2.44664943		2.44664943
2014/07/20 11:41	2.962475289	2014/07/20	20.48702546	11:41:19	00:02:28	2.962475289	2.11	2.962475289	Weekend	29.92809694	2.962475289		2.962475289
2014/07/20 11:43	1.235245667	2014/07/20	20.48842593	11:43:20	00:02:01	1.235245667	2.11	1.235245667	Weekend	29.92809694	1.235245667		1.235245667
2014/07/20 11:48	0.825044683	2014/07/20	20.49180556	11:48:12	00:04:52	0.825044683	2.11	0.825044683	Weekend	29.92809694	0.825044683		0.825044683
2014/07/20 11:55	3.238575001	2014/07/20	20.49685185	11:55:28	00:07:16	3.238575001	2.11	3.238575001	Weekend	29.92809694	3.238575001		3.238575001
2014/07/20 11:57	3.644462413	2014/07/20	20.49813657	11:57:19	00:01:51	3.644462413	2.11	3.644462413	Weekend	29.92809694	3.644462413		3.644462413
2014/07/20 11:58	0.017568071	2014/07/20	20.49928241	11:58:58	00:01:39	0.017568071	2.11	0.017568071	Weekend	29.92809694	0.017568071		0.017568071
2014/07/20 17:40	0.605754665	2014/07/20	20.73645833	17:40:30	05:41:32	0.605754665	2.11	0.605754665	Weekend	29.92809694	0.605754665		0.605754665
2014/07/20 17:50	0.415320717	2014/07/20	20.74333333	17:50:24	00:09:54	0.415320717	2.11	0.415320717	Weekend	29.92809694	0.415320717		0.415320717
2014/07/20 18:04	0.761937007	2014/07/20	20.75336806	18:04:51	00:14:27	0.761937007	2.11	0.761937007	Weekend	29.92809694	0.761937007		0.761937007
2014/07/20 18:12	0.723443586	2014/07/20	20.75883102	18:12:43	00:07:52	0.723443586	2.11	0.723443586	Weekend	29.92809694	0.723443586		0.723443586
2014/07/20 18:21	1.153624294	2014/07/20	20.76459491	18:21:01	00:08:18	1.153624294	2.11	1.153624294	Weekend	29.92809694	1.153624294		1.153624294
2014/07/20 18:26	0.693909015	2014/07/20	20.76820602	18:26:13	00:05:12	0.693909015	2.11	0.693909015	Weekend	29.92809694	0.693909015		0.693909015
2014/07/20 18:34	0.684150508	2014/07/20	20.77421296	18:34:52	00:08:39	0.684150508	2.11	0.684150508	Weekend	29.92809694	0.684150508		0.684150508
2014/07/20 18:43	0.741870332	2014/07/20	20.78030093	18:43:38	00:08:46	0.741870332	2.11	0.741870332	Weekend	29.92809694	0.741870332		0.741870332
2014/07/20 18:51	0.579635469	2014/07/20	20.78591435	18:51:43	00:08:05	0.579635469	2.11	0.579635469	Weekend	29.92809694	0.579635469		0.579635469
2014/07/20 19:02	0.467253325	2014/07/20	20.79310185	19:02:04	00:10:21	0.467253325	2.11	0.467253325	Weekend	29.92809694	0.467253325		0.467253325
2014/07/20 19:14	1.642935365	2014/07/20	20.80202546	19:14:55	00:12:51	1.642935365	2.11	1.642935365	Weekend	29.92809694	1.642935365		1.642935365
2014/07/20 19:18	2.062564439	2014/07/20	20.80456019	19:18:34	00:03:39	2.062564439	2.11	2.062564439	Weekend	29.92809694	2.062564439		2.062564439
2014/07/20 19:21	1.162190073	2014/07/20	20.80657407	19:21:28	00:02:54	1.162190073	2.11	1.162190073	Weekend	29.92809694	1.162190073		1.162190073
2014/07/20 19:26	1.128738939	2014/07/20	20.81016204	19:26:38	00:05:10	1.128738939	2.11	1.128738939	Weekend	29.92809694	1.128738939		1.128738939
2014/07/20 19:31	1.254705134	2014/07/20	20.81385417	19:31:57	00:05:19	1.254705134	2.11	1.254705134	Weekend	29.92809694	1.254705134		1.254705134
2014/07/20 19:36	1.094557608	2014/07/20	20.81717593	19:36:44	00:04:47	1.094557608	2.11	1.094557608	Weekend	29.92809694	1.094557608		1.094557608
2014/07/20 19:42	0.524124272	2014/07/20	20.8209838	19:42:13	00:05:29	0.524124272	2.11	0.524124272	Weekend	29.92809694	0.524124272		0.524124272
2014/07/20 19:53	0.803607297	2014/07/20	20.82893519	19:53:40	00:11:27	0.803607297	2.11	0.803607297	Weekend	29.92809694	0.803607297		0.803607297
2014/07/20 20:01	0.521240548	2014/07/20	20.83412037	20:01:08	00:07:28	0.521240548	2.11	0.521240548	Weekend	29.92809694	0.521240548		0.521240548
2014/07/20 20:12	0.744971437	2014/07/20	20.84210648	20:12:38	00:11:30	0.744971437	2.11	0.744971437	Weekend	29.92809694	0.744971437		0.744971437
2014/07/20 20:20	0.762130572	2014/07/20	20.84769676	20:20:41	00:08:03	0.762130572	2.11	0.762130572	Weekend	29.92809694	0.762130572		0.762130572
2014/07/20 20:28	0.756970430	2014/07/20	20.8531713	20:28:34	00:07:53	0.75697043	2.11	0.75697043	Weekend	29.92809694	0.75697043		0.75697043
2014/07/20 20:36	0.441826211	2014/07/20	20.85866898	20:36:29	00:07:55	0.441826211	2.11	0.441826211	Weekend	29.92809694	0.441826211		0.441826211
2014/07/20 20:50	0.896905668	2014/07/20	20.86810185	20:50:04	00:13:35	0.896905668	2.11	0.896905668	Weekend	29.92809694	0.896905668		0.896905668
2014/07/20 20:56	0.756525022	2014/07/20	20.87275463	20:56:46	00:06:42	0.756525022	2.11	0.756525022	Weekend	29.92809694	0.756525022		0.756525022
2014/07/20 21:04	0.451206975	2014/07/20	20.87825231	21:04:41	00:07:55	0.451206975	2.11	0.451206975	Weekend	29.92809694	0.451206975		0.451206975
2014/07/20 21:17	0.911438547	2014/07/20	20.88748843	21:17:59	00:13:18	0.911438547	2.11	0.911438547	Weekend	29.92809694	0.911438547		0.911438547
2014/07/20 21:24	0.246359354	2014/07/20	20.89206019	21:24:34	00:06:35	0.246359354	2.11	0.246359354	Weekend	29.92809694	0.246359354		0.246359354
2014/07/20 21:48	0.318060535	2014/07/20	20.90898148	21:48:56	00:24:22	0.318060535	2.11	0.318060535	Weekend	29.92809694	0.318060535		0.318060535
2014/07/20 22:07	0.252157344	2014/07/20	20.92207176	22:07:47	00:18:51	0.252157344	2.11	0.252157344	Weekend	29.92809694	0.252157344		0.252157344
2014/07/20 22:31	0.242659547	2014/07/20	20.93859954	22:31:35	00:23:48	0.242659547	2.11	0.242659547	Weekend	29.92809694	0.242659547		0.242659547
2014/07/20 22:56	0.035776326	2014/07/20	20.95577546	22:56:19	00:24:44	0.035776326	2.11	0.035776326	Weekend	29.92809694	0.035776326		0.035776326
2014/07/21 01:44	0.042250645	2014/07/21	21.0722338	01:44:01	02:47:42	0.042250645	2.11	0.042250645	Weekday	29.93743714	0.042250645	0.042250645	
2014/07/21 04:06	0.244130689	2014/07/21	21.17085648	04:06:02	02:22:01	0.244130689	2.11	0.244130689	Weekday	29.93743714	0.244130689		0.244130689
2014/07/21 04:30	0.170523981	2014/07/21	21.18791667	04:30:36	00:24:34	0.170523981	2.11	0.170523981	Weekday	29.93743714	0.170523981		0.170523981
2014/07/21 05:05	0.737161105	2014/07/21	21.21236111	05:05:48	00:35:12	0.737161105	2.11	0.737161105	Weekday	29.93743714	0.737161105		0.737161105
2014/07/21 05:13	1.178241792	2014/07/21	21.21800926	05:13:56	00:08:08	1.178241792	2.11	1.178241792	Weekday	29.93743714	1.178241792		1.178241792
2014/07/21 05:19	0.727802032	2014/07/21	21.22153935	05:19:01	00:05:05	0.727802032	2.11	0.727802032	Weekday	29.93743714	0.727802032		0.727802032
2014/07/21 05:27	1.218191652	2014/07/21	21.22726852	05:27:16	00:08:15	1.218191652	2.11	1.218191652	Weekday	29.93743714	1.218191652		1.218191652
2014/07/21 05:32	0.683994523	2014/07/21	21.23069444	05:32:12	00:04:56	0.683994523	2.11	0.683994523	Weekday	29.93743714	0.683994523		0.683994523
2014/07/21 05:40	0.596540063	2014/07/21	21.23678241	05:40:58	00:08:46	0.596540063	2.11	0.596540063	Weekday	29.93743714	0.596540063		0.596540063
2014/07/21 05:51	0.969357524	2014/07/21	21.24376157	05:51:01	00:10:03	0.969357524	2.11	0.969357524	Weekday	29.93743714	0.969357524		0.969357524
2014/07/21 05:57	0.606285151	2014/07/21	21.24806713	05:57:13	00:06:12	0.606285151	2.11	0.606285151	Weekday	29.93743714	0.606285151		0.606285151
2014/07/21 06:07	0.881791008	2014/07/21	21.25494213	06:07:07	00:09:54	0.881791008	2.11	0.881791008	Weekday	29.93743714	0.881791008		0.881791008
2014/07/21 06:13	0.757002265	2014/07/21	21.25966435	06:13:55	00:06:48	0.757002265	2.11	0.757002265	Weekday	29.93743714	0.757002265		0.757002265
2014/07/21 06:21	0.362566971	2014/07/21	21.26516204	06:21:50	00:07:55	0.362566971	2.11	0.362566971	Weekday	29.93743714	0.362566971		0.362566971
2014/07/21 06:38	1.811776533	2014/07/21	21.27665509	06:38:23	00:16:33	1.811776533	2.11	1.811776533	Weekday	29.93743714	1.811776533		1.811776533
2014/07/21 06:41	0.949817944	2014/07/21	21.27895833	06:41:42	00:03:19	0.949817944	2.11	0.949817944	Weekday	29.93743714	0.949817944		0.949817944
2014/07/21 06:48	1.557362853	2014/07/21	21.28334491	06:48:01	00:06:19	1.557362853	2.11	1.557362853	Weekday	29.93743714	1.557362853		1.557362853
2014/07/21 06:51	1.201361533	2014/07/21	21.28601852	06:51:52	00:03:51	1.201361533	2.11	1.201361533	Weekday	29.93743714	1.201361533		1.201361533
2014/07/21 06:56	0.635010226	2014/07/21	21.28949074	06:56:52	00:05:00	0.635010226	2.11	0.635010226	Weekday	29.93743714	0.635010226		0.635010226
2014/07/21 07:06	0.917010538	2014/07/21	21.29605324	07:06:19	00:09:27	0.917010538	2.11	0.917010538	Weekday	29.93743714	0.917010538		0.917010538
2014/07/21 07:12	1.471550021	2014/07/21	21.30059028	07:12:51	00:06:32	1.471550021	2.11	1.471550021	Weekday	29.93743714	1.471550021		1.471550021
2014/07/21 07:16	2.049880407	2014/07/21	21.30342593	07:16:56	00:04:05	2.049880407	2.11	2.049880407	Weekday	29.93743714	2.049880407		2.049880407
2014/07/21 07:19	1.139384723	2014/07/21	21.30546296	07:19:52	00:02:56	1.139384723	2.11	1.139384723	Weekday	29.93743714	1.139384723		1.139384723
2014/07/21 07:25	1.828524975	2014/07/21	21.30912037	07:25:08	00:05:16	1.828524975	2.11	1.828524975	Weekday	29.93743714	1.828524975		1.828524975
2014/07/21 07:28	1.550387585	2014/07/21	21.31138889	07:28:24	00:03:16	1.550387585	2.11	1.550387585	Weekday	29.93743714	1.550387585		1.550387585
2014/07/21 07:32	1.820388335	2014/07/21	21.31408565	07:32:17	00:03:53	1.820388335	2.11	1.820388335	Weekday	29.93743714	1.820388335		1.820388335
2014/07/21 07:35	1.113654634	2014/07/21	21.31636574	07:35:34	00:03:17	1.113654634	2.11	1.113654634	Weekday	29.93743714	1.113654634		1.113654634
2014/07/21 07:40	1.011406409	2014/07/21	21.32011574	07:40:58	00:05:24	1.011406409	2.11	1.011406409	Weekday	29.93743714	1.011406409		1.011406409
2014/07/21 07:46	0.788989211	2014/07/21	21.32423611	07:46:54	00:05:56	0.788989211	2.11	0.788989211	Weekday	29.93743714	0.788989211		0.788989211
2014/07/21 07:54	0.523255810	2014/07/21	21.32951389	07:54:30	00:07:36	0.52325581	2.11	0.52325581	Weekday	29.93743714	0.52325581		0.52325581
2014/07/21 08:05	0.702740683	2014/07/21	21.33747685	08:05:58	00:11:28	0.702740683	2.11	0.702740683	Weekday	29.93743714	0.702740683		0.702740683
2014/07/21 08:14	1.177317016	2014/07/21	21.34340278	08:14:30	00:08:32	1.177317016	2.11	1.177317016	Weekday	29.93743714	1.177317016		1.177317016
2014/07/21 08:19	1.516044795	2014/07/21	21.34694444	08:19:36	00:05:06	1.516044795	2.11	1.516044795	Weekday	29.93743714	1.516044795		1.516044795
2014/07/21 08:23	1.752507045	2014/07/21	21.3496875	08:23:33	00:03:57	1.752507045	2.11	1.752507045	Weekday	29.93743714	1.752507045		1.752507045
2014/07/21 08:26	1.050972141	2014/07/21	21.35207176	08:26:59	00:03:26	1.050972141	2.11	1.050972141	Weekday	29.93743714	1.050972141		1.050972141
2014/07/21 08:32	0.868097413	2014/07/21	21.35603009	08:32:41	00:05:42	0.868097413	2.11	0.868097413	Weekday	29.93743714	0.868097413		0.868097413
2014/07/21 08:39	1.546657489	2014/07/21	21.36083333	08:39:36	00:06:55	1.546657489	2.11	1.546657489	Weekday	29.93743714	1.546657489		1.546657489
2014/07/21 08:43	0.914355372	2014/07/21	21.36353009	08:43:29	00:03:53	0.914355372	2.11	0.914355372	Weekday	29.93743714	0.914355372		0.914355372
2014/07/21 08:50	1.349730043	2014/07/21	21.36809028	08:50:03	00:06:34	1.349730043	2.11	1.349730043	Weekday	29.93743714	1.349730043		1.349730043
2014/07/21 08:54	0.980125230	2014/07/21	21.37116898	08:54:29	00:04:26	0.98012523	2.11	0.98012523	Weekday	29.93743714	0.98012523		0.98012523
2014/07/21 09:00	2.095947817	2014/07/21	21.37542824	09:00:37	00:06:08	2.095947817	2.11	2.095947817	Weekday	29.93743714	2.095947817		2.095947817
2014/07/21 09:03	0.909274594	2014/07/21	21.37740741	09:03:28	00:02:51	0.909274594	2.11	0.909274594	Weekday	29.93743714	0.909274594		0.909274594
2014/07/21 09:10	1.266000834	2014/07/21	21.38199074	09:10:04	00:06:36	1.266000834	2.11	1.266000834	Weekday	29.93743714	1.266000834		1.266000834
2014/07/21 09:14	1.658527583	2014/07/21	21.38528935	09:14:49	00:04:45	1.658527583	2.11	1.658527583	Weekday	29.93743714	1.658527583		1.658527583
2014/07/21 09:18	1.831874604	2014/07/21	21.38780093	09:18:26	00:03:37	1.831874604	2.11	1.831874604	Weekday	29.93743714	1.831874604		1.831874604
2014/07/21 09:21	1.247314798	2014/07/21	21.39006944	09:21:42	00:03:16	1.247314798	2.11	1.247314798	Weekday	29.93743714	1.247314798		1.247314798
2014/07/21 09:26	1.088797475	2014/07/21	21.39341435	09:26:31	00:04:49	1.088797475	2.11	1.088797475	Weekday	29.93743714	1.088797475		1.088797475
2014/07/21 09:32	1.660669790	2014/07/21	21.3972338	09:32:01	00:05:30	1.66066979	2.11	1.66066979	Weekday	29.93743714	1.66066979		1.66066979
2014/07/21 09:35	1.202404800	2014/07/21	21.39974537	09:35:38	00:03:37	1.2024048	2.11	1.2024048	Weekday	29.93743714	1.2024048		1.2024048
2014/07/21 09:40	1.883042144	2014/07/21	21.40321759	09:40:38	00:05:00	1.883042144	2.11	1.883042144	Weekday	29.93743714	1.883042144		1.883042144
2014/07/21 09:43	3.400075530	2014/07/21	21.40542824	09:43:49	00:03:11	3.40007553	2.11	3.40007553	Weekday	29.93743714	3.40007553		3.40007553
2014/07/21 09:45	3.232758595	2014/07/21	21.40665509	09:45:35	00:01:46	3.232758595	2.11	3.232758595	Weekday	29.93743714	3.232758595		3.232758595
2014/07/21 09:47	2.179440593	2014/07/21	21.40793981	09:47:26	00:01:51	2.179440593	2.11	2.179440593	Weekday	29.93743714	2.179440593		2.179440593
2014/07/21 09:50	1.183198571	2014/07/21	21.40984954	09:50:11	00:02:45	1.183198571	2.11	1.183198571	Weekday	29.93743714	1.183198571		1.183198571
2014/07/21 09:55	1.388460341	2014/07/21	21.41336806	09:55:15	00:05:04	1.388460341	2.11	1.388460341	Weekday	29.93743714	1.388460341		1.388460341
2014/07/21 09:59	0.647412145	2014/07/21	21.41637731	09:59:35	00:04:20	0.647412145	2.11	0.647412145	Weekday	29.93743714	0.647412145		0.647412145
2014/07/21 10:08	0.657822602	2014/07/21	21.4228125	10:08:51	00:09:16	0.657822602	2.11	0.657822602	Weekday	29.93743714	0.657822602		0.657822602
2014/07/21 10:17	1.692365537	2014/07/21	21.42914352	10:17:58	00:09:07	1.692365537	2.11	1.692365537	Weekday	29.93743714	1.692365537		1.692365537
2014/07/21 10:21	1.821493610	2014/07/21	21.4316088	10:21:31	00:03:33	1.82149361	2.11	1.82149361	Weekday	29.93743714	1.82149361		1.82149361
2014/07/21 10:24	2.300613479	2014/07/21	21.43388889	10:24:48	00:03:17	2.300613479	2.11	2.300613479	Weekday	29.93743714	2.300613479		2.300613479
2014/07/21 10:27	1.548520290	2014/07/21	21.43570602	10:27:25	00:02:37	1.54852029	2.11	1.54852029	Weekday	29.93743714	1.54852029		1.54852029
2014/07/21 10:31	1.175241568	2014/07/21	21.4383912	10:31:17	00:03:52	1.175241568	2.11	1.175241568	Weekday	29.93743714	1.175241568		1.175241568
2014/07/21 10:36	0.653689710	2014/07/21	21.44194444	10:36:24	00:05:07	0.65368971	2.11	0.65368971	Weekday	29.93743714	0.65368971		0.65368971
2014/07/21 10:45	1.487726246	2014/07/21	21.44831019	10:45:34	00:09:10	1.487726246	2.11	1.487726246	Weekday	29.93743714	1.487726246		1.487726246
2014/07/21 10:49	1.380368087	2014/07/21	21.45111111	10:49:36	00:04:02	1.380368087	2.11	1.380368087	Weekday	29.93743714	1.380368087		1.380368087
2014/07/21 10:53	0.829111002	2014/07/21	21.45413194	10:53:57	00:04:21	0.829111002	2.11	0.829111002	Weekday	29.93743714	0.829111002		0.829111002
2014/07/21 11:01	1.006036209	2014/07/21	21.45915509	11:01:11	00:07:14	1.006036209	2.11	1.006036209	Weekday	29.93743714	1.006036209		1.006036209
2014/07/21 11:07	1.001223710	2014/07/21	21.46329861	11:07:09	00:05:58	1.00122371	2.11	1.00122371	Weekday	29.93743714	1.00122371		1.00122371
2014/07/21 11:13	1.828710744	2014/07/21	21.46746528	11:13:09	00:06:00	1.828710744	2.11	1.828710744	Weekday	29.93743714	1.828710744		1.828710744
2014/07/21 11:16	1.713143605	2014/07/21	21.46974537	11:16:26	00:03:17	1.713143605	2.11	1.713143605	Weekday	29.93743714	1.713143605		1.713143605
2014/07/21 11:19	1.164294945	2014/07/21	21.47217593	11:19:56	00:03:30	1.164294945	2.11	1.164294945	Weekday	29.93743714	1.164294945		1.164294945
2014/07/21 11:25	0.948316730	2014/07/21	21.47575231	11:25:05	00:05:09	0.94831673	2.11	0.94831673	Weekday	29.93743714	0.94831673		0.94831673
2014/07/21 11:31	0.796107910	2014/07/21	21.48015046	11:31:25	00:06:20	0.79610791	2.11	0.79610791	Weekday	29.93743714	0.79610791		0.79610791
2014/07/21 11:38	0.724579336	2014/07/21	21.48538194	11:38:57	00:07:32	0.724579336	2.11	0.724579336	Weekday	29.93743714	0.724579336		0.724579336
2014/07/21 11:47	0.999888893	2014/07/21	21.49113426	11:47:14	00:08:17	0.999888893	2.11	0.999888893	Weekday	29.93743714	0.999888893		0.999888893
2014/07/21 11:53	1.977804621	2014/07/21	21.49530093	11:53:14	00:06:00	1.977804621	2.11	1.977804621	Weekday	29.93743714	1.977804621		1.977804621
2014/07/21 11:56	3.842049062	2014/07/21	21.49740741	11:56:16	00:03:02	3.842049062	2.11	3.842049062	Weekday	29.93743714	3.842049062		3.842049062
2014/07/21 11:57	3.629764036	2014/07/21	21.4984838	11:57:49	00:01:33	3.629764036	2.11	3.629764036	Weekday	29.93743714	3.629764036		3.629764036
2014/07/21 11:59	0.029319972	2014/07/21	21.4996412	11:59:29	00:01:40	0.029319972	2.11	0.029319972	Weekday	29.93743714	0.029319972		0.029319972
2014/07/21 15:24	1.542813050	2014/07/21	21.64174769	15:24:07	03:24:38	1.54281305	2.11	1.54281305	Weekday	29.93743714	1.54281305		1.54281305
2014/07/21 15:28	1.153698235	2014/07/21	21.64444444	15:28:00	00:03:53	1.153698235	2.11	1.153698235	Weekday	29.93743714	1.153698235		1.153698235
2014/07/21 15:33	0.012867657	2014/07/21	21.64805556	15:33:12	00:05:12	0.012867657	2.11	0.012867657	Weekday	29.93743714	0.012867657		0.012867657
2014/07/21 23:19	0.170498137	2014/07/21	21.97186343	23:19:29	07:46:17	0.170498137	2.11	0.170498137	Weekday	29.93743714	0.170498137	0.170498137	
2014/07/21 23:54	0.413612442	2014/07/21	21.99630787	23:54:41	00:35:12	0.413612442	2.11	0.413612442	Weekday	29.93743714	0.413612442	0.413612442	

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/22 00:09	0.025395607	2014/07/22	22.00637731	00:09:11	00:14:30	0.025395607	2.11	0.025395607	Weekday	36.20575745	0.025395607	0.025395607	
2014/07/22 04:05	0.172804422	2014/07/22	22.17045139	04:05:27	03:56:16	0.172804422	2.11	0.172804422	Weekday	36.20575745	0.172804422		0.172804422
2014/07/22 04:40	0.262992561	2014/07/22	22.19456019	04:40:10	00:34:43	0.262992561	2.11	0.262992561	Weekday	36.20575745	0.262992561		0.262992561
2014/07/22 05:02	0.342328975	2014/07/22	22.21040509	05:02:59	00:22:49	0.342328975	2.11	0.342328975	Weekday	36.20575745	0.342328975		0.342328975
2014/07/22 05:20	1.471068965	2014/07/22	22.22258102	05:20:31	00:17:32	1.471068965	2.11	1.471068965	Weekday	36.20575745	1.471068965		1.471068965
2014/07/22 05:24	1.568900885	2014/07/22	22.22540509	05:24:35	00:04:04	1.568900885	2.11	1.568900885	Weekday	36.20575745	1.568900885		1.568900885
2014/07/22 05:28	1.723972786	2014/07/22	22.22806713	05:28:25	00:03:50	1.723972786	2.11	1.723972786	Weekday	36.20575745	1.723972786		1.723972786
2014/07/22 05:31	0.953743435	2014/07/22	22.23048611	05:31:54	00:03:29	0.953743435	2.11	0.953743435	Weekday	36.20575745	0.953743435		0.953743435
2014/07/22 05:38	0.553863191	2014/07/22	22.23484954	05:38:11	00:06:17	0.553863191	2.11	0.553863191	Weekday	36.20575745	0.553863191		0.553863191
2014/07/22 05:49	1.455604064	2014/07/22	22.24237269	05:49:01	00:10:50	1.455604064	2.11	1.455604064	Weekday	36.20575745	1.455604064		1.455604064
2014/07/22 05:53	1.815797423	2014/07/22	22.24523148	05:53:08	00:04:07	1.815797423	2.11	1.815797423	Weekday	36.20575745	1.815797423		1.815797423
2014/07/22 05:56	0.886568480	2014/07/22	22.24753472	05:56:27	00:03:19	0.88656848	2.11	0.88656848	Weekday	36.20575745	0.88656848		0.88656848
2014/07/22 06:03	0.554511563	2014/07/22	22.2522338	06:03:13	00:06:46	0.554511563	2.11	0.554511563	Weekday	36.20575745	0.554511563		0.554511563
2014/07/22 06:14	1.049746303	2014/07/22	22.25974537	06:14:02	00:10:49	1.049746303	2.11	1.049746303	Weekday	36.20575745	1.049746303		1.049746303
2014/07/22 06:19	0.581545614	2014/07/22	22.26371528	06:19:45	00:05:43	0.581545614	2.11	0.581545614	Weekday	36.20575745	0.581545614		0.581545614
2014/07/22 06:30	0.981996719	2014/07/22	22.27087963	06:30:04	00:10:19	0.981996719	2.11	0.981996719	Weekday	36.20575745	0.981996719		0.981996719
2014/07/22 06:36	0.728508979	2014/07/22	22.27512731	06:36:11	00:06:07	0.728508979	2.11	0.728508979	Weekday	36.20575745	0.728508979		0.728508979
2014/07/22 06:44	1.182732102	2014/07/22	22.28084491	06:44:25	00:08:14	1.182732102	2.11	1.182732102	Weekday	36.20575745	1.182732102		1.182732102
2014/07/22 06:49	2.630425231	2014/07/22	22.28436343	06:49:29	00:05:04	2.630425231	2.11	2.630425231	Weekday	36.20575745	2.630425231		2.630425231
2014/07/22 06:51	1.854905179	2014/07/22	22.28594907	06:51:46	00:02:17	1.854905179	2.11	1.854905179	Weekday	36.20575745	1.854905179		1.854905179
2014/07/22 06:55	2.273588462	2014/07/22	22.28819444	06:55:00	00:03:14	2.273588462	2.11	2.273588462	Weekday	36.20575745	2.273588462		2.273588462
2014/07/22 06:57	2.552467365	2014/07/22	22.29002315	06:57:38	00:02:38	2.552467365	2.11	2.552467365	Weekday	36.20575745	2.552467365		2.552467365
2014/07/22 06:59	2.701485796	2014/07/22	22.29165509	06:59:59	00:02:21	2.701485796	2.11	2.701485796	Weekday	36.20575745	2.701485796		2.701485796
2014/07/22 07:02	2.264150925	2014/07/22	22.29320602	07:02:13	00:02:14	2.264150925	2.11	2.264150925	Weekday	36.20575745	2.264150925		2.264150925
2014/07/22 07:04	0.725513900	2014/07/22	22.2950463	07:04:52	00:02:39	0.7255139	2.11	0.7255139	Weekday	36.20575745	0.7255139		0.7255139
2014/07/22 07:13	0.814811455	2014/07/22	22.30078704	07:13:08	00:08:16	0.814811455	2.11	0.814811455	Weekday	36.20575745	0.814811455		0.814811455
2014/07/22 07:20	0.743617279	2014/07/22	22.30590278	07:20:30	00:07:22	0.743617279	2.11	0.743617279	Weekday	36.20575745	0.743617279		0.743617279
2014/07/22 07:28	1.102130777	2014/07/22	22.31150463	07:28:34	00:08:04	1.102130777	2.11	1.102130777	Weekday	36.20575745	1.102130777		1.102130777
2014/07/22 07:34	1.504387786	2014/07/22	22.31528935	07:34:01	00:05:27	1.504387786	2.11	1.504387786	Weekday	36.20575745	1.504387786		1.504387786
2014/07/22 07:38	1.110425654	2014/07/22	22.31805556	07:38:00	00:03:59	1.110425654	2.11	1.110425654	Weekday	36.20575745	1.110425654		1.110425654
2014/07/22 07:43	0.812457678	2014/07/22	22.32180556	07:43:24	00:05:24	0.812457678	2.11	0.812457678	Weekday	36.20575745	0.812457678		0.812457678
2014/07/22 07:50	2.055029096	2014/07/22	22.32693287	07:50:47	00:07:23	2.055029096	2.11	2.055029096	Weekday	36.20575745	2.055029096		2.055029096
2014/07/22 07:53	1.324113569	2014/07/22	22.32895833	07:53:42	00:02:55	1.324113569	2.11	1.324113569	Weekday	36.20575745	1.324113569		1.324113569
2014/07/22 07:58	1.145985857	2014/07/22	22.33210648	07:58:14	00:04:32	1.145985857	2.11	1.145985857	Weekday	36.20575745	1.145985857		1.145985857
2014/07/22 08:03	1.193396530	2014/07/22	22.33574074	08:03:28	00:05:14	1.19339653	2.11	1.19339653	Weekday	36.20575745	1.19339653		1.19339653
2014/07/22 08:08	0.629744948	2014/07/22	22.33923611	08:08:30	00:05:02	0.629744948	2.11	0.629744948	Weekday	36.20575745	0.629744948		0.629744948
2014/07/22 08:18	0.853849431	2014/07/22	22.34585648	08:18:02	00:09:32	0.853849431	2.11	0.853849431	Weekday	36.20575745	0.853849431		0.853849431
2014/07/22 08:25	1.185614534	2014/07/22	22.35072917	08:25:03	00:07:01	1.185614534	2.11	1.185614534	Weekday	36.20575745	1.185614534		1.185614534
2014/07/22 08:30	0.815697642	2014/07/22	22.35424769	08:30:07	00:05:04	0.815697642	2.11	0.815697642	Weekday	36.20575745	0.815697642		0.815697642
2014/07/22 08:37	0.785785998	2014/07/22	22.35935185	08:37:28	00:07:21	0.785785998	2.11	0.785785998	Weekday	36.20575745	0.785785998		0.785785998
2014/07/22 08:45	0.373103388	2014/07/22	22.36465278	08:45:06	00:07:38	0.373103388	2.11	0.373103388	Weekday	36.20575745	0.373103388		0.373103388
2014/07/22 09:01	0.626043401	2014/07/22	22.37582176	09:01:11	00:16:05	0.626043401	2.11	0.626043401	Weekday	36.20575745	0.626043401		0.626043401
2014/07/22 09:10	0.621439664	2014/07/22	22.38247685	09:10:46	00:09:35	0.621439664	2.11	0.621439664	Weekday	36.20575745	0.621439664		0.621439664
2014/07/22 09:20	0.648088135	2014/07/22	22.38918981	09:20:26	00:09:40	0.648088135	2.11	0.648088135	Weekday	36.20575745	0.648088135		0.648088135
2014/07/22 09:29	0.604351325	2014/07/22	22.39561343	09:29:41	00:09:15	0.604351325	2.11	0.604351325	Weekday	36.20575745	0.604351325		0.604351325
2014/07/22 09:39	0.856245831	2014/07/22	22.40251157	09:39:37	00:09:56	0.856245831	2.11	0.856245831	Weekday	36.20575745	0.856245831		0.856245831
2014/07/22 09:46	1.123595497	2014/07/22	22.40737269	09:46:37	00:07:00	1.123595497	2.11	1.123595497	Weekday	36.20575745	1.123595497		1.123595497
2014/07/22 09:51	0.706935820	2014/07/22	22.41108796	09:51:58	00:05:21	0.70693582	2.11	0.70693582	Weekday	36.20575745	0.70693582		0.70693582
2014/07/22 10:00	0.717960985	2014/07/22	22.41697917	10:00:27	00:08:29	0.717960985	2.11	0.717960985	Weekday	36.20575745	0.717960985		0.717960985
2014/07/22 10:08	1.141842163	2014/07/22	22.42277778	10:08:48	00:08:21	1.141842163	2.11	1.141842163	Weekday	36.20575745	1.141842163		1.141842163
2014/07/22 10:14	1.632504975	2014/07/22	22.42643519	10:14:04	00:05:16	1.632504975	2.11	1.632504975	Weekday	36.20575745	1.632504975		1.632504975
2014/07/22 10:17	1.607142844	2014/07/22	22.42898148	10:17:44	00:03:40	1.607142844	2.11	1.607142844	Weekday	36.20575745	1.607142844		1.607142844
2014/07/22 10:21	1.304536879	2014/07/22	22.43157407	10:21:28	00:03:44	1.304536879	2.11	1.304536879	Weekday	36.20575745	1.304536879		1.304536879
2014/07/22 10:26	1.913672109	2014/07/22	22.43476852	10:26:04	00:04:36	1.913672109	2.11	1.913672109	Weekday	36.20575745	1.913672109		1.913672109
2014/07/22 10:29	0.869523204	2014/07/22	22.43694444	10:29:12	00:03:08	0.869523204	2.11	0.869523204	Weekday	36.20575745	0.869523204		0.869523204
2014/07/22 10:36	0.996457034	2014/07/22	22.44173611	10:36:06	00:06:54	0.996457034	2.11	0.996457034	Weekday	36.20575745	0.996457034		0.996457034
2014/07/22 10:42	2.169720330	2014/07/22	22.44591435	10:42:07	00:06:01	2.16972033	2.11	2.16972033	Weekday	36.20575745	2.16972033		2.16972033
2014/07/22 10:44	1.327237860	2014/07/22	22.44783565	10:44:53	00:02:46	1.32723786	2.11	1.32723786	Weekday	36.20575745	1.32723786		1.32723786
2014/07/22 10:49	1.088929211	2014/07/22	22.4509838	10:49:25	00:04:32	1.088929211	2.11	1.088929211	Weekday	36.20575745	1.088929211		1.088929211
2014/07/22 10:54	0.770943972	2014/07/22	22.45480324	10:54:55	00:05:30	0.770943972	2.11	0.770943972	Weekday	36.20575745	0.770943972		0.770943972
2014/07/22 11:02	0.379947227	2014/07/22	22.46020833	11:02:42	00:07:47	0.379947227	2.11	0.379947227	Weekday	36.20575745	0.379947227		0.379947227
2014/07/22 11:18	0.861945116	2014/07/22	22.47118056	11:18:30	00:15:48	0.861945116	2.11	0.861945116	Weekday	36.20575745	0.861945116		0.861945116
2014/07/22 11:25	0.713153719	2014/07/22	22.47600694	11:25:27	00:06:57	0.713153719	2.11	0.713153719	Weekday	36.20575745	0.713153719		0.713153719
2014/07/22 11:33	0.686394137	2014/07/22	22.48185185	11:33:52	00:08:25	0.686394137	2.11	0.686394137	Weekday	36.20575745	0.686394137		0.686394137
2014/07/22 11:42	0.648648643	2014/07/22	22.48792824	11:42:37	00:08:45	0.648648643	2.11	0.648648643	Weekday	36.20575745	0.648648643		0.648648643
2014/07/22 11:51	1.526329166	2014/07/22	22.49435185	11:51:52	00:09:15	1.526329166	2.11	1.526329166	Weekday	36.20575745	1.526329166		1.526329166
2014/07/22 11:55	3.653338716	2014/07/22	22.49707176	11:55:47	00:03:55	3.653338716	2.11	3.653338716	Weekday	36.20575745	3.653338716		3.653338716
2014/07/22 11:57	3.914745510	2014/07/22	22.49821759	11:57:26	00:01:39	3.91474551	2.11	3.91474551	Weekday	36.20575745	3.91474551		3.91474551
2014/07/22 11:58	0.037709365	2014/07/22	22.49928241	11:58:58	00:01:32	0.037709365	2.11	0.037709365	Weekday	36.20575745	0.037709365		0.037709365
2014/07/22 14:38	5.662157866	2014/07/22	22.60978009	14:38:05	02:39:07	5.662157866	2.11	5.662157866	Weekday	36.20575745	5.662157866		5.662157866
2014/07/22 14:39	5.235602053	2014/07/22	22.61050926	14:39:08	00:01:03	5.235602053	2.11	5.235602053	Weekday	36.20575745	5.235602053		5.235602053
2014/07/22 14:40	5.588326562	2014/07/22	22.61130787	14:40:17	00:01:09	5.588326562	2.11	5.588326562	Weekday	36.20575745	5.588326562		5.588326562
2014/07/22 14:41	5.438066422	2014/07/22	22.61204861	14:41:21	00:01:04	5.438066422	2.11	5.438066422	Weekday	36.20575745	5.438066422		5.438066422
2014/07/22 14:42	5.763688715	2014/07/22	22.61282407	14:42:28	00:01:07	5.763688715	2.11	5.763688715	Weekday	36.20575745	5.763688715		5.763688715
2014/07/22 14:43	6.014032695	2014/07/22	22.61354167	14:43:30	00:01:02	6.014032695	2.11	6.014032695	Weekday	36.20575745	6.014032695		6.014032695
2014/07/22 14:44	5.555555511	2014/07/22	22.61423611	14:44:30	00:01:00	5.555555511	2.11	5.555555511	Weekday	36.20575745	5.555555511		5.555555511
2014/07/22 14:45	5.438066422	2014/07/22	22.61498843	14:45:35	00:01:05	5.438066422	2.11	5.438066422	Weekday	36.20575745	5.438066422		5.438066422
2014/07/22 14:46	0.902843951	2014/07/22	22.61575231	14:46:41	00:01:06	0.902843951	2.11	0.902843951	Weekday	36.20575745	0.902843951		0.902843951
2014/07/22 14:53	0.017105160	2014/07/22	22.62037037	14:53:20	00:06:39	0.01710516	2.11	0.01710516	Weekday	36.20575745	0.01710516		0.01710516
2014/07/22 20:44	0.121162350	2014/07/22	22.86395833	20:44:06	05:50:46	0.12116235	2.11	0.12116235	Weekday	36.20575745	0.12116235		0.12116235
2014/07/22 21:33	0.189687331	2014/07/22	22.89834491	21:33:37	00:49:31	0.189687331	2.11	0.189687331	Weekday	36.20575745	0.189687331		0.189687331
2014/07/22 22:05	0.380123748	2014/07/22	22.9203125	22:05:15	00:31:38	0.380123748	2.11	0.380123748	Weekday	36.20575745	0.380123748		0.380123748
2014/07/22 22:21	0.746887961	2014/07/22	22.93127315	22:21:02	00:15:47	0.746887961	2.11	0.746887961	Weekday	36.20575745	0.746887961		0.746887961
2014/07/22 22:29	0.194798869	2014/07/22	22.93685185	22:29:04	00:08:02	0.194798869	2.11	0.194798869	Weekday	36.20575745	0.194798869		0.194798869
2014/07/22 22:59	0.066465301	2014/07/22	22.95824074	22:59:52	00:30:48	0.066465301	2.11	0.066465301	Weekday	36.20575745	0.066465301		0.066465301
2014/07/23 00:30	0.031539661	2014/07/23	23.0209375	00:30:09	01:30:17	0.031539661	2.11	0.031539661	Weekday	26.09971093	0.031539661	0.031539661	
2014/07/23 03:40	0.070694693	2014/07/23	23.15304398	03:40:23	03:10:14	0.070694693	2.11	0.070694693	Weekday	26.09971093	0.070694693	0.070694693	
2014/07/23 05:05	0.583733294	2014/07/23	23.21197917	05:05:15	01:24:52	0.583733294	2.11	0.583733294	Weekday	26.09971093	0.583733294		0.583733294
2014/07/23 05:15	0.767492426	2014/07/23	23.21912037	05:15:32	00:10:17	0.767492426	2.11	0.767492426	Weekday	26.09971093	0.767492426		0.767492426
2014/07/23 05:23	0.984790451	2014/07/23	23.22454861	05:23:21	00:07:49	0.984790451	2.11	0.984790451	Weekday	26.09971093	0.984790451		0.984790451
2014/07/23 05:29	1.053864160	2014/07/23	23.22877315	05:29:26	00:06:05	1.05386416	2.11	1.05386416	Weekday	26.09971093	1.05386416		1.05386416
2014/07/23 05:35	0.434383895	2014/07/23	23.23273148	05:35:08	00:05:42	0.434383895	2.11	0.434383895	Weekday	26.09971093	0.434383895		0.434383895
2014/07/23 05:48	1.630877943	2014/07/23	23.24232639	05:48:57	00:13:49	1.630877943	2.11	1.630877943	Weekday	26.09971093	1.630877943		1.630877943
2014/07/23 05:52	1.927814058	2014/07/23	23.24487269	05:52:37	00:03:40	1.927814058	2.11	1.927814058	Weekday	26.09971093	1.927814058		1.927814058
2014/07/23 05:55	2.051983568	2014/07/23	23.24703704	05:55:44	00:03:07	2.051983568	2.11	2.051983568	Weekday	26.09971093	2.051983568		2.051983568
2014/07/23 05:58	1.020813240	2014/07/23	23.24907407	05:58:40	00:02:56	1.02081324	2.11	1.02081324	Weekday	26.09971093	1.02081324		1.02081324
2014/07/23 06:04	1.142784576	2014/07/23	23.25314815	06:04:32	00:05:52	1.142784576	2.11	1.142784576	Weekday	26.09971093	1.142784576		1.142784576
2014/07/23 06:09	1.077457192	2014/07/23	23.25679398	06:09:47	00:05:15	1.077457192	2.11	1.077457192	Weekday	26.09971093	1.077457192		1.077457192
2014/07/23 06:15	0.535013668	2014/07/23	23.26065972	06:15:21	00:05:34	0.535013668	2.11	0.535013668	Weekday	26.09971093	0.535013668		0.535013668
2014/07/23 06:26	0.882655806	2014/07/23	23.26844907	06:26:34	00:11:13	0.882655806	2.11	0.882655806	Weekday	26.09971093	0.882655806		0.882655806
2014/07/23 06:33	0.882007049	2014/07/23	23.2731713	06:33:22	00:06:48	0.882007049	2.11	0.882007049	Weekday	26.09971093	0.882007049		0.882007049
2014/07/23 06:40	1.287922142	2014/07/23	23.27789352	06:40:10	00:06:48	1.287922142	2.11	1.287922142	Weekday	26.09971093	1.287922142		1.287922142
2014/07/23 06:44	1.809045212	2014/07/23	23.28113426	06:44:50	00:04:40	1.809045212	2.11	1.809045212	Weekday	26.09971093	1.809045212		1.809045212
2014/07/23 06:48	1.313676825	2014/07/23	23.2834375	06:48:09	00:03:19	1.313676825	2.11	1.313676825	Weekday	26.09971093	1.313676825		1.313676825
2014/07/23 06:52	1.159494966	2014/07/23	23.2866088	06:52:43	00:04:34	1.159494966	2.11	1.159494966	Weekday	26.09971093	1.159494966		1.159494966
2014/07/23 06:57	1.121635086	2014/07/23	23.29019676	06:57:53	00:05:10	1.121635086	2.11	1.121635086	Weekday	26.09971093	1.121635086		1.121635086
2014/07/23 07:03	1.399580115	2014/07/23	23.29391204	07:03:14	00:05:21	1.399580115	2.11	1.399580115	Weekday	26.09971093	1.399580115		1.399580115
2014/07/23 07:07	0.815069727	2014/07/23	23.29689815	07:07:32	00:04:18	0.815069727	2.11	0.815069727	Weekday	26.09971093	0.815069727		0.815069727
2014/07/23 07:14	1.792114681	2014/07/23	23.30200231	07:14:53	00:07:21	1.792114681	2.11	1.792114681	Weekday	26.09971093	1.792114681		1.792114681
2014/07/23 07:18	1.657153365	2014/07/23	23.3043287	07:18:14	00:03:21	1.657153365	2.11	1.657153365	Weekday	26.09971093	1.657153365		1.657153365
2014/07/23 07:21	1.307854382	2014/07/23	23.30684028	07:21:51	00:03:37	1.307854382	2.11	1.307854382	Weekday	26.09971093	1.307854382		1.307854382
2014/07/23 07:26	1.395240668	2014/07/23	23.31003472	07:26:27	00:04:36	1.395240668	2.11	1.395240668	Weekday	26.09971093	1.395240668		1.395240668
2014/07/23 07:30	1.601138575	2014/07/23	23.31302083	07:30:45	00:04:18	1.601138575	2.11	1.601138575	Weekday	26.09971093	1.601138575		1.601138575
2014/07/23 07:34	0.972815211	2014/07/23	23.31561343	07:34:29	00:03:44	0.972815211	2.11	0.972815211	Weekday	26.09971093	0.972815211		0.972815211
2014/07/23 07:40	0.896637602	2014/07/23	23.31990741	07:40:40	00:06:11	0.896637602	2.11	0.896637602	Weekday	26.09971093	0.896637602		0.896637602
2014/07/23 07:47	1.131790735	2014/07/23	23.32454861	07:47:21	00:06:41	1.131790735	2.11	1.131790735	Weekday	26.09971093	1.131790735		1.131790735
2014/07/23 07:52	0.834956854	2014/07/23	23.32822917	07:52:39	00:05:18	0.834956854	2.11	0.834956854	Weekday	26.09971093	0.834956854		0.834956854
2014/07/23 07:59	0.571156588	2014/07/23	23.33321759	07:59:50	00:07:11	0.571156588	2.11	0.571156588	Weekday	26.09971093	0.571156588		0.571156588
2014/07/23 08:10	1.219842766	2014/07/23	23.34052083	08:10:21	00:10:31	1.219842766	2.11	1.219842766	Weekday	26.09971093	1.219842766		1.219842766
2014/07/23 08:15	0.556637903	2014/07/23	23.34393519	08:15:16	00:04:55	0.556637903	2.11	0.556637903	Weekday	26.09971093	0.556637903		0.556637903
2014/07/23 08:26	1.914893602	2014/07/23	23.35141204	08:26:02	00:10:46	1.914893602	2.11	1.914893602	Weekday	26.09971093	1.914893602		1.914893602
2014/07/23 08:29	2.086714567	2014/07/23	23.35358796	08:29:10	00:03:08	2.086714567	2.11	2.086714567	Weekday	26.09971093	2.086714567		2.086714567
2014/07/23 08:32	0.448173689	2014/07/23	23.35559028	08:32:03	00:02:53	0.448173689	2.11	0.448173689	Weekday	26.09971093	0.448173689		0.448173689
2014/07/23 08:45	0.684150508	2014/07/23	23.36488426	08:45:26	00:13:23	0.684150508	2.11	0.684150508	Weekday	26.09971093	0.684150508		0.684150508
2014/07/23 08:54	1.286633299	2014/07/23	23.37097222	08:54:12	00:08:46	1.286633299	2.11	1.286633299	Weekday	26.09971093	1.286633299		1.286633299

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/23 08:58	1.313197626	2014/07/23	23.37421296	08:58:52	00:04:40	1.313197626	2.11	1.313197626	Weekday	26.09971093	1.313197626		1.313197626
2014/07/23 09:03	0.991517013	2014/07/23	23.37738426	09:03:26	00:04:34	0.991517013	2.11	0.991517013	Weekday	26.09971093	0.991517013		0.991517013
2014/07/23 09:09	1.628811859	2014/07/23	23.38158565	09:09:29	00:06:03	1.628811859	2.11	1.628811859	Weekday	26.09971093	1.628811859		1.628811859
2014/07/23 09:13	0.803248688	2014/07/23	23.38414352	09:13:10	00:03:41	0.803248688	2.11	0.803248688	Weekday	26.09971093	0.803248688		0.803248688
2014/07/23 09:20	1.903150757	2014/07/23	23.38934028	09:20:39	00:07:29	1.903150757	2.11	1.903150757	Weekday	26.09971093	1.903150757		1.903150757
2014/07/23 09:23	1.988071555	2014/07/23	23.39152778	09:23:48	00:03:09	1.988071555	2.11	1.988071555	Weekday	26.09971093	1.988071555		1.988071555
2014/07/23 09:26	0.682050694	2014/07/23	23.39362269	09:26:49	00:03:01	0.682050694	2.11	0.682050694	Weekday	26.09971093	0.682050694		0.682050694
2014/07/23 09:35	0.937060745	2014/07/23	23.3997338	09:35:37	00:08:48	0.937060745	2.11	0.937060745	Weekday	26.09971093	0.937060745		0.937060745
2014/07/23 09:42	0.998502239	2014/07/23	23.40417824	09:42:01	00:06:24	0.998502239	2.11	0.998502239	Weekday	26.09971093	0.998502239		0.998502239
2014/07/23 09:48	1.189217749	2014/07/23	23.40834491	09:48:01	00:06:00	1.189217749	2.11	1.189217749	Weekday	26.09971093	1.189217749		1.189217749
2014/07/23 09:53	1.881270888	2014/07/23	23.41185185	09:53:04	00:05:03	1.881270888	2.11	1.881270888	Weekday	26.09971093	1.881270888		1.881270888
2014/07/23 09:56	0.817253115	2014/07/23	23.41407407	09:56:16	00:03:12	0.817253115	2.11	0.817253115	Weekday	26.09971093	0.817253115		0.817253115
2014/07/23 10:03	0.805008938	2014/07/23	23.41916667	10:03:36	00:07:20	0.805008938	2.11	0.805008938	Weekday	26.09971093	0.805008938		0.805008938
2014/07/23 10:11	2.238805952	2014/07/23	23.42434028	10:11:03	00:07:27	2.238805952	2.11	2.238805952	Weekday	26.09971093	2.238805952		2.238805952
2014/07/23 10:13	1.409001946	2014/07/23	23.4262037	10:13:44	00:02:41	1.409001946	2.11	1.409001946	Weekday	26.09971093	1.409001946		1.409001946
2014/07/23 10:18	1.593061320	2014/07/23	23.42916667	10:18:00	00:04:16	1.59306132	2.11	1.59306132	Weekday	26.09971093	1.59306132		1.59306132
2014/07/23 10:21	1.645789509	2014/07/23	23.43177083	10:21:45	00:03:45	1.645789509	2.11	1.645789509	Weekday	26.09971093	1.645789509		1.645789509
2014/07/23 10:25	1.032110083	2014/07/23	23.43430556	10:25:24	00:03:39	1.032110083	2.11	1.032110083	Weekday	26.09971093	1.032110083		1.032110083
2014/07/23 10:31	2.371541483	2014/07/23	23.43834491	10:31:13	00:05:49	2.371541483	2.11	2.371541483	Weekday	26.09971093	2.371541483		2.371541483
2014/07/23 10:33	1.966353491	2014/07/23	23.44010417	10:33:45	00:02:32	1.966353491	2.11	1.966353491	Weekday	26.09971093	1.966353491		1.966353491
2014/07/23 10:36	0.905705940	2014/07/23	23.44222222	10:36:48	00:03:03	0.90570594	2.11	0.90570594	Weekday	26.09971093	0.90570594		0.90570594
2014/07/23 10:43	1.406359861	2014/07/23	23.44681713	10:43:25	00:06:37	1.406359861	2.11	1.406359861	Weekday	26.09971093	1.406359861		1.406359861
2014/07/23 10:47	0.861738790	2014/07/23	23.44978009	10:47:41	00:04:16	0.86173879	2.11	0.86173879	Weekday	26.09971093	0.86173879		0.86173879
2014/07/23 10:54	0.685505364	2014/07/23	23.45461806	10:54:39	00:06:58	0.685505364	2.11	0.685505364	Weekday	26.09971093	0.685505364		0.685505364
2014/07/23 11:03	0.483455089	2014/07/23	23.46069444	11:03:24	00:08:45	0.483455089	2.11	0.483455089	Weekday	26.09971093	0.483455089		0.483455089
2014/07/23 11:15	0.997838010	2014/07/23	23.46931713	11:15:49	00:12:25	0.99783801	2.11	0.99783801	Weekday	26.09971093	0.99783801		0.99783801
2014/07/23 11:21	1.426985877	2014/07/23	23.47349537	11:21:50	00:06:01	1.426985877	2.11	1.426985877	Weekday	26.09971093	1.426985877		1.426985877
2014/07/23 11:26	1.966138706	2014/07/23	23.47641204	11:26:02	00:04:12	1.966138706	2.11	1.966138706	Weekday	26.09971093	1.966138706		1.966138706
2014/07/23 11:29	1.842374601	2014/07/23	23.47853009	11:29:05	00:03:03	1.842374601	2.11	1.842374601	Weekday	26.09971093	1.842374601		1.842374601
2014/07/23 11:32	0.415704385	2014/07/23	23.48078704	11:32:20	00:03:15	0.415704385	2.11	0.415704385	Weekday	26.09971093	0.415704385		0.415704385
2014/07/23 11:46	1.083293203	2014/07/23	23.49081019	11:46:46	00:14:26	1.083293203	2.11	1.083293203	Weekday	26.09971093	1.083293203		1.083293203
2014/07/23 11:52	1.670378606	2014/07/23	23.49466435	11:52:19	00:05:33	1.670378606	2.11	1.670378606	Weekday	26.09971093	1.670378606		1.670378606
2014/07/23 11:55	4.100227758	2014/07/23	23.49715278	11:55:54	00:03:35	4.100227758	2.11	4.100227758	Weekday	26.09971093	4.100227758		4.100227758
2014/07/23 11:57	3.801478322	2014/07/23	23.4981713	11:57:22	00:01:28	3.801478322	2.11	3.801478322	Weekday	26.09971093	3.801478322		3.801478322
2014/07/23 11:58	0.093134921	2014/07/23	23.49927083	11:58:57	00:01:35	0.093134921	2.11	0.093134921	Weekday	26.09971093	0.093134921		0.093134921
2014/07/23 13:03	0.739371528	2014/07/23	23.54400463	13:03:22	01:04:25	0.739371528	2.11	0.739371528	Weekday	26.09971093	0.739371528		0.739371528
2014/07/23 13:11	0.686944238	2014/07/23	23.5496412	13:11:29	00:08:07	0.686944238	2.11	0.686944238	Weekday	26.09971093	0.686944238		0.686944238
2014/07/23 13:20	0.502078041	2014/07/23	23.55570602	13:20:13	00:08:44	0.502078041	2.11	0.502078041	Weekday	26.09971093	0.502078041		0.502078041
2014/07/23 13:32	0.037412703	2014/07/23	23.56400463	13:32:10	00:11:57	0.037412703	2.11	0.037412703	Weekday	26.09971093	0.037412703		0.037412703
2014/07/23 16:12	0.470416053	2014/07/23	23.67538194	16:12:33	02:40:23	0.470416053	2.11	0.470416053	Weekday	26.09971093	0.470416053		0.470416053
2014/07/23 16:25	0.631180302	2014/07/23	23.68423611	16:25:18	00:12:45	0.631180302	2.11	0.631180302	Weekday	26.09971093	0.631180302		0.631180302
2014/07/23 16:34	0.605510137	2014/07/23	23.69083333	16:34:48	00:09:30	0.605510137	2.11	0.605510137	Weekday	26.09971093	0.605510137		0.605510137
2014/07/23 16:44	0.618918263	2014/07/23	23.69771991	16:44:43	00:09:55	0.618918263	2.11	0.618918263	Weekday	26.09971093	0.618918263		0.618918263
2014/07/23 16:54	0.387013542	2014/07/23	23.70444444	16:54:24	00:09:41	0.387013542	2.11	0.387013542	Weekday	26.09971093	0.387013542		0.387013542
2014/07/23 17:09	0.028194959	2014/07/23	23.71521991	17:09:55	00:15:31	0.028194959	2.11	0.028194959	Weekday	26.09971093	0.028194959		0.028194959
2014/07/23 20:42	0.270843676	2014/07/23	23.86299769	20:42:43	03:32:48	0.270843676	2.11	0.270843676	Weekday	26.09971093	0.270843676		0.270843676
2014/07/23 21:04	0.652433936	2014/07/23	23.87837963	21:04:52	00:22:09	0.652433936	2.11	0.652433936	Weekday	26.09971093	0.652433936		0.652433936
2014/07/23 21:14	0.217068845	2014/07/23	23.88476852	21:14:04	00:09:12	0.217068845	2.11	0.217068845	Weekday	26.09971093	0.217068845		0.217068845
2014/07/23 21:41	0.354407448	2014/07/23	23.90395833	21:41:42	00:27:38	0.354407448	2.11	0.354407448	Weekday	26.09971093	0.354407448		0.354407448
2014/07/23 21:58	0.226292695	2014/07/23	23.91571759	21:58:38	00:16:56	0.226292695	2.11	0.226292695	Weekday	26.09971093	0.226292695		0.226292695
2014/07/23 22:25	1.057144527	2014/07/23	23.93413194	22:25:09	00:26:31	1.057144527	2.11	1.057144527	Weekday	26.09971093	1.057144527		1.057144527
2014/07/23 22:30	0.792183780	2014/07/23	23.93806713	22:30:49	00:05:40	0.79218378	2.11	0.79218378	Weekday	26.09971093	0.79218378		0.79218378
2014/07/23 22:38	0.502372310	2014/07/23	23.94333333	22:38:24	00:07:35	0.50237231	2.11	0.50237231	Weekday	26.09971093	0.50237231		0.50237231
2014/07/23 22:50	0.133422280	2014/07/23	23.95162037	22:50:20	00:11:56	0.13342228	2.11	0.13342228	Weekday	26.09971093	0.13342228		0.13342228
2014/07/23 23:35	0.120566662	2014/07/23	23.9828588	23:35:19	00:44:59	0.120566662	2.11	0.120566662	Weekday	26.09971093	0.120566662	0.120566662	
2014/07/24 00:25	0.029280528	2014/07/24	24.01741898	00:25:05	00:49:46	0.029280528	2.11	0.029280528	Weekday	85.37726372	0.029280528	0.029280528	
2014/07/24 03:49	0.206213911	2014/07/24	24.15971065	03:49:59	03:24:54	0.206213911	2.11	0.206213911	Weekday	85.37726372	0.206213911	0.206213911	
2014/07/24 04:19	0.107630396	2014/07/24	24.17991898	04:19:05	00:29:06	0.107630396	2.11	0.107630396	Weekday	85.37726372	0.107630396		0.107630396
2014/07/24 05:14	1.008233902	2014/07/24	24.21863426	05:14:50	00:55:45	1.008233902	2.11	1.008233902	Weekday	85.37726372	1.008233902		1.008233902
2014/07/24 05:20	1.600711414	2014/07/24	24.2227662	05:20:47	00:05:57	1.600711414	2.11	1.600711414	Weekday	85.37726372	1.600711414		1.600711414
2014/07/24 05:24	1.201361534	2014/07/24	24.22537037	05:24:32	00:03:45	1.201361534	2.11	1.201361534	Weekday	85.37726372	1.201361534		1.201361534
2014/07/24 05:29	0.899910002	2014/07/24	24.22884259	05:29:32	00:05:00	0.899910002	2.11	0.899910002	Weekday	85.37726372	0.899910002		0.899910002
2014/07/24 05:36	0.900945986	2014/07/24	24.23347222	05:36:12	00:06:40	0.900945986	2.11	0.900945986	Weekday	85.37726372	0.900945986		0.900945986
2014/07/24 05:42	2.690985178	2014/07/24	24.23809028	05:42:51	00:06:39	2.690985178	2.11	2.690985178	Weekday	85.37726372	2.690985178		2.690985178
2014/07/24 05:45	2.367175152	2014/07/24	24.2396412	05:45:05	00:02:14	2.367175152	2.11	2.367175152	Weekday	85.37726372	2.367175152		2.367175152
2014/07/24 05:47	0.992118164	2014/07/24	24.24140046	05:47:37	00:02:32	0.992118164	2.11	0.992118164	Weekday	85.37726372	0.992118164		0.992118164
2014/07/24 05:53	0.900225049	2014/07/24	24.24560185	05:53:40	00:06:03	0.900225049	2.11	0.900225049	Weekday	85.37726372	0.900225049		0.900225049
2014/07/24 06:00	1.010781663	2014/07/24	24.25023148	06:00:20	00:06:40	1.010781663	2.11	1.010781663	Weekday	85.37726372	1.010781663		1.010781663
2014/07/24 06:06	0.966754383	2014/07/24	24.25435185	06:06:16	00:05:56	0.966754383	2.11	0.966754383	Weekday	85.37726372	0.966754383		0.966754383
2014/07/24 06:12	0.353773582	2014/07/24	24.25865741	06:12:28	00:06:12	0.353773582	2.11	0.353773582	Weekday	85.37726372	0.353773582		0.353773582
2014/07/24 06:29	0.666444513	2014/07/24	24.27043981	06:29:26	00:16:58	0.666444513	2.11	0.666444513	Weekday	85.37726372	0.666444513		0.666444513
2014/07/24 06:38	0.940881285	2014/07/24	24.27668981	06:38:26	00:09:00	0.940881285	2.11	0.940881285	Weekday	85.37726372	0.940881285		0.940881285
2014/07/24 06:44	1.186630619	2014/07/24	24.28112269	06:44:49	00:06:23	1.186630619	2.11	1.186630619	Weekday	85.37726372	1.186630619		1.186630619
2014/07/24 06:49	1.088336650	2014/07/24	24.28462963	06:49:52	00:05:03	1.08833665	2.11	1.08833665	Weekday	85.37726372	1.08833665		1.08833665
2014/07/24 06:55	2.263296851	2014/07/24	24.28846065	06:55:23	00:05:31	2.263296851	2.11	2.263296851	Weekday	85.37726372	2.263296851		2.263296851
2014/07/24 06:58	2.729754300	2014/07/24	24.29030093	06:58:02	00:02:39	2.7297543	2.11	2.7297543	Weekday	85.37726372	2.7297543		2.7297543
2014/07/24 07:00	2.465415677	2014/07/24	24.2918287	07:00:14	00:02:12	2.465415677	2.11	2.465415677	Weekday	85.37726372	2.465415677		2.465415677
2014/07/24 07:02	2.142347043	2014/07/24	24.29351852	07:02:40	00:02:26	2.142347043	2.11	2.142347043	Weekday	85.37726372	2.142347043		2.142347043
2014/07/24 07:05	0.909504313	2014/07/24	24.29546296	07:05:28	00:02:48	0.909504313	2.11	0.909504313	Weekday	85.37726372	0.909504313		0.909504313
2014/07/24 07:12	0.405186382	2014/07/24	24.3000463	07:12:04	00:06:36	0.405186382	2.11	0.405186382	Weekday	85.37726372	0.405186382		0.405186382
2014/07/24 07:26	1.120448170	2014/07/24	24.31032407	07:26:52	00:14:48	1.12044817	2.11	1.12044817	Weekday	85.37726372	1.12044817		1.12044817
2014/07/24 07:32	0.704556124	2014/07/24	24.31405093	07:32:14	00:05:22	0.704556124	2.11	0.704556124	Weekday	85.37726372	0.704556124		0.704556124
2014/07/24 07:40	0.997229909	2014/07/24	24.31996528	07:40:45	00:08:31	0.997229909	2.11	0.997229909	Weekday	85.37726372	0.997229909		0.997229909
2014/07/24 07:46	0.938869177	2014/07/24	24.32414352	07:46:46	00:06:01	0.938869177	2.11	0.938869177	Weekday	85.37726372	0.938869177		0.938869177
2014/07/24 07:53	0.415100428	2014/07/24	24.32857639	07:53:09	00:06:23	0.415100428	2.11	0.415100428	Weekday	85.37726372	0.415100428		0.415100428
2014/07/24 08:07	0.769165023	2014/07/24	24.33861111	08:07:36	00:14:27	0.769165023	2.11	0.769165023	Weekday	85.37726372	0.769165023		0.769165023
2014/07/24 08:15	4.558115942	2014/07/24	24.34402778	08:15:24	00:07:48	4.558115942	2.11	4.558115942	Weekday	85.37726372	4.558115942		4.558115942
2014/07/24 08:16	4.219409249	2014/07/24	24.34494213	08:16:43	00:01:19	4.219409249	2.11	4.219409249	Weekday	85.37726372	4.219409249		4.219409249
2014/07/24 08:18	4.585987224	2014/07/24	24.3459375	08:18:09	00:01:26	4.585987224	2.11	4.585987224	Weekday	85.37726372	4.585987224		4.585987224
2014/07/24 08:19	4.489897694	2014/07/24	24.34684028	08:19:27	00:01:18	4.489897694	2.11	4.489897694	Weekday	85.37726372	4.489897694		4.489897694
2014/07/24 08:20	5.128205087	2014/07/24	24.3477662	08:20:47	00:01:20	5.128205087	2.11	5.128205087	Weekday	85.37726372	5.128205087		5.128205087
2014/07/24 08:21	5.897771906	2014/07/24	24.34857639	08:21:57	00:01:10	5.897771906	2.11	5.897771906	Weekday	85.37726372	5.897771906		5.897771906
2014/07/24 08:22	5.050505010	2014/07/24	24.34928241	08:22:58	00:01:01	5.05050501	2.11	5.05050501	Weekday	85.37726372	5.05050501		5.05050501
2014/07/24 08:24	1.184288431	2014/07/24	24.35011574	08:24:10	00:01:12	1.184288431	2.11	1.184288431	Weekday	85.37726372	1.184288431		1.184288431
2014/07/24 08:29	1.249132537	2014/07/24	24.35363426	08:29:14	00:05:04	1.249132537	2.11	1.249132537	Weekday	85.37726372	1.249132537		1.249132537
2014/07/24 08:34	1.415873504	2014/07/24	24.35696759	08:34:02	00:04:48	1.415873504	2.11	1.415873504	Weekday	85.37726372	1.415873504		1.415873504
2014/07/24 08:38	8.321775245	2014/07/24	24.35990741	08:38:16	00:04:14	8.321775245	2.11	8.321775245	Weekday	85.37726372	8.321775245		8.321775245
2014/07/24 08:38	9.155645908	2014/07/24	24.36040509	08:38:59	00:00:43	9.155645908	2.11	9.155645908	Weekday	85.37726372	9.155645908		9.155645908
2014/07/24 08:39	8.845208774	2014/07/24	24.36086806	08:39:39	00:00:40	8.845208774	2.11	8.845208774	Weekday	85.37726372	8.845208774		8.845208774
2014/07/24 08:40	9.072580572	2014/07/24	24.36133102	08:40:19	00:00:40	9.072580572	2.11	9.072580572	Weekday	85.37726372	9.072580572		9.072580572
2014/07/24 08:40	9.745533220	2014/07/24	24.36179398	08:40:59	00:00:40	9.74553322	2.11	9.74553322	Weekday	85.37726372	9.74553322		9.74553322
2014/07/24 08:41	9.729729652	2014/07/24	24.36222222	08:41:36	00:00:37	9.729729652	2.11	9.729729652	Weekday	85.37726372	9.729729652		9.729729652
2014/07/24 08:42	9.682624990	2014/07/24	24.36265046	08:42:13	00:00:37	9.68262499	2.11	9.68262499	Weekday	85.37726372	9.68262499		9.68262499
2014/07/24 08:42	9.610250857	2014/07/24	24.3630787	08:42:50	00:00:37	9.610250857	2.11	9.610250857	Weekday	85.37726372	9.610250857		9.610250857
2014/07/24 08:43	8.959681362	2014/07/24	24.36351852	08:43:28	00:00:38	8.959681362	2.11	8.959681362	Weekday	85.37726372	8.959681362		8.959681362
2014/07/24 08:44	8.906481869	2014/07/24	24.36398148	08:44:08	00:00:40	8.906481869	2.11	8.906481869	Weekday	85.37726372	8.906481869		8.906481869
2014/07/24 08:44	8.819206201	2014/07/24	24.36444444	08:44:48	00:00:40	8.819206201	2.11	8.819206201	Weekday	85.37726372	8.819206201		8.819206201
2014/07/24 08:45	9.365244462	2014/07/24	24.36491898	08:45:29	00:00:41	9.365244462	2.11	9.365244462	Weekday	85.37726372	9.365244462		9.365244462
2014/07/24 08:46	8.959681362	2014/07/24	24.36537037	08:46:08	00:00:39	8.959681362	2.11	8.959681362	Weekday	85.37726372	8.959681362		8.959681362
2014/07/24 08:46	9.394571950	2014/07/24	24.36583333	08:46:48	00:00:40	9.39457195	2.11	9.39457195	Weekday	85.37726372	9.39457195		9.39457195
2014/07/24 08:47	9.160305271	2014/07/24	24.36627315	08:47:26	00:00:38	9.160305271	2.11	9.160305271	Weekday	85.37726372	9.160305271		9.160305271
2014/07/24 08:48	8.620689586	2014/07/24	24.36672454	08:48:05	00:00:39	8.620689586	2.11	8.620689586	Weekday	85.37726372	8.620689586		8.620689586
2014/07/24 08:48	8.494572844	2014/07/24	24.36721065	08:48:47	00:00:42	8.494572844	2.11	8.494572844	Weekday	85.37726372	8.494572844		8.494572844
2014/07/24 08:49	8.699854933	2014/07/24	24.36770833	08:49:30	00:00:43	8.699854933	2.11	8.699854933	Weekday	85.37726372	8.699854933		8.699854933
2014/07/24 08:50	9.443861414	2014/07/24	24.36818287	08:50:11	00:00:41	9.443861414	2.11	9.443861414	Weekday	85.37726372	9.443861414		9.443861414
2014/07/24 08:50	9.095502707	2014/07/24	24.36862269	08:50:49	00:00:38	9.095502707	2.11	9.095502707	Weekday	85.37726372	9.095502707		9.095502707
2014/07/24 08:51	8.474576203	2014/07/24	24.36908565	08:51:29	00:00:40	8.474576203	2.11	8.474576203	Weekday	85.37726372	8.474576203		8.474576203
2014/07/24 08:52	9.370119654	2014/07/24	24.36957176	08:52:11	00:00:42	9.370119654	2.11	9.370119654	Weekday	85.37726372	9.370119654		9.370119654
2014/07/24 08:52	##########	2014/07/24	24.37002315	08:52:50	00:00:39	10.08403353	2.11	10.08403353	Weekday	85.37726372	10.08403353		10.08403353
2014/07/24 08:53	9.661835671	2014/07/24	24.37042824	08:53:25	00:00:35	9.661835671	2.11	9.661835671	Weekday	85.37726372	9.661835671		9.661835671
2014/07/24 08:54	9.503695806	2014/07/24	24.37085648	08:54:02	00:00:37	9.503695806	2.11	9.503695806	Weekday	85.37726372	9.503695806		9.503695806
2014/07/24 08:54	9.188361335	2014/07/24	24.3712963	08:54:40	00:00:38	9.188361335	2.11	9.188361335	Weekday	85.37726372	9.188361335		9.188361335
2014/07/24 08:55	9.677419277	2014/07/24	24.37175926	08:55:20	00:00:40	9.677419277	2.11	9.677419277	Weekday	85.37726372	9.677419277		9.677419277
2014/07/24 08:55	9.793253458	2014/07/24	24.3721875	08:55:57	00:00:37	9.793253458	2.11	9.793253458	Weekday	85.37726372	9.793253458		9.793253458
2014/07/24 08:56	9.605122655	2014/07/24	24.37260417	08:56:33	00:00:36	9.605122655	2.11	9.605122655	Weekday	85.37726372	9.605122655		9.605122655

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/24 08:57	9.453781438	2014/07/24	24.37304398	08:57:11	00:00:38	9.453781438	2.11	9.453781438	Weekday	85.37726372	9.453781438		9.453781438
2014/07/24 08:57	8.910891018	2014/07/24	24.3734838	08:57:49	00:00:38	8.910891018	2.11	8.910891018	Weekday	85.37726372	8.910891018		8.910891018
2014/07/24 08:58	8.789062430	2014/07/24	24.37394676	08:58:29	00:00:40	8.78906243	2.11	8.78906243	Weekday	85.37726372	8.78906243		8.78906243
2014/07/24 08:59	8.888888818	2014/07/24	24.3744213	08:59:10	00:00:41	8.888888818	2.11	8.888888818	Weekday	85.37726372	8.888888818		8.888888818
2014/07/24 08:59	8.746355615	2014/07/24	24.37489583	08:59:51	00:00:41	8.746355615	2.11	8.746355615	Weekday	85.37726372	8.746355615		8.746355615
2014/07/24 09:00	9.045226059	2014/07/24	24.37537037	09:00:32	00:00:41	9.045226059	2.11	9.045226059	Weekday	85.37726372	9.045226059		9.045226059
2014/07/24 09:01	9.169638235	2014/07/24	24.37583333	09:01:12	00:00:40	9.169638235	2.11	9.169638235	Weekday	85.37726372	9.169638235		9.169638235
2014/07/24 09:01	9.268794982	2014/07/24	24.37628472	09:01:51	00:00:39	9.268794982	2.11	9.268794982	Weekday	85.37726372	9.268794982		9.268794982
2014/07/24 09:02	9.384775733	2014/07/24	24.37673611	09:02:30	00:00:39	9.384775733	2.11	9.384775733	Weekday	85.37726372	9.384775733		9.384775733
2014/07/24 09:03	9.326424796	2014/07/24	24.37717593	09:03:08	00:00:38	9.326424796	2.11	9.326424796	Weekday	85.37726372	9.326424796		9.326424796
2014/07/24 09:03	9.207161052	2014/07/24	24.37762731	09:03:47	00:00:39	9.207161052	2.11	9.207161052	Weekday	85.37726372	9.207161052		9.207161052
2014/07/24 09:04	6.823350969	2014/07/24	24.3780787	09:04:26	00:00:39	6.823350969	2.11	6.823350969	Weekday	85.37726372	6.823350969		6.823350969
2014/07/24 09:05	4.144600473	2014/07/24	24.37869213	09:05:19	00:00:53	4.144600473	2.11	4.144600473	Weekday	85.37726372	4.144600473		4.144600473
2014/07/24 09:06	4.442250705	2014/07/24	24.37969907	09:06:46	00:01:27	4.442250705	2.11	4.442250705	Weekday	85.37726372	4.442250705		4.442250705
2014/07/24 09:08	4.222378573	2014/07/24	24.38063657	09:08:07	00:01:21	4.222378573	2.11	4.222378573	Weekday	85.37726372	4.222378573		4.222378573
2014/07/24 09:09	4.639175221	2014/07/24	24.38162037	09:09:32	00:01:25	4.639175221	2.11	4.639175221	Weekday	85.37726372	4.639175221		4.639175221
2014/07/24 09:10	3.845332163	2014/07/24	24.38252315	09:10:50	00:01:18	3.845332163	2.11	3.845332163	Weekday	85.37726372	3.845332163		3.845332163
2014/07/24 09:12	4.760645294	2014/07/24	24.38359954	09:12:23	00:01:33	4.760645294	2.11	4.760645294	Weekday	85.37726372	4.760645294		4.760645294
2014/07/24 09:13	4.726890718	2014/07/24	24.38447917	09:13:39	00:01:16	4.726890718	2.11	4.726890718	Weekday	85.37726372	4.726890718		4.726890718
2014/07/24 09:14	4.700966272	2014/07/24	24.3853588	09:14:55	00:01:16	4.700966272	2.11	4.700966272	Weekday	85.37726372	4.700966272		4.700966272
2014/07/24 09:16	4.520341501	2014/07/24	24.38625	09:16:12	00:01:17	4.520341501	2.11	4.520341501	Weekday	85.37726372	4.520341501		4.520341501
2014/07/24 09:17	5.240174630	2014/07/24	24.38716435	09:17:31	00:01:19	5.24017463	2.11	5.24017463	Weekday	85.37726372	5.24017463		5.24017463
2014/07/24 09:18	5.619731457	2014/07/24	24.38796296	09:18:40	00:01:09	5.619731457	2.11	5.619731457	Weekday	85.37726372	5.619731457		5.619731457
2014/07/24 09:19	5.431502672	2014/07/24	24.3887037	09:19:44	00:01:04	5.431502672	2.11	5.431502672	Weekday	85.37726372	5.431502672		5.431502672
2014/07/24 09:20	5.456198804	2014/07/24	24.38946759	09:20:50	00:01:06	5.456198804	2.11	5.456198804	Weekday	85.37726372	5.456198804		5.456198804
2014/07/24 09:21	4.422604387	2014/07/24	24.39023148	09:21:56	00:01:06	4.422604387	2.11	4.422604387	Weekday	85.37726372	4.422604387		4.422604387
2014/07/24 09:23	4.433497501	2014/07/24	24.39118056	09:23:18	00:01:22	4.433497501	2.11	4.433497501	Weekday	85.37726372	4.433497501		4.433497501
2014/07/24 09:24	4.308281440	2014/07/24	24.39211806	09:24:39	00:01:21	4.30828144	2.11	4.30828144	Weekday	85.37726372	4.30828144		4.30828144
2014/07/24 09:26	3.375843934	2014/07/24	24.3930787	09:26:02	00:01:23	3.375843934	2.11	3.375843934	Weekday	85.37726372	3.375843934		3.375843934
2014/07/24 09:27	1.919795206	2014/07/24	24.39431713	09:27:49	00:01:47	1.919795206	2.11	1.919795206	Weekday	85.37726372	1.919795206		1.919795206
2014/07/24 09:30	1.746047129	2014/07/24	24.39649306	09:30:57	00:03:08	1.746047129	2.11	1.746047129	Weekday	85.37726372	1.746047129		1.746047129
2014/07/24 09:34	1.266535312	2014/07/24	24.39887731	09:34:23	00:03:26	1.266535312	2.11	1.266535312	Weekday	85.37726372	1.266535312		1.266535312
2014/07/24 09:39	0.943495118	2014/07/24	24.40216435	09:39:07	00:04:44	0.943495118	2.11	0.943495118	Weekday	85.37726372	0.943495118		0.943495118
2014/07/24 09:45	1.293847028	2014/07/24	24.40657407	09:45:28	00:06:21	1.293847028	2.11	1.293847028	Weekday	85.37726372	1.293847028		1.293847028
2014/07/24 09:50	1.040161795	2014/07/24	24.40980324	09:50:07	00:04:39	1.040161795	2.11	1.040161795	Weekday	85.37726372	1.040161795		1.040161795
2014/07/24 09:55	1.155698225	2014/07/24	24.41380787	09:55:53	00:05:46	1.155698225	2.11	1.155698225	Weekday	85.37726372	1.155698225		1.155698225
2014/07/24 10:01	3.111495221	2014/07/24	24.41740741	10:01:04	00:05:11	3.111495221	2.11	3.111495221	Weekday	85.37726372	3.111495221		3.111495221
2014/07/24 10:03	3.189227473	2014/07/24	24.41875	10:03:00	00:01:56	3.189227473	2.11	3.189227473	Weekday	85.37726372	3.189227473		3.189227473
2014/07/24 10:04	4.626060102	2014/07/24	24.42005787	10:04:53	00:01:53	4.626060102	2.11	4.626060102	Weekday	85.37726372	4.626060102		4.626060102
2014/07/24 10:06	3.419452860	2014/07/24	24.42096065	10:06:11	00:01:18	3.41945286	2.11	3.41945286	Weekday	85.37726372	3.41945286		3.41945286
2014/07/24 10:07	3.164556937	2014/07/24	24.42217593	10:07:56	00:01:45	3.164556937	2.11	3.164556937	Weekday	85.37726372	3.164556937		3.164556937
2014/07/24 10:09	2.909796291	2014/07/24	24.42349537	10:09:50	00:01:54	2.909796291	2.11	2.909796291	Weekday	85.37726372	2.909796291		2.909796291
2014/07/24 10:11	2.652910811	2014/07/24	24.42491898	10:11:53	00:02:03	2.652910811	2.11	2.652910811	Weekday	85.37726372	2.652910811		2.652910811
2014/07/24 10:14	2.459352351	2014/07/24	24.42649306	10:14:09	00:02:16	2.459352351	2.11	2.459352351	Weekday	85.37726372	2.459352351		2.459352351
2014/07/24 10:16	2.695417768	2014/07/24	24.42819444	10:16:36	00:02:27	2.695417768	2.11	2.695417768	Weekday	85.37726372	2.695417768		2.695417768
2014/07/24 10:18	3.735214745	2014/07/24	24.4297338	10:18:49	00:02:13	3.735214745	2.11	3.735214745	Weekday	85.37726372	3.735214745		3.735214745
2014/07/24 10:20	3.168456232	2014/07/24	24.43085648	10:20:26	00:01:37	3.168456232	2.11	3.168456232	Weekday	85.37726372	3.168456232		3.168456232
2014/07/24 10:22	2.595904219	2014/07/24	24.43216435	10:22:19	00:01:53	2.595904219	2.11	2.595904219	Weekday	85.37726372	2.595904219		2.595904219
2014/07/24 10:24	2.232973559	2014/07/24	24.43377315	10:24:38	00:02:19	2.232973559	2.11	2.232973559	Weekday	85.37726372	2.232973559		2.232973559
2014/07/24 10:27	2.934942093	2014/07/24	24.43563657	10:27:19	00:02:41	2.934942093	2.11	2.934942093	Weekday	85.37726372	2.934942093		2.934942093
2014/07/24 10:29	3.184713351	2014/07/24	24.43706019	10:29:22	00:02:03	3.184713351	2.11	3.184713351	Weekday	85.37726372	3.184713351		3.184713351
2014/07/24 10:31	3.484320530	2014/07/24	24.43836806	10:31:15	00:01:53	3.48432053	2.11	3.48432053	Weekday	85.37726372	3.48432053		3.48432053
2014/07/24 10:32	2.595529900	2014/07/24	24.43956019	10:32:58	00:01:43	2.5955299	2.11	2.5955299	Weekday	85.37726372	2.5955299		2.5955299
2014/07/24 10:35	2.368421034	2014/07/24	24.44116898	10:35:17	00:02:19	2.368421034	2.11	2.368421034	Weekday	85.37726372	2.368421034		2.368421034
2014/07/24 10:37	2.192448216	2014/07/24	24.44292824	10:37:49	00:02:32	2.192448216	2.11	2.192448216	Weekday	85.37726372	2.192448216		2.192448216
2014/07/24 10:40	2.536282916	2014/07/24	24.44482639	10:40:33	00:02:44	2.536282916	2.11	2.536282916	Weekday	85.37726372	2.536282916		2.536282916
2014/07/24 10:42	2.952755882	2014/07/24	24.44646991	10:42:55	00:02:22	2.952755882	2.11	2.952755882	Weekday	85.37726372	2.952755882		2.952755882
2014/07/24 10:44	3.257918526	2014/07/24	24.44788194	10:44:57	00:02:02	3.257918526	2.11	3.257918526	Weekday	85.37726372	3.257918526		3.257918526
2014/07/24 10:46	3.448936550	2014/07/24	24.44915509	10:46:47	00:01:50	3.44893655	2.11	3.44893655	Weekday	85.37726372	3.44893655		3.44893655
2014/07/24 10:48	3.171247332	2014/07/24	24.45037037	10:48:32	00:01:45	3.171247332	2.11	3.171247332	Weekday	85.37726372	3.171247332		3.171247332
2014/07/24 10:50	2.388852005	2014/07/24	24.45167824	10:50:25	00:01:53	2.388852005	2.11	2.388852005	Weekday	85.37726372	2.388852005		2.388852005
2014/07/24 10:52	2.190847110	2014/07/24	24.45342593	10:52:56	00:02:31	2.19084711	2.11	2.19084711	Weekday	85.37726372	2.19084711		2.19084711
2014/07/24 10:55	2.096191901	2014/07/24	24.45532407	10:55:40	00:02:44	2.096191901	2.11	2.096191901	Weekday	85.37726372	2.096191901		2.096191901
2014/07/24 10:58	2.426530043	2014/07/24	24.45731481	10:58:32	00:02:52	2.426530043	2.11	2.426530043	Weekday	85.37726372	2.426530043		2.426530043
2014/07/24 11:01	2.450313076	2014/07/24	24.45902778	11:01:00	00:02:28	2.450313076	2.11	2.450313076	Weekday	85.37726372	2.450313076		2.450313076
2014/07/24 11:03	3.211991409	2014/07/24	24.46072917	11:03:27	00:02:27	3.211991409	2.11	3.211991409	Weekday	85.37726372	3.211991409		3.211991409
2014/07/24 11:05	2.458344695	2014/07/24	24.46202546	11:05:19	00:01:52	2.458344695	2.11	2.458344695	Weekday	85.37726372	2.458344695		2.458344695
2014/07/24 11:07	2.328589891	2014/07/24	24.46372685	11:07:46	00:02:27	2.328589891	2.11	2.328589891	Weekday	85.37726372	2.328589891		2.328589891
2014/07/24 11:10	2.526670390	2014/07/24	24.46550926	11:10:20	00:02:34	2.52667039	2.11	2.52667039	Weekday	85.37726372	2.52667039		2.52667039
2014/07/24 11:12	2.569960002	2014/07/24	24.46716435	11:12:43	00:02:23	2.569960002	2.11	2.569960002	Weekday	85.37726372	2.569960002		2.569960002
2014/07/24 11:15	2.332512616	2014/07/24	24.46878472	11:15:03	00:02:20	2.332512616	2.11	2.332512616	Weekday	85.37726372	2.332512616		2.332512616
2014/07/24 11:17	2.635046092	2014/07/24	24.47056713	11:17:37	00:02:34	2.635046092	2.11	2.635046092	Weekday	85.37726372	2.635046092		2.635046092
2014/07/24 11:19	2.288038624	2014/07/24	24.47215278	11:19:54	00:02:17	2.288038624	2.11	2.288038624	Weekday	85.37726372	2.288038624		2.288038624
2014/07/24 11:22	2.243549776	2014/07/24	24.47396991	11:22:31	00:02:37	2.243549776	2.11	2.243549776	Weekday	85.37726372	2.243549776		2.243549776
2014/07/24 11:25	2.027712049	2014/07/24	24.47583333	11:25:12	00:02:41	2.027712049	2.11	2.027712049	Weekday	85.37726372	2.027712049		2.027712049
2014/07/24 11:28	2.445984489	2014/07/24	24.47788194	11:28:09	00:02:57	2.445984489	2.11	2.445984489	Weekday	85.37726372	2.445984489		2.445984489
2014/07/24 11:30	2.367486500	2014/07/24	24.47958333	11:30:36	00:02:27	2.3674865	2.11	2.3674865	Weekday	85.37726372	2.3674865		2.3674865
2014/07/24 11:33	1.543474520	2014/07/24	24.48134259	11:33:08	00:02:32	1.54347452	2.11	1.54347452	Weekday	85.37726372	1.54347452		1.54347452
2014/07/24 11:37	2.215384598	2014/07/24	24.48405093	11:37:02	00:03:54	2.215384598	2.11	2.215384598	Weekday	85.37726372	2.215384598		2.215384598
2014/07/24 11:39	2.547410113	2014/07/24	24.48592593	11:39:44	00:02:42	2.547410113	2.11	2.547410113	Weekday	85.37726372	2.547410113		2.547410113
2014/07/24 11:42	3.093846658	2014/07/24	24.48756944	11:42:06	00:02:22	3.093846658	2.11	3.093846658	Weekday	85.37726372	3.093846658		3.093846658
2014/07/24 11:44	2.042205566	2014/07/24	24.48891204	11:44:02	00:01:56	2.042205566	2.11	2.042205566	Weekday	85.37726372	2.042205566		2.042205566
2014/07/24 11:46	2.778635359	2014/07/24	24.49094907	11:46:58	00:02:56	2.778635359	2.11	2.778635359	Weekday	85.37726372	2.778635359		2.778635359
2014/07/24 11:49	2.565198782	2014/07/24	24.4924537	11:49:08	00:02:10	2.565198782	2.11	2.565198782	Weekday	85.37726372	2.565198782		2.565198782
2014/07/24 11:51	2.498611862	2014/07/24	24.49407407	11:51:28	00:02:20	2.498611862	2.11	2.498611862	Weekday	85.37726372	2.498611862		2.498611862
2014/07/24 11:53	3.695339737	2014/07/24	24.49574074	11:53:52	00:02:24	3.695339737	2.11	3.695339737	Weekday	85.37726372	3.695339737		3.695339737
2014/07/24 11:55	4.874086070	2014/07/24	24.496875	11:55:30	00:01:38	4.87408607	2.11	4.87408607	Weekday	85.37726372	4.87408607		4.87408607
2014/07/24 11:56	5.215879413	2014/07/24	24.49771991	11:56:43	00:01:13	5.215879413	2.11	5.215879413	Weekday	85.37726372	5.215879413		5.215879413
2014/07/24 11:57	7.901668067	2014/07/24	24.49851852	11:57:52	00:01:09	7.901668067	2.11	7.901668067	Weekday	85.37726372	7.901668067		7.901668067
2014/07/24 11:58	0.087796312	2014/07/24	24.49905093	11:58:38	00:00:46	0.087796312	2.11	0.087796312	Weekday	85.37726372	0.087796312		0.087796312
2014/07/24 13:06	1.524777624	2014/07/24	24.54650463	13:06:58	01:08:20	1.524777624	2.11	1.524777624	Weekday	85.37726372	1.524777624		1.524777624
2014/07/24 13:10	2.401601048	2014/07/24	24.54924769	13:10:55	00:03:57	2.401601048	2.11	2.401601048	Weekday	85.37726372	2.401601048		2.401601048
2014/07/24 13:13	0.037042601	2014/07/24	24.55097222	13:13:24	00:02:29	0.037042601	2.11	0.037042601	Weekday	85.37726372	0.037042601		0.037042601
2014/07/24 15:55	0.683656799	2014/07/24	24.66346065	15:55:23	02:41:59	0.683656799	2.11	0.683656799	Weekday	85.37726372	0.683656799		0.683656799
2014/07/24 16:04	0.386282670	2014/07/24	24.66956019	16:04:10	00:08:47	0.38628267	2.11	0.38628267	Weekday	85.37726372	0.38628267		0.38628267
2014/07/24 16:19	0.605978988	2014/07/24	24.68033565	16:19:41	00:15:31	0.605978988	2.11	0.605978988	Weekday	85.37726372	0.605978988		0.605978988
2014/07/24 16:29	0.277068003	2014/07/24	24.68722222	16:29:36	00:09:55	0.277068003	2.11	0.277068003	Weekday	85.37726372	0.277068003		0.277068003
2014/07/24 16:51	0.869229276	2014/07/24	24.70225694	16:51:15	00:21:39	0.869229276	2.11	0.869229276	Weekday	85.37726372	0.869229276		0.869229276
2014/07/24 16:58	0.894854579	2014/07/24	24.70704861	16:58:09	00:06:54	0.894854579	2.11	0.894854579	Weekday	85.37726372	0.894854579		0.894854579
2014/07/24 17:04	0.937793053	2014/07/24	24.71170139	17:04:51	00:06:42	0.937793053	2.11	0.937793053	Weekday	85.37726372	0.937793053		0.937793053
2014/07/24 17:11	0.352216023	2014/07/24	24.71614583	17:11:15	00:06:24	0.352216023	2.11	0.352216023	Weekday	85.37726372	0.352216023		0.352216023
2014/07/24 17:28	0.775260567	2014/07/24	24.72797454	17:28:17	00:17:02	0.775260567	2.11	0.775260567	Weekday	85.37726372	0.775260567		0.775260567
2014/07/24 17:36	1.756440267	2014/07/24	24.73335648	17:36:02	00:07:45	1.756440267	2.11	1.756440267	Weekday	85.37726372	1.756440267		1.756440267
2014/07/24 17:39	0.800391296	2014/07/24	24.73572917	17:39:27	00:03:25	0.800391296	2.11	0.800391296	Weekday	85.37726372	0.800391296		0.800391296
2014/07/24 17:46	1.496508136	2014/07/24	24.74092593	17:46:56	00:07:29	1.496508136	2.11	1.496508136	Weekday	85.37726372	1.496508136		1.496508136
2014/07/24 17:50	1.243179768	2014/07/24	24.74371528	17:50:57	00:04:01	1.243179768	2.11	1.243179768	Weekday	85.37726372	1.243179768		1.243179768
2014/07/24 17:55	0.862275442	2014/07/24	24.74707176	17:55:47	00:04:50	0.862275442	2.11	0.862275442	Weekday	85.37726372	0.862275442		0.862275442
2014/07/24 18:02	1.339883866	2014/07/24	24.75189815	18:02:44	00:06:57	1.339883866	2.11	1.339883866	Weekday	85.37726372	1.339883866		1.339883866
2014/07/24 18:07	1.283788593	2014/07/24	24.75501157	18:07:13	00:04:29	1.283788593	2.11	1.283788593	Weekday	85.37726372	1.283788593		1.283788593
2014/07/24 18:11	1.658527583	2014/07/24	24.75825231	18:11:53	00:04:40	1.658527583	2.11	1.658527583	Weekday	85.37726372	1.658527583		1.658527583
2014/07/24 18:15	0.586414721	2014/07/24	24.76076389	18:15:30	00:03:37	0.586414721	2.11	0.586414721	Weekday	85.37726372	0.586414721		0.586414721
2014/07/24 18:25	1.283605495	2014/07/24	24.76787037	18:25:44	00:10:14	1.283605495	2.11	1.283605495	Weekday	85.37726372	1.283605495		1.283605495
2014/07/24 18:30	2.023153856	2014/07/24	24.77112269	18:30:25	00:04:41	2.023153856	2.11	2.023153856	Weekday	85.37726372	2.023153856		2.023153856
2014/07/24 18:33	2.066115686	2014/07/24	24.77318287	18:33:23	00:02:58	2.066115686	2.11	2.066115686	Weekday	85.37726372	2.066115686		2.066115686
2014/07/24 18:36	1.905165099	2014/07/24	24.77519676	18:36:17	00:02:54	1.905165099	2.11	1.905165099	Weekday	85.37726372	1.905165099		1.905165099
2014/07/24 18:39	0.991353189	2014/07/24	24.77738426	18:39:26	00:03:09	0.991353189	2.11	0.991353189	Weekday	85.37726372	0.991353189		0.991353189
2014/07/24 18:45	1.038301791	2014/07/24	24.78158565	18:45:29	00:06:03	1.038301791	2.11	1.038301791	Weekday	85.37726372	1.038301791		1.038301791
2014/07/24 18:51	1.635471548	2014/07/24	24.78560185	18:51:16	00:05:47	1.635471548	2.11	1.635471548	Weekday	85.37726372	1.635471548		1.635471548
2014/07/24 18:54	2.388852005	2014/07/24	24.78814815	18:54:56	00:03:40	2.388852005	2.11	2.388852005	Weekday	85.37726372	2.388852005		2.388852005
2014/07/24 18:57	1.415650795	2014/07/24	24.78988426	18:57:26	00:02:30	1.415650795	2.11	1.415650795	Weekday	85.37726372	1.415650795		1.415650795
2014/07/24 19:01	0.671266077	2014/07/24	24.79283565	19:01:41	00:04:15	0.671266077	2.11	0.671266077	Weekday	85.37726372	0.671266077		0.671266077
2014/07/24 19:10	0.371425031	2014/07/24	24.79903935	19:10:37	00:08:56	0.371425031	2.11	0.371425031	Weekday	85.37726372	0.371425031		0.371425031
2014/07/24 19:26	0.214881754	2014/07/24	24.81025463	19:26:46	00:16:09	0.214881754	2.11	0.214881754	Weekday	85.37726372	0.214881754		0.214881754
2014/07/24 19:54	0.435224137	2014/07/24	24.82965278	19:54:42	00:27:56	0.435224137	2.11	0.435224137	Weekday	85.37726372	0.435224137		0.435224137
2014/07/24 20:08	0.759653929	2014/07/24	24.83922454	20:08:29	00:13:47	0.759653929	2.11	0.759653929	Weekday	85.37726372	0.759653929		0.759653929

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/24 20:16	1.072258287	2014/07/24	24.84471065	20:16:23	00:07:54	1.072258287	2.11	1.072258287	Weekday	85.37726372	1.072258287		1.072258287
2014/07/24 20:21	0.574694290	2014/07/24	24.84858796	20:21:58	00:05:35	0.57469429	2.11	0.57469429	Weekday	85.37726372	0.57469429		0.57469429
2014/07/24 20:32	0.513845271	2014/07/24	24.85584491	20:32:25	00:10:27	0.513845271	2.11	0.513845271	Weekday	85.37726372	0.513845271		0.513845271
2014/07/24 20:44	1.279317687	2014/07/24	24.86394676	20:44:05	00:11:40	1.279317687	2.11	1.279317687	Weekday	85.37726372	1.279317687		1.279317687
2014/07/24 20:48	0.555401273	2014/07/24	24.86721065	20:48:47	00:04:42	0.555401273	2.11	0.555401273	Weekday	85.37726372	0.555401273		0.555401273
2014/07/24 20:59	0.250748762	2014/07/24	24.87471065	20:59:35	00:10:48	0.250748762	2.11	0.250748762	Weekday	85.37726372	0.250748762		0.250748762
2014/07/24 21:23	0.207590906	2014/07/24	24.89133102	21:23:31	00:23:56	0.207590906	2.11	0.207590906	Weekday	85.37726372	0.207590906		0.207590906
2014/07/24 21:52	0.743463709	2014/07/24	24.91140046	21:52:25	00:28:54	0.743463709	2.11	0.743463709	Weekday	85.37726372	0.743463709		0.743463709
2014/07/24 22:00	0.387655328	2014/07/24	24.91700231	22:00:29	00:08:04	0.387655328	2.11	0.387655328	Weekday	85.37726372	0.387655328		0.387655328
2014/07/24 22:15	0.178156083	2014/07/24	24.92775463	22:15:58	00:15:29	0.178156083	2.11	0.178156083	Weekday	85.37726372	0.178156083		0.178156083
2014/07/24 22:49	0.078376730	2014/07/24	24.95113426	22:49:38	00:33:40	0.07837673	2.11	0.07837673	Weekday	85.37726372	0.07837673		0.07837673
2014/07/25 00:06	0.056118472	2014/07/25	25.00430556	00:06:12	01:16:34	0.056118472	2.11	0.056118472	Weekday	32.10136415	0.056118472	0.056118472	
2014/07/25 01:53	0.039870995	2014/07/25	25.07855324	01:53:07	01:46:55	0.039870995	2.11	0.039870995	Weekday	32.10136415	0.039870995	0.039870995	
2014/07/25 04:23	0.121430450	2014/07/25	25.18305556	04:23:36	02:30:29	0.12143045	2.11	0.12143045	Weekday	32.10136415	0.12143045		0.12143045
2014/07/25 05:13	0.860050641	2014/07/25	25.21736111	05:13:00	00:49:24	0.860050641	2.11	0.860050641	Weekday	32.10136415	0.860050641		0.860050641
2014/07/25 05:19	1.152073724	2014/07/25	25.22221065	05:19:59	00:06:59	1.152073724	2.11	1.152073724	Weekday	32.10136415	1.152073724		1.152073724
2014/07/25 05:25	0.888274766	2014/07/25	25.22582176	05:25:11	00:05:12	0.888274766	2.11	0.888274766	Weekday	32.10136415	0.888274766		0.888274766
2014/07/25 05:31	1.535443134	2014/07/25	25.23052083	05:31:57	00:06:46	1.535443134	2.11	1.535443134	Weekday	32.10136415	1.535443134		1.535443134
2014/07/25 05:35	1.576458211	2014/07/25	25.23322917	05:35:51	00:03:54	1.576458211	2.11	1.576458211	Weekday	32.10136415	1.576458211		1.576458211
2014/07/25 05:39	1.226325103	2014/07/25	25.23587963	05:39:40	00:03:49	1.226325103	2.11	1.226325103	Weekday	32.10136415	1.226325103		1.226325103
2014/07/25 05:44	0.490851077	2014/07/25	25.23927083	05:44:33	00:04:53	0.490851077	2.11	0.490851077	Weekday	32.10136415	0.490851077		0.490851077
2014/07/25 05:56	1.064899713	2014/07/25	25.2477662	05:56:47	00:12:14	1.064899713	2.11	1.064899713	Weekday	32.10136415	1.064899713		1.064899713
2014/07/25 06:02	1.146642875	2014/07/25	25.25167824	06:02:25	00:05:38	1.146642875	2.11	1.146642875	Weekday	32.10136415	1.146642875		1.146642875
2014/07/25 06:07	1.309662388	2014/07/25	25.2553125	06:07:39	00:05:14	1.309662388	2.11	1.309662388	Weekday	32.10136415	1.309662388		1.309662388
2014/07/25 06:12	0.366434588	2014/07/25	25.2584838	06:12:13	00:04:34	0.366434588	2.11	0.366434588	Weekday	32.10136415	0.366434588		0.366434588
2014/07/25 06:28	0.824553360	2014/07/25	25.26986111	06:28:36	00:16:23	0.82455336	2.11	0.82455336	Weekday	32.10136415	0.82455336		0.82455336
2014/07/25 06:35	1.040462419	2014/07/25	25.27491898	06:35:53	00:07:17	1.040462419	2.11	1.040462419	Weekday	32.10136415	1.040462419		1.040462419
2014/07/25 06:41	2.160086386	2014/07/25	25.27892361	06:41:39	00:05:46	2.160086386	2.11	2.160086386	Weekday	32.10136415	2.160086386		2.160086386
2014/07/25 06:44	2.288038624	2014/07/25	25.28084491	06:44:25	00:02:46	2.288038624	2.11	2.288038624	Weekday	32.10136415	2.288038624		2.288038624
2014/07/25 06:47	2.012297357	2014/07/25	25.28267361	06:47:03	00:02:38	2.012297357	2.11	2.012297357	Weekday	32.10136415	2.012297357		2.012297357
2014/07/25 06:50	1.123244921	2014/07/25	25.2847338	06:50:01	00:02:58	1.123244921	2.11	1.123244921	Weekday	32.10136415	1.123244921		1.123244921
2014/07/25 06:55	1.686498628	2014/07/25	25.28844907	06:55:22	00:05:21	1.686498628	2.11	1.686498628	Weekday	32.10136415	1.686498628		1.686498628
2014/07/25 06:58	0.902934530	2014/07/25	25.29091435	06:58:55	00:03:33	0.90293453	2.11	0.90293453	Weekday	32.10136415	0.90293453		0.90293453
2014/07/25 07:05	0.617516891	2014/07/25	25.29553241	07:05:34	00:06:39	0.617516891	2.11	0.617516891	Weekday	32.10136415	0.617516891		0.617516891
2014/07/25 07:15	1.496632565	2014/07/25	25.30228009	07:15:17	00:09:43	1.496632565	2.11	1.496632565	Weekday	32.10136415	1.496632565		1.496632565
2014/07/25 07:19	1.225156538	2014/07/25	25.30506944	07:19:18	00:04:01	1.225156538	2.11	1.225156538	Weekday	32.10136415	1.225156538		1.225156538
2014/07/25 07:24	1.205949340	2014/07/25	25.30846065	07:24:11	00:04:53	1.20594934	2.11	1.20594934	Weekday	32.10136415	1.20594934		1.20594934
2014/07/25 07:29	1.388460341	2014/07/25	25.3119213	07:29:10	00:04:59	1.388460341	2.11	1.388460341	Weekday	32.10136415	1.388460341		1.388460341
2014/07/25 07:33	0.942161730	2014/07/25	25.31491898	07:33:29	00:04:19	0.94216173	2.11	0.94216173	Weekday	32.10136415	0.94216173		0.94216173
2014/07/25 07:39	1.036806627	2014/07/25	25.31934028	07:39:51	00:06:22	1.036806627	2.11	1.036806627	Weekday	32.10136415	1.036806627		1.036806627
2014/07/25 07:45	0.956276888	2014/07/25	25.32336806	07:45:39	00:05:48	0.956276888	2.11	0.956276888	Weekday	32.10136415	0.956276888		0.956276888
2014/07/25 07:51	1.226492222	2014/07/25	25.32771991	07:51:55	00:06:16	1.226492222	2.11	1.226492222	Weekday	32.10136415	1.226492222		1.226492222
2014/07/25 07:56	1.697472638	2014/07/25	25.33112269	07:56:49	00:04:54	1.697472638	2.11	1.697472638	Weekday	32.10136415	1.697472638		1.697472638
2014/07/25 08:00	1.496134973	2014/07/25	25.33357639	08:00:21	00:03:32	1.496134973	2.11	1.496134973	Weekday	32.10136415	1.496134973		1.496134973
2014/07/25 08:04	0.854619687	2014/07/25	25.33635417	08:04:21	00:04:00	0.854619687	2.11	0.854619687	Weekday	32.10136415	0.854619687		0.854619687
2014/07/25 08:11	1.045478298	2014/07/25	25.34122685	08:11:22	00:07:01	1.045478298	2.11	1.045478298	Weekday	32.10136415	1.045478298		1.045478298
2014/07/25 08:17	0.756048381	2014/07/25	25.34521991	08:17:07	00:05:45	0.756048381	2.11	0.756048381	Weekday	32.10136415	0.756048381		0.756048381
2014/07/25 08:25	0.975504003	2014/07/25	25.35072917	08:25:03	00:07:56	0.975504003	2.11	0.975504003	Weekday	32.10136415	0.975504003		0.975504003
2014/07/25 08:31	0.714087351	2014/07/25	25.355	08:31:12	00:06:09	0.714087351	2.11	0.714087351	Weekday	32.10136415	0.714087351		0.714087351
2014/07/25 08:39	0.923834934	2014/07/25	25.36083333	08:39:36	00:08:24	0.923834934	2.11	0.923834934	Weekday	32.10136415	0.923834934		0.923834934
2014/07/25 08:46	0.909182739	2014/07/25	25.36534722	08:46:06	00:06:30	0.909182739	2.11	0.909182739	Weekday	32.10136415	0.909182739		0.909182739
2014/07/25 08:52	0.809316121	2014/07/25	25.36993056	08:52:42	00:06:36	0.809316121	2.11	0.809316121	Weekday	32.10136415	0.809316121		0.809316121
2014/07/25 09:00	1.449275351	2014/07/25	25.37508102	09:00:07	00:07:25	1.449275351	2.11	1.449275351	Weekday	32.10136415	1.449275351		1.449275351
2014/07/25 09:04	2.034358031	2014/07/25	25.37795139	09:04:15	00:04:08	2.034358031	2.11	2.034358031	Weekday	32.10136415	2.034358031		2.034358031
2014/07/25 09:07	1.014370237	2014/07/25	25.38	09:07:12	00:02:57	1.014370237	2.11	1.014370237	Weekday	32.10136415	1.014370237		1.014370237
2014/07/25 09:13	1.444043310	2014/07/25	25.3841088	09:13:07	00:05:55	1.44404331	2.11	1.44404331	Weekday	32.10136415	1.44404331		1.44404331
2014/07/25 09:17	1.811411880	2014/07/25	25.38699074	09:17:16	00:04:09	1.81141188	2.11	1.81141188	Weekday	32.10136415	1.81141188		1.81141188
2014/07/25 09:20	2.153882955	2014/07/25	25.38929398	09:20:35	00:03:19	2.153882955	2.11	2.153882955	Weekday	32.10136415	2.153882955		2.153882955
2014/07/25 09:23	1.422137936	2014/07/25	25.39122685	09:23:22	00:02:47	1.422137936	2.11	1.422137936	Weekday	32.10136415	1.422137936		1.422137936
2014/07/25 09:27	0.929416009	2014/07/25	25.39415509	09:27:35	00:04:13	0.929416009	2.11	0.929416009	Weekday	32.10136415	0.929416009		0.929416009
2014/07/25 09:34	1.685551068	2014/07/25	25.39864583	09:34:03	00:06:28	1.685551068	2.11	1.685551068	Weekday	32.10136415	1.685551068		1.685551068
2014/07/25 09:37	0.653310099	2014/07/25	25.40111111	09:37:36	00:03:33	0.653310099	2.11	0.653310099	Weekday	32.10136415	0.653310099		0.653310099
2014/07/25 09:46	1.068312651	2014/07/25	25.40748843	09:46:47	00:09:11	1.068312651	2.11	1.068312651	Weekday	32.10136415	1.068312651		1.068312651
2014/07/25 09:52	2.088651643	2014/07/25	25.41138889	09:52:24	00:05:37	2.088651643	2.11	2.088651643	Weekday	32.10136415	2.088651643		2.088651643
2014/07/25 09:55	2.217021783	2014/07/25	25.41337963	09:55:16	00:02:52	2.217021783	2.11	2.217021783	Weekday	32.10136415	2.217021783		2.217021783
2014/07/25 09:57	1.372683586	2014/07/25	25.4152662	09:57:59	00:02:43	1.372683586	2.11	1.372683586	Weekday	32.10136415	1.372683586		1.372683586
2014/07/25 10:02	0.969618609	2014/07/25	25.41829861	10:02:21	00:04:22	0.969618609	2.11	0.969618609	Weekday	32.10136415	0.969618609		0.969618609
2014/07/25 10:08	1.827596696	2014/07/25	25.42259259	10:08:32	00:06:11	1.827596696	2.11	1.827596696	Weekday	32.10136415	1.827596696		1.827596696
2014/07/25 10:11	1.477226086	2014/07/25	25.42487269	10:11:49	00:03:17	1.477226086	2.11	1.477226086	Weekday	32.10136415	1.477226086		1.477226086
2014/07/25 10:15	1.837859900	2014/07/25	25.42769676	10:15:53	00:04:04	1.8378599	2.11	1.8378599	Weekday	32.10136415	1.8378599		1.8378599
2014/07/25 10:19	2.831078933	2014/07/25	25.42996528	10:19:09	00:03:16	2.831078933	2.11	2.831078933	Weekday	32.10136415	2.831078933		2.831078933
2014/07/25 10:21	1.956096485	2014/07/25	25.43143519	10:21:16	00:02:07	1.956096485	2.11	1.956096485	Weekday	32.10136415	1.956096485		1.956096485
2014/07/25 10:24	1.940700793	2014/07/25	25.43356481	10:24:20	00:03:04	1.940700793	2.11	1.940700793	Weekday	32.10136415	1.940700793		1.940700793
2014/07/25 10:27	1.132716623	2014/07/25	25.43571759	10:27:26	00:03:06	1.132716623	2.11	1.132716623	Weekday	32.10136415	1.132716623		1.132716623
2014/07/25 10:32	0.801175050	2014/07/25	25.43938657	10:32:43	00:05:17	0.80117505	2.11	0.80117505	Weekday	32.10136415	0.80117505		0.80117505
2014/07/25 10:40	0.472007339	2014/07/25	25.44459491	10:40:13	00:07:30	0.472007339	2.11	0.472007339	Weekday	32.10136415	0.472007339		0.472007339
2014/07/25 10:52	1.031459507	2014/07/25	25.45342593	10:52:56	00:12:43	1.031459507	2.11	1.031459507	Weekday	32.10136415	1.031459507		1.031459507
2014/07/25 10:58	1.746724877	2014/07/25	25.45746528	10:58:45	00:05:49	1.746724877	2.11	1.746724877	Weekday	32.10136415	1.746724877		1.746724877
2014/07/25 11:02	1.362294699	2014/07/25	25.45984954	11:02:11	00:03:26	1.362294699	2.11	1.362294699	Weekday	32.10136415	1.362294699		1.362294699
2014/07/25 11:06	0.894010125	2014/07/25	25.46290509	11:06:35	00:04:24	0.894010125	2.11	0.894010125	Weekday	32.10136415	0.894010125		0.894010125
2014/07/25 11:13	0.762711858	2014/07/25	25.46756944	11:13:18	00:06:43	0.762711858	2.11	0.762711858	Weekday	32.10136415	0.762711858		0.762711858
2014/07/25 11:21	1.141697314	2014/07/25	25.47303241	11:21:10	00:07:52	1.141697314	2.11	1.141697314	Weekday	32.10136415	1.141697314		1.141697314
2014/07/25 11:26	1.581027655	2014/07/25	25.47667824	11:26:25	00:05:15	1.581027655	2.11	1.581027655	Weekday	32.10136415	1.581027655		1.581027655
2014/07/25 11:30	1.628664482	2014/07/25	25.47931713	11:30:13	00:03:48	1.628664482	2.11	1.628664482	Weekday	32.10136415	1.628664482		1.628664482
2014/07/25 11:33	1.694117633	2014/07/25	25.481875	11:33:54	00:03:41	1.694117633	2.11	1.694117633	Weekday	32.10136415	1.694117633		1.694117633
2014/07/25 11:37	0.543724509	2014/07/25	25.4843287	11:37:26	00:03:32	0.543724509	2.11	0.543724509	Weekday	32.10136415	0.543724509		0.543724509
2014/07/25 11:48	0.887355181	2014/07/25	25.49199074	11:48:28	00:11:02	0.887355181	2.11	0.887355181	Weekday	32.10136415	0.887355181		0.887355181
2014/07/25 11:55	4.607115397	2014/07/25	25.49668981	11:55:14	00:06:46	4.607115397	2.11	4.607115397	Weekday	32.10136415	4.607115397		4.607115397
2014/07/25 11:56	4.834810598	2014/07/25	25.49759259	11:56:32	00:01:18	4.834810598	2.11	4.834810598	Weekday	32.10136415	4.834810598		4.834810598
2014/07/25 11:57	5.309734471	2014/07/25	25.49846065	11:57:47	00:01:15	5.309734471	2.11	5.309734471	Weekday	32.10136415	5.309734471		5.309734471
2014/07/25 11:58	5.533353783	2014/07/25	25.49923611	11:58:54	00:01:07	5.533353783	2.11	5.533353783	Weekday	32.10136415	5.533353783		5.533353783
2014/07/25 11:59	6.030150705	2014/07/25	25.49998843	11:59:59	00:01:05	6.030150705	2.11	6.030150705	Weekday	32.10136415	6.030150705		6.030150705
2014/07/25 12:00	6.081081032	2014/07/25	25.50068287	12:00:59	00:01:00	6.081081032	2.11	6.081081032	Weekday	32.10136415	6.081081032		6.081081032
2014/07/25 12:01	5.452893019	2014/07/25	25.50136574	12:01:58	00:00:59	5.452893019	2.11	5.452893019	Weekday	32.10136415	5.452893019		5.452893019
2014/07/25 12:03	5.424954749	2014/07/25	25.50212963	12:03:04	00:01:06	5.424954749	2.11	5.424954749	Weekday	32.10136415	5.424954749		5.424954749
2014/07/25 12:04	1.976718631	2014/07/25	25.50290509	12:04:11	00:01:07	1.976718631	2.11	1.976718631	Weekday	32.10136415	1.976718631		1.976718631
2014/07/25 12:07	0.519210795	2014/07/25	25.50501157	12:07:13	00:03:02	0.519210795	2.11	0.519210795	Weekday	32.10136415	0.519210795		0.519210795
2014/07/25 12:18	1.266891882	2014/07/25	25.51303241	12:18:46	00:11:33	1.266891882	2.11	1.266891882	Weekday	32.10136415	1.266891882		1.266891882
2014/07/25 12:23	1.956947147	2014/07/25	25.51631944	12:23:30	00:04:44	1.956947147	2.11	1.956947147	Weekday	32.10136415	1.956947147		1.956947147
2014/07/25 12:26	2.309468804	2014/07/25	25.51844907	12:26:34	00:03:04	2.309468804	2.11	2.309468804	Weekday	32.10136415	2.309468804		2.309468804
2014/07/25 12:29	1.872074868	2014/07/25	25.52025463	12:29:10	00:02:36	1.872074868	2.11	1.872074868	Weekday	32.10136415	1.872074868		1.872074868
2014/07/25 12:32	1.915504933	2014/07/25	25.52247685	12:32:22	00:03:12	1.915504933	2.11	1.915504933	Weekday	32.10136415	1.915504933		1.915504933
2014/07/25 12:35	2.318392563	2014/07/25	25.52465278	12:35:30	00:03:08	2.318392563	2.11	2.318392563	Weekday	32.10136415	2.318392563		2.318392563
2014/07/25 12:38	2.209673442	2014/07/25	25.52645833	12:38:06	00:02:36	2.209673442	2.11	2.209673442	Weekday	32.10136415	2.209673442		2.209673442
2014/07/25 12:40	1.412983739	2014/07/25	25.52834491	12:40:49	00:02:43	1.412983739	2.11	1.412983739	Weekday	32.10136415	1.412983739		1.412983739
2014/07/25 12:45	2.014549508	2014/07/25	25.53128472	12:45:03	00:04:14	2.014549508	2.11	2.014549508	Weekday	32.10136415	2.014549508		2.014549508
2014/07/25 12:48	2.074927937	2014/07/25	25.53335648	12:48:02	00:02:59	2.074927937	2.11	2.074927937	Weekday	32.10136415	2.074927937		2.074927937
2014/07/25 12:50	2.070393358	2014/07/25	25.53537037	12:50:56	00:02:54	2.070393358	2.11	2.070393358	Weekday	32.10136415	2.070393358		2.070393358
2014/07/25 12:53	1.863739890	2014/07/25	25.53737269	12:53:49	00:02:53	1.86373989	2.11	1.86373989	Weekday	32.10136415	1.86373989		1.86373989
2014/07/25 12:57	1.142712027	2014/07/25	25.53961806	12:57:03	00:03:14	1.142712027	2.11	1.142712027	Weekday	32.10136415	1.142712027		1.142712027
2014/07/25 13:02	1.251129482	2014/07/25	25.54326389	13:02:18	00:05:15	1.251129482	2.11	1.251129482	Weekday	32.10136415	1.251129482		1.251129482
2014/07/25 13:07	1.134501441	2014/07/25	25.54658565	13:07:05	00:04:47	1.134501441	2.11	1.134501441	Weekday	32.10136415	1.134501441		1.134501441
2014/07/25 13:12	0.497127703	2014/07/25	25.5502662	13:12:23	00:05:18	0.497127703	2.11	0.497127703	Weekday	32.10136415	0.497127703		0.497127703
2014/07/25 13:24	1.225239933	2014/07/25	25.55864583	13:24:27	00:12:04	1.225239933	2.11	1.225239933	Weekday	32.10136415	1.225239933		1.225239933
2014/07/25 13:29	0.517851488	2014/07/25	25.56204861	13:29:21	00:04:54	0.517851488	2.11	0.517851488	Weekday	32.10136415	0.517851488		0.517851488
2014/07/25 13:40	0.046630191	2014/07/25	25.57009259	13:40:56	00:11:35	0.046630191	2.11	0.046630191	Weekday	32.10136415	0.046630191		0.046630191
2014/07/25 15:49	0.652717839	2014/07/25	25.65944444	15:49:36	02:08:40	0.652717839	2.11	0.652717839	Weekday	32.10136415	0.652717839		0.652717839
2014/07/25 15:58	0.446174054	2014/07/25	25.66583333	15:58:48	00:09:12	0.446174054	2.11	0.446174054	Weekday	32.10136415	0.446174054		0.446174054
2014/07/25 16:12	0.568415065	2014/07/25	25.67517361	16:12:15	00:13:27	0.568415065	2.11	0.568415065	Weekday	32.10136415	0.568415065		0.568415065
2014/07/25 16:22	0.338651412	2014/07/25	25.6825	16:22:48	00:10:33	0.338651412	2.11	0.338651412	Weekday	32.10136415	0.338651412		0.338651412
2014/07/25 16:40	0.473522212	2014/07/25	25.69480324	16:40:31	00:17:43	0.473522212	2.11	0.473522212	Weekday	32.10136415	0.473522212		0.473522212
2014/07/25 16:53	0.622062478	2014/07/25	25.70359954	16:53:11	00:12:40	0.622062478	2.11	0.622062478	Weekday	32.10136415	0.622062478		0.622062478
2014/07/25 17:02	0.882136724	2014/07/25	25.71030093	17:02:50	00:09:39	0.882136724	2.11	0.882136724	Weekday	32.10136415	0.882136724		0.882136724
2014/07/25 17:09	0.957090437	2014/07/25	25.71502315	17:09:38	00:06:48	0.957090437	2.11	0.957090437	Weekday	32.10136415	0.957090437		0.957090437
2014/07/25 17:15	0.408283618	2014/07/25	25.719375	17:15:54	00:06:16	0.408283618	2.11	0.408283618	Weekday	32.10136415	0.408283618		0.408283618

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/25 17:30	0.401239381	2014/07/25	25.72958333	17:30:36	00:14:42	0.401239381	2.11	0.401239381	Weekday	32.10136415	0.401239381		0.401239381
2014/07/25 17:45	0.490877849	2014/07/25	25.73996528	17:45:33	00:14:57	0.490877849	2.11	0.490877849	Weekday	32.10136415	0.490877849		0.490877849
2014/07/25 17:57	0.873574368	2014/07/25	25.74846065	17:57:47	00:12:14	0.873574368	2.11	0.873574368	Weekday	32.10136415	0.873574368		0.873574368
2014/07/25 18:04	1.218274102	2014/07/25	25.75322917	18:04:39	00:06:52	1.218274102	2.11	1.218274102	Weekday	32.10136415	1.218274102		1.218274102
2014/07/25 18:09	0.821880273	2014/07/25	25.75664352	18:09:34	00:04:55	0.821880273	2.11	0.821880273	Weekday	32.10136415	0.821880273		0.821880273
2014/07/25 18:16	1.451847061	2014/07/25	25.76171296	18:16:52	00:07:18	1.451847061	2.11	1.451847061	Weekday	32.10136415	1.451847061		1.451847061
2014/07/25 18:21	1.108647441	2014/07/25	25.76458333	18:21:00	00:04:08	1.108647441	2.11	1.108647441	Weekday	32.10136415	1.108647441		1.108647441
2014/07/25 18:26	1.446247779	2014/07/25	25.76834491	18:26:25	00:05:25	1.446247779	2.11	1.446247779	Weekday	32.10136415	1.446247779		1.446247779
2014/07/25 18:30	1.073153273	2014/07/25	25.77122685	18:30:34	00:04:09	1.073153273	2.11	1.073153273	Weekday	32.10136415	1.073153273		1.073153273
2014/07/25 18:36	0.827814563	2014/07/25	25.7751041	18:36:09	00:05:35	0.827814563	2.11	0.827814563	Weekday	32.10136415	0.827814563		0.827814563
2014/07/25 18:43	0.301724858	2014/07/25	25.78013889	18:43:24	00:07:15	0.301724858	2.11	0.301724858	Weekday	32.10136415	0.301724858		0.301724858
2014/07/25 19:03	0.615868883	2014/07/25	25.79394676	19:03:17	00:19:53	0.615868883	2.11	0.615868883	Weekday	32.10136415	0.615868883		0.615868883
2014/07/25 19:13	0.500236219	2014/07/25	25.80071759	19:13:02	00:09:45	0.500236219	2.11	0.500236219	Weekday	32.10136415	0.500236219		0.500236219
2014/07/25 19:25	0.581188849	2014/07/25	25.80903935	19:25:01	00:11:59	0.581188849	2.11	0.581188849	Weekday	32.10136415	0.581188849		0.581188849
2014/07/25 19:35	1.065025730	2014/07/25	25.81621528	19:35:21	00:10:20	1.06502573	2.11	1.06502573	Weekday	32.10136415	1.06502573		1.06502573
2014/07/25 19:40	0.664991867	2014/07/25	25.82012731	19:40:59	00:05:38	0.664991867	2.11	0.664991867	Weekday	32.10136415	0.664991867		0.664991867
2014/07/25 19:50	0.471339911	2014/07/25	25.82638889	19:50:00	00:09:01	0.471339911	2.11	0.471339911	Weekday	32.10136415	0.471339911		0.471339911
2014/07/25 20:02	1.155995110	2014/07/25	25.83523148	20:02:44	00:12:44	1.15599511	2.11	1.15599511	Weekday	32.10136415	1.15599511		1.15599511
2014/07/25 20:07	0.364409350	2014/07/25	25.83883102	20:07:55	00:05:11	0.36440935	2.11	0.36440935	Weekday	32.10136415	0.36440935		0.36440935
2014/07/25 20:24	0.443688527	2014/07/25	25.8502662	20:24:23	00:16:28	0.443688527	2.11	0.443688527	Weekday	32.10136415	0.443688527		0.443688527
2014/07/25 20:37	0.307844912	2014/07/25	25.85966435	20:37:55	00:13:32	0.307844912	2.11	0.307844912	Weekday	32.10136415	0.307844912		0.307844912
2014/07/25 20:57	0.346981260	2014/07/25	25.87319444	20:57:24	00:19:29	0.34698126	2.11	0.34698126	Weekday	32.10136415	0.34698126		0.34698126
2014/07/25 21:14	0.311214078	2014/07/25	25.88520833	21:14:42	00:17:18	0.311214078	2.11	0.311214078	Weekday	32.10136415	0.311214078		0.311214078
2014/07/25 21:33	0.296652766	2014/07/25	25.89858796	21:33:58	00:19:16	0.296652766	2.11	0.296652766	Weekday	32.10136415	0.296652766		0.296652766
2014/07/25 21:54	0.579896903	2014/07/25	25.91263889	21:54:12	00:20:14	0.579896903	2.11	0.579896903	Weekday	32.10136415	0.579896903		0.579896903
2014/07/25 22:04	0.612244893	2014/07/25	25.91982639	22:04:33	00:10:21	0.612244893	2.11	0.612244893	Weekday	32.10136415	0.612244893		0.612244893
2014/07/25 22:14	0.397044223	2014/07/25	25.92663194	22:14:21	00:09:48	0.397044223	2.11	0.397044223	Weekday	32.10136415	0.397044223		0.397044223
2014/07/25 22:29	0.250163299	2014/07/25	25.93711806	22:29:27	00:15:06	0.250163299	2.11	0.250163299	Weekday	32.10136415	0.250163299		0.250163299
2014/07/25 22:53	0.299765182	2014/07/25	25.95378472	22:53:27	00:24:00	0.299765182	2.11	0.299765182	Weekday	32.10136415	0.299765182		0.299765182
2014/07/25 23:13	0.297653496	2014/07/25	25.96767361	23:13:27	00:20:00	0.297653496	2.11	0.297653496	Weekday	32.10136415	0.297653496	0.297653496	
2014/07/25 23:33	0.134362449	2014/07/25	25.98167824	23:33:37	00:20:10	0.134362449	2.11	0.134362449	Weekday	32.10136415	0.134362449	0.134362449	
2014/07/26 00:18	0.145592195	2014/07/26	26.01268519	00:18:16	00:44:39	0.145592195	2.11	0.145592195	Weekend	29.73036184	0.145592195	0.145592195	
2014/07/26 00:59	0.056003584	2014/07/26	26.04130787	00:59:29	00:41:13	0.056003584	2.11	0.056003584	Weekend	29.73036184	0.056003584	0.056003584	
2014/07/26 02:46	0.065245995	2014/07/26	26.11570602	02:46:37	01:47:08	0.065245995	2.11	0.065245995	Weekend	29.73036184	0.065245995	0.065245995	
2014/07/26 04:18	0.110293441	2014/07/26	26.17957176	04:18:35	01:31:58	0.110293441	2.11	0.110293441	Weekend	29.73036184	0.110293441		0.110293441
2014/07/26 05:12	0.192519545	2014/07/26	26.21734954	05:12:59	00:54:24	0.192519545	2.11	0.192519545	Weekend	29.73036184	0.192519545		0.192519545
2014/07/26 05:44	0.167518216	2014/07/26	26.23899306	05:44:09	00:31:10	0.167518216	2.11	0.167518216	Weekend	29.73036184	0.167518216		0.167518216
2014/07/26 06:19	0.354379538	2014/07/26	26.26386574	06:19:58	00:35:49	0.354379538	2.11	0.354379538	Weekend	29.73036184	0.354379538		0.354379538
2014/07/26 06:36	0.598165621	2014/07/26	26.27561343	06:36:53	00:16:55	0.598165621	2.11	0.598165621	Weekend	29.73036184	0.598165621		0.598165621
2014/07/26 06:46	2.034817981	2014/07/26	26.28258102	06:46:55	00:10:02	2.034817981	2.11	2.034817981	Weekend	29.73036184	2.034817981		2.034817981
2014/07/26 06:49	0.351727369	2014/07/26	26.28462963	06:49:52	00:02:57	0.351727369	2.11	0.351727369	Weekend	29.73036184	0.351727369		0.351727369
2014/07/26 07:06	0.584396606	2014/07/26	26.29648148	07:06:56	00:17:04	0.584396606	2.11	0.584396606	Weekend	29.73036184	0.584396606		0.584396606
2014/07/26 07:17	1.202163885	2014/07/26	26.30361111	07:17:12	00:10:16	1.202163885	2.11	1.202163885	Weekend	29.73036184	1.202163885		1.202163885
2014/07/26 07:22	1.594331254	2014/07/26	26.30707176	07:22:11	00:04:59	1.594331254	2.11	1.594331254	Weekend	29.73036184	1.594331254		1.594331254
2014/07/26 07:25	1.671774854	2014/07/26	26.3096875	07:25:57	00:03:46	1.671774854	2.11	1.671774854	Weekend	29.73036184	1.671774854		1.671774854
2014/07/26 07:29	1.588702547	2014/07/26	26.31217593	07:29:32	00:03:35	1.588702547	2.11	1.588702547	Weekend	29.73036184	1.588702547		1.588702547
2014/07/26 07:33	1.368717197	2014/07/26	26.31480324	07:33:19	00:03:47	1.368717197	2.11	1.368717197	Weekend	29.73036184	1.368717197		1.368717197
2014/07/26 07:37	1.720183472	2014/07/26	26.31784722	07:37:42	00:04:23	1.720183472	2.11	1.720183472	Weekend	29.73036184	1.720183472		1.720183472
2014/07/26 07:41	0.705135733	2014/07/26	26.3202662	07:41:11	00:03:29	0.705135733	2.11	0.705135733	Weekend	29.73036184	0.705135733		0.705135733
2014/07/26 07:49	0.738673664	2014/07/26	26.32618056	07:49:42	00:08:31	0.738673664	2.11	0.738673664	Weekend	29.73036184	0.738673664		0.738673664
2014/07/26 07:57	0.761840261	2014/07/26	26.33181713	07:57:49	00:08:07	0.761840261	2.11	0.761840261	Weekend	29.73036184	0.761840261		0.761840261
2014/07/26 08:05	1.711351954	2014/07/26	26.33729167	08:05:42	00:07:53	1.711351954	2.11	1.711351954	Weekend	29.73036184	1.711351954		1.711351954
2014/07/26 08:09	2.530933613	2014/07/26	26.33972222	08:09:12	00:03:30	2.530933613	2.11	2.530933613	Weekend	29.73036184	2.530933613		2.530933613
2014/07/26 08:11	2.360655719	2014/07/26	26.34136574	08:11:34	00:02:22	2.360655719	2.11	2.360655719	Weekend	29.73036184	2.360655719		2.360655719
2014/07/26 08:14	1.964422117	2014/07/26	26.34313657	08:14:07	00:02:33	1.964422117	2.11	1.964422117	Weekend	29.73036184	1.964422117		1.964422117
2014/07/26 08:17	1.585903071	2014/07/26	26.34525463	08:17:10	00:03:03	1.585903071	2.11	1.585903071	Weekend	29.73036184	1.585903071		1.585903071
2014/07/26 08:20	0.648134807	2014/07/26	26.34788194	08:20:57	00:03:47	0.648134807	2.11	0.648134807	Weekend	29.73036184	0.648134807		0.648134807
2014/07/26 08:30	0.762808826	2014/07/26	26.35431713	08:30:13	00:09:16	0.762808826	2.11	0.762808826	Weekend	29.73036184	0.762808826		0.762808826
2014/07/26 08:38	0.949467236	2014/07/26	26.35976852	08:38:04	00:07:51	0.949467236	2.11	0.949467236	Weekend	29.73036184	0.949467236		0.949467236
2014/07/26 08:44	1.110220185	2014/07/26	26.36416667	08:44:24	00:06:20	1.110220185	2.11	1.110220185	Weekend	29.73036184	1.110220185		1.110220185
2014/07/26 08:49	0.913937540	2014/07/26	26.36791667	08:49:48	00:05:24	0.91393754	2.11	0.91393754	Weekend	29.73036184	0.91393754		0.91393754
2014/07/26 08:56	0.897621296	2014/07/26	26.37247685	08:56:22	00:06:34	0.897621296	2.11	0.897621296	Weekend	29.73036184	0.897621296		0.897621296
2014/07/26 09:03	1.445667003	2014/07/26	26.37711806	09:03:03	00:06:41	1.445667003	2.11	1.445667003	Weekend	29.73036184	1.445667003		1.445667003
2014/07/26 09:07	1.056276032	2014/07/26	26.38	09:07:12	00:04:09	1.056276032	2.11	1.056276032	Weekend	29.73036184	1.056276032		1.056276032
2014/07/26 09:12	1.284063337	2014/07/26	26.38394676	09:12:53	00:05:41	1.284063337	2.11	1.284063337	Weekend	29.73036184	1.284063337		1.284063337
2014/07/26 09:17	1.760563366	2014/07/26	26.3871875	09:17:33	00:04:40	1.760563366	2.11	1.760563366	Weekend	29.73036184	1.760563366		1.760563366
2014/07/26 09:20	1.325576247	2014/07/26	26.38956019	09:20:58	00:03:25	1.325576247	2.11	1.325576247	Weekend	29.73036184	1.325576247		1.325576247
2014/07/26 09:25	2.098391217	2014/07/26	26.39269676	09:25:29	00:04:31	2.098391217	2.11	2.098391217	Weekend	29.73036184	2.098391217		2.098391217
2014/07/26 09:28	1.842563195	2014/07/26	26.3946875	09:28:21	00:02:52	1.842563195	2.11	1.842563195	Weekend	29.73036184	1.842563195		1.842563195
2014/07/26 09:31	2.182082659	2014/07/26	26.39694444	09:31:36	00:03:15	2.182082659	2.11	2.182082659	Weekend	29.73036184	2.182082659		2.182082659
2014/07/26 09:34	1.741991663	2014/07/26	26.39885417	09:34:21	00:02:45	1.741991663	2.11	1.741991663	Weekend	29.73036184	1.741991663		1.741991663
2014/07/26 09:37	1.330770358	2014/07/26	26.40125	09:37:48	00:03:27	1.330770358	2.11	1.330770358	Weekend	29.73036184	1.330770358		1.330770358
2014/07/26 09:42	2.098391217	2014/07/26	26.404375	09:42:18	00:04:30	2.098391217	2.11	2.098391217	Weekend	29.73036184	2.098391217		2.098391217
2014/07/26 09:45	1.477711178	2014/07/26	26.40636574	09:45:10	00:02:52	1.477711178	2.11	1.477711178	Weekend	29.73036184	1.477711178		1.477711178
2014/07/26 09:49	1.196569824	2014/07/26	26.40917824	09:49:13	00:04:03	1.196569824	2.11	1.196569824	Weekend	29.73036184	1.196569824		1.196569824
2014/07/26 09:54	1.705837742	2014/07/26	26.41266204	09:54:14	00:05:01	1.705837742	2.11	1.705837742	Weekend	29.73036184	1.705837742		1.705837742
2014/07/26 09:57	1.509687147	2014/07/26	26.41510417	09:57:45	00:03:31	1.509687147	2.11	1.509687147	Weekend	29.73036184	1.509687147		1.509687147
2014/07/26 10:01	1.563450000	2014/07/26	26.41787037	10:01:44	00:03:59	1.56345	2.11	1.56345	Weekend	29.73036184	1.56345		1.56345
2014/07/26 10:05	1.779007695	2014/07/26	26.42053241	10:05:34	00:03:50	1.779007695	2.11	1.779007695	Weekend	29.73036184	1.779007695		1.779007695
2014/07/26 10:08	2.278480994	2014/07/26	26.42287037	10:08:56	00:03:22	2.278480994	2.11	2.278480994	Weekend	29.73036184	2.278480994		2.278480994
2014/07/26 10:11	1.634135257	2014/07/26	26.42469907	10:11:34	00:02:38	1.634135257	2.11	1.634135257	Weekend	29.73036184	1.634135257		1.634135257
2014/07/26 10:15	1.803245828	2014/07/26	26.42725694	10:15:15	00:03:41	1.803245828	2.11	1.803245828	Weekend	29.73036184	1.803245828		1.803245828
2014/07/26 10:18	1.328413273	2014/07/26	26.42956019	10:18:34	00:03:19	1.328413273	2.11	1.328413273	Weekend	29.73036184	1.328413273		1.328413273
2014/07/26 10:23	0.961949543	2014/07/26	26.43269676	10:23:05	00:04:31	0.961949543	2.11	0.961949543	Weekend	29.73036184	0.961949543		0.961949543
2014/07/26 10:29	1.915504933	2014/07/26	26.43703704	10:29:20	00:06:15	1.915504933	2.11	1.915504933	Weekend	29.73036184	1.915504933		1.915504933
2014/07/26 10:32	2.682563317	2014/07/26	26.43920139	10:32:27	00:03:07	2.682563317	2.11	2.682563317	Weekend	29.73036184	2.682563317		2.682563317
2014/07/26 10:34	2.262443421	2014/07/26	26.44076389	10:34:42	00:02:15	2.262443421	2.11	2.262443421	Weekend	29.73036184	2.262443421		2.262443421
2014/07/26 10:37	1.325673874	2014/07/26	26.44260417	10:37:21	00:02:39	1.325673874	2.11	1.325673874	Weekend	29.73036184	1.325673874		1.325673874
2014/07/26 10:41	1.245071582	2014/07/26	26.44574074	10:41:52	00:04:31	1.245071582	2.11	1.245071582	Weekend	29.73036184	1.245071582		1.245071582
2014/07/26 10:46	1.903754612	2014/07/26	26.44909722	10:46:42	00:04:50	1.903754612	2.11	1.903754612	Weekend	29.73036184	1.903754612		1.903754612
2014/07/26 10:49	1.848239024	2014/07/26	26.45128472	10:49:51	00:03:09	1.848239024	2.11	1.848239024	Weekend	29.73036184	1.848239024		1.848239024
2014/07/26 10:53	1.803245828	2014/07/26	26.45353009	10:53:05	00:03:14	1.803245828	2.11	1.803245828	Weekend	29.73036184	1.803245828		1.803245828
2014/07/26 10:56	1.839550317	2014/07/26	26.45584491	10:56:25	00:03:20	1.839550317	2.11	1.839550317	Weekend	29.73036184	1.839550317		1.839550317
2014/07/26 10:59	1.514896470	2014/07/26	26.45811343	10:59:41	00:03:16	1.51489647	2.11	1.51489647	Weekend	29.73036184	1.51489647		1.51489647
2014/07/26 11:03	1.796048678	2014/07/26	26.46085648	11:03:38	00:03:57	1.796048678	2.11	1.796048678	Weekend	29.73036184	1.796048678		1.796048678
2014/07/26 11:06	1.312527334	2014/07/26	26.46318287	11:06:59	00:03:21	1.312527334	2.11	1.312527334	Weekend	29.73036184	1.312527334		1.312527334
2014/07/26 11:11	2.618943672	2014/07/26	26.46635417	11:11:33	00:04:34	2.618943672	2.11	2.618943672	Weekend	29.73036184	2.618943672		2.618943672
2014/07/26 11:13	2.202912723	2014/07/26	26.46795139	11:13:51	00:02:18	2.202912723	2.11	2.202912723	Weekend	29.73036184	2.202912723		2.202912723
2014/07/26 11:16	1.428344696	2014/07/26	26.46983796	11:16:34	00:02:43	1.428344696	2.11	1.428344696	Weekend	29.73036184	1.428344696		1.428344696
2014/07/26 11:20	1.639045698	2014/07/26	26.47275463	11:20:46	00:04:12	1.639045698	2.11	1.639045698	Weekend	29.73036184	1.639045698		1.639045698
2014/07/26 11:24	0.899685103	2014/07/26	26.47530093	11:24:26	00:03:40	0.899685103	2.11	0.899685103	Weekend	29.73036184	0.899685103		0.899685103
2014/07/26 11:31	0.894810094	2014/07/26	26.47993056	11:31:06	00:06:40	0.894810094	2.11	0.894810094	Weekend	29.73036184	0.894810094		0.894810094
2014/07/26 11:37	1.196092754	2014/07/26	26.48458333	11:37:48	00:06:42	1.196092754	2.11	1.196092754	Weekend	29.73036184	1.196092754		1.196092754
2014/07/26 11:42	0.943940419	2014/07/26	26.48806713	11:42:49	00:05:01	0.943940419	2.11	0.943940419	Weekend	29.73036184	0.943940419		0.943940419
2014/07/26 11:49	1.049991242	2014/07/26	26.49247685	11:49:10	00:06:21	1.049991242	2.11	1.049991242	Weekend	29.73036184	1.049991242		1.049991242
2014/07/26 11:54	5.096262700	2014/07/26	26.49644676	11:54:53	00:05:43	5.0962627	2.11	5.0962627	Weekend	29.73036184	5.0962627		5.0962627
2014/07/26 11:56	4.664420797	2014/07/26	26.49726852	11:56:04	00:01:11	4.664420797	2.11	4.664420797	Weekend	29.73036184	4.664420797		4.664420797
2014/07/26 11:57	3.928415508	2014/07/26	26.49815972	11:57:21	00:01:17	3.928415508	2.11	3.928415508	Weekend	29.73036184	3.928415508		3.928415508
2014/07/26 11:58	3.183586816	2014/07/26	26.49922454	11:58:53	00:01:32	3.183586816	2.11	3.183586816	Weekend	29.73036184	3.183586816		3.183586816
2014/07/26 12:00	3.388554190	2014/07/26	26.50053241	12:00:46	00:01:53	3.38855419	2.11	3.38855419	Weekend	29.73036184	3.38855419		3.38855419
2014/07/26 12:02	3.493110781	2014/07/26	26.50175926	12:02:32	00:01:46	3.493110781	2.11	3.493110781	Weekend	29.73036184	3.493110781		3.493110781
2014/07/26 12:04	0.845546780	2014/07/26	26.50295139	12:04:15	00:01:43	0.84554678	2.11	0.84554678	Weekend	29.73036184	0.84554678		0.84554678
2014/07/26 12:11	1.572739175	2014/07/26	26.50788194	12:11:21	00:07:06	1.572739175	2.11	1.572739175	Weekend	29.73036184	1.572739175		1.572739175
2014/07/26 12:15	1.005698953	2014/07/26	26.51053241	12:15:10	00:03:49	1.005698953	2.11	1.005698953	Weekend	29.73036184	1.005698953		1.005698953
2014/07/26 12:21	0.832793553	2014/07/26	26.51467593	12:21:08	00:05:58	0.832793553	2.11	0.832793553	Weekend	29.73036184	0.832793553		0.832793553
2014/07/26 12:28	0.844792784	2014/07/26	26.51967593	12:28:20	00:07:12	0.844792784	2.11	0.844792784	Weekend	29.73036184	0.844792784		0.844792784
2014/07/26 12:35	1.708590399	2014/07/26	26.52460648	12:35:26	00:07:06	1.708590399	2.11	1.708590399	Weekend	29.73036184	1.708590399		1.708590399
2014/07/26 12:38	1.630582467	2014/07/26	26.52704861	12:38:57	00:03:31	1.630582467	2.11	1.630582467	Weekend	29.73036184	1.630582467		1.630582467
2014/07/26 12:42	2.034358031	2014/07/26	26.52960648	12:42:38	00:03:41	2.034358031	2.11	2.034358031	Weekend	29.73036184	2.034358031		2.034358031
2014/07/26 12:45	1.999111490	2014/07/26	26.53165509	12:45:35	00:02:57	1.99911149	2.11	1.99911149	Weekend	29.73036184	1.99911149		1.99911149
2014/07/26 12:48	2.414810821	2014/07/26	26.53373843	12:48:35	00:03:00	2.414810821	2.11	2.414810821	Weekend	29.73036184	2.414810821		2.414810821
2014/07/26 12:51	1.015686709	2014/07/26	26.53546296	12:51:04	00:02:29	1.015686709	2.11	1.015686709	Weekend	29.73036184	1.015686709		1.015686709
2014/07/26 12:56	0.745928468	2014/07/26	26.53956019	12:56:58	00:05:54	0.745928468	2.11	0.745928468	Weekend	29.73036184	0.745928468		0.745928468
2014/07/26 13:05	0.683111949	2014/07/26	26.54515046	13:05:01	00:08:03	0.683111949	2.11	0.683111949	Weekend	29.73036184	0.683111949		0.683111949
2014/07/26 13:13	1.412540207	2014/07/26	26.55125	13:13:48	00:08:47	1.412540207	2.11	1.412540207	Weekend	29.73036184	1.412540207		1.412540207

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/26 13:18	1.689030671	2014/07/26	26.55420139	13:18:03	00:04:15	1.689030671	2.11	1.689030671	Weekend	29.73036184	1.689030671		1.689030671
2014/07/26 13:21	2.050113879	2014/07/26	26.55666667	13:21:36	00:03:33	2.050113879	2.11	2.050113879	Weekend	29.73036184	2.050113879		2.050113879
2014/07/26 13:24	0.928457206	2014/07/26	26.55869213	13:24:31	00:02:55	0.928457206	2.11	0.928457206	Weekend	29.73036184	0.928457206		0.928457206
2014/07/26 13:30	0.408524542	2014/07/26	26.56318287	13:30:59	00:06:28	0.408524542	2.11	0.408524542	Weekend	29.73036184	0.408524542		0.408524542
2014/07/26 13:45	0.451773206	2014/07/26	26.57337963	13:45:40	00:14:41	0.451773206	2.11	0.451773206	Weekend	29.73036184	0.451773206		0.451773206
2014/07/26 13:58	0.551352340	2014/07/26	26.58260417	13:58:57	00:13:17	0.55135234	2.11	0.55135234	Weekend	29.73036184	0.55135234		0.55135234
2014/07/26 14:09	0.597569878	2014/07/26	26.59016204	14:09:50	00:10:53	0.597569878	2.11	0.597569878	Weekend	29.73036184	0.597569878		0.597569878
2014/07/26 14:19	0.619344178	2014/07/26	26.5971412	14:19:53	00:10:03	0.619344178	2.11	0.619344178	Weekend	29.73036184	0.619344178		0.619344178
2014/07/26 14:29	0.861738790	2014/07/26	26.60386574	14:29:34	00:09:41	0.86173879	2.11	0.86173879	Weekend	29.73036184	0.86173879		0.86173879
2014/07/26 14:36	1.101186826	2014/07/26	26.6087037	14:36:32	00:06:58	1.101186826	2.11	1.101186826	Weekend	29.73036184	1.101186826		1.101186826
2014/07/26 14:41	0.491279780	2014/07/26	26.61248843	14:41:59	00:05:27	0.49127978	2.11	0.49127978	Weekend	29.73036184	0.49127978		0.49127978
2014/07/26 14:54	0.475863159	2014/07/26	26.62096065	14:54:11	00:12:12	0.475863159	2.11	0.475863159	Weekend	29.73036184	0.475863159		0.475863159
2014/07/26 15:06	0.222802607	2014/07/26	26.62972222	15:06:48	00:12:37	0.222802607	2.11	0.222802607	Weekend	29.73036184	0.222802607		0.222802607
2014/07/26 15:33	0.436268447	2014/07/26	26.64842593	15:33:44	00:26:56	0.436268447	2.11	0.436268447	Weekend	29.73036184	0.436268447		0.436268447
2014/07/26 15:47	0.798792929	2014/07/26	26.65797454	15:47:29	00:13:45	0.798792929	2.11	0.798792929	Weekend	29.73036184	0.798792929		0.798792929
2014/07/26 15:55	0.476505622	2014/07/26	26.66319444	15:55:00	00:07:31	0.476505622	2.11	0.476505622	Weekend	29.73036184	0.476505622		0.476505622
2014/07/26 16:07	0.450022498	2014/07/26	26.67193287	16:07:35	00:12:35	0.450022498	2.11	0.450022498	Weekend	29.73036184	0.450022498		0.450022498
2014/07/26 16:20	1.023832538	2014/07/26	26.68119213	16:20:55	00:13:20	1.023832538	2.11	1.023832538	Weekend	29.73036184	1.023832538		1.023832538
2014/07/26 16:26	0.691297329	2014/07/26	26.6852662	16:26:47	00:05:52	0.691297329	2.11	0.691297329	Weekend	29.73036184	0.691297329		0.691297329
2014/07/26 16:35	0.967689901	2014/07/26	26.69128472	16:35:27	00:08:40	0.967689901	2.11	0.967689901	Weekend	29.73036184	0.967689901		0.967689901
2014/07/26 16:41	0.347403159	2014/07/26	26.69559028	16:41:39	00:06:12	0.347403159	2.11	0.347403159	Weekend	29.73036184	0.347403159		0.347403159
2014/07/26 16:58	0.686027893	2014/07/26	26.70759259	16:58:56	00:17:17	0.686027893	2.11	0.686027893	Weekend	29.73036184	0.686027893		0.686027893
2014/07/26 17:07	0.868097413	2014/07/26	26.71365741	17:07:40	00:08:44	0.868097413	2.11	0.868097413	Weekend	29.73036184	0.868097413		0.868097413
2014/07/26 17:14	1.146058822	2014/07/26	26.71846065	17:14:35	00:06:55	1.146058822	2.11	1.146058822	Weekend	29.73036184	1.146058822		1.146058822
2014/07/26 17:19	1.041847535	2014/07/26	26.72209491	17:19:49	00:05:14	1.041847535	2.11	1.041847535	Weekend	29.73036184	1.041847535		1.041847535
2014/07/26 17:25	0.925212020	2014/07/26	26.72609954	17:25:35	00:05:46	0.92521202	2.11	0.92521202	Weekend	29.73036184	0.92521202		0.92521202
2014/07/26 17:32	1.367573306	2014/07/26	26.73060185	17:32:04	00:06:29	1.367573306	2.11	1.367573306	Weekend	29.73036184	1.367573306		1.367573306
2014/07/26 17:36	1.511969748	2014/07/26	26.73364583	17:36:27	00:04:23	1.511969748	2.11	1.511969748	Weekend	29.73036184	1.511969748		1.511969748
2014/07/26 17:40	1.810500891	2014/07/26	26.73640046	17:40:25	00:03:58	1.810500891	2.11	1.810500891	Weekend	29.73036184	1.810500891		1.810500891
2014/07/26 17:43	1.842563195	2014/07/26	26.7387037	17:43:44	00:03:19	1.842563195	2.11	1.842563195	Weekend	29.73036184	1.842563195		1.842563195
2014/07/26 17:46	1.350033740	2014/07/26	26.74096065	17:46:59	00:03:15	1.35003374	2.11	1.35003374	Weekend	29.73036184	1.35003374		1.35003374
2014/07/26 17:51	1.194029841	2014/07/26	26.74405093	17:51:26	00:04:27	1.194029841	2.11	1.194029841	Weekend	29.73036184	1.194029841		1.194029841
2014/07/26 17:56	1.126055668	2014/07/26	26.7475463	17:56:28	00:05:02	1.126055668	2.11	1.126055668	Weekend	29.73036184	1.126055668		1.126055668
2014/07/26 18:01	1.221664168	2014/07/26	26.75123843	18:01:47	00:05:19	1.221664168	2.11	1.221664168	Weekend	29.73036184	1.221664168		1.221664168
2014/07/26 18:06	1.327825307	2014/07/26	26.75465278	18:06:42	00:04:55	1.327825307	2.11	1.327825307	Weekend	29.73036184	1.327825307		1.327825307
2014/07/26 18:11	0.954350239	2014/07/26	26.75778935	18:11:13	00:04:31	0.954350239	2.11	0.954350239	Weekend	29.73036184	0.954350239		0.954350239
2014/07/26 18:17	1.269662119	2014/07/26	26.76215278	18:17:30	00:06:17	1.269662119	2.11	1.269662119	Weekend	29.73036184	1.269662119		1.269662119
2014/07/26 18:22	1.260327675	2014/07/26	26.76543981	18:22:14	00:04:44	1.260327675	2.11	1.260327675	Weekend	29.73036184	1.260327675		1.260327675
2014/07/26 18:27	0.641276848	2014/07/26	26.76875	18:27:00	00:04:46	0.641276848	2.11	0.641276848	Weekend	29.73036184	0.641276848		0.641276848
2014/07/26 18:36	0.546414907	2014/07/26	26.77524306	18:36:21	00:09:21	0.546414907	2.11	0.546414907	Weekend	29.73036184	0.546414907		0.546414907
2014/07/26 18:47	0.753043545	2014/07/26	26.78287037	18:47:20	00:10:59	0.753043545	2.11	0.753043545	Weekend	29.73036184	0.753043545		0.753043545
2014/07/26 18:55	1.405481366	2014/07/26	26.78840278	18:55:18	00:07:58	1.405481366	2.11	1.405481366	Weekend	29.73036184	1.405481366		1.405481366
2014/07/26 18:59	0.710143207	2014/07/26	26.79136574	18:59:34	00:04:16	0.710143207	2.11	0.710143207	Weekend	29.73036184	0.710143207		0.710143207
2014/07/26 19:08	0.376584791	2014/07/26	26.7972338	19:08:01	00:08:27	0.376584791	2.11	0.376584791	Weekend	29.73036184	0.376584791		0.376584791
2014/07/26 19:23	0.319182889	2014/07/26	26.80829861	19:23:57	00:15:56	0.319182889	2.11	0.319182889	Weekend	29.73036184	0.319182889		0.319182889
2014/07/26 19:42	0.487289852	2014/07/26	26.82135417	19:42:45	00:18:48	0.487289852	2.11	0.487289852	Weekend	29.73036184	0.487289852		0.487289852
2014/07/26 19:55	0.556500227	2014/07/26	26.82989583	19:55:03	00:12:18	0.556500227	2.11	0.556500227	Weekend	29.73036184	0.556500227		0.556500227
2014/07/26 20:05	0.580439194	2014/07/26	26.83738426	20:05:50	00:10:47	0.580439194	2.11	0.580439194	Weekend	29.73036184	0.580439194		0.580439194
2014/07/26 20:16	1.365912874	2014/07/26	26.84457176	20:16:11	00:10:21	1.365912874	2.11	1.365912874	Weekend	29.73036184	1.365912874		1.365912874
2014/07/26 20:20	0.584131100	2014/07/26	26.84761574	20:20:34	00:04:23	0.5841311	2.11	0.5841311	Weekend	29.73036184	0.5841311		0.5841311
2014/07/26 20:30	0.451761868	2014/07/26	26.85474537	20:30:50	00:10:16	0.451761868	2.11	0.451761868	Weekend	29.73036184	0.451761868		0.451761868
2014/07/26 20:44	0.388726916	2014/07/26	26.86396991	20:44:07	00:13:17	0.388726916	2.11	0.388726916	Weekend	29.73036184	0.388726916		0.388726916
2014/07/26 20:59	0.355801539	2014/07/26	26.8746875	20:59:33	00:15:26	0.355801539	2.11	0.355801539	Weekend	29.73036184	0.355801539		0.355801539
2014/07/26 21:16	0.439453121	2014/07/26	26.88640046	21:16:25	00:16:52	0.439453121	2.11	0.439453121	Weekend	29.73036184	0.439453121		0.439453121
2014/07/26 21:30	0.291866647	2014/07/26	26.89587963	21:30:04	00:13:39	0.291866647	2.11	0.291866647	Weekend	29.73036184	0.291866647		0.291866647
2014/07/26 21:50	0.295619896	2014/07/26	26.91016204	21:50:38	00:20:34	0.295619896	2.11	0.295619896	Weekend	29.73036184	0.295619896		0.295619896
2014/07/26 22:10	0.408830741	2014/07/26	26.92425926	22:10:56	00:20:18	0.408830741	2.11	0.408830741	Weekend	29.73036184	0.408830741		0.408830741
2014/07/26 22:25	0.274511596	2014/07/26	26.93444444	22:25:36	00:14:40	0.274511596	2.11	0.274511596	Weekend	29.73036184	0.274511596		0.274511596
2014/07/26 22:47	0.139748297	2014/07/26	26.94962963	22:47:28	00:21:52	0.139748297	2.11	0.139748297	Weekend	29.73036184	0.139748297		0.139748297
2014/07/26 23:30	0.367264489	2014/07/26	26.97944444	23:30:24	00:42:56	0.367264489	2.11	0.367264489	Weekend	29.73036184	0.367264489	0.367264489	
2014/07/26 23:46	0.047559409	2014/07/26	26.99078704	23:46:44	00:16:20	0.047559409	2.11	0.047559409	Weekend	29.73036184	0.047559409	0.047559409	
2014/07/27 01:52	0.133010167	2014/07/27	27.0783912	01:52:53	02:06:09	0.133010167	2.11	0.133010167	Weekend	41.9366203	0.133010167	0.133010167	
2014/07/27 02:38	0.052478746	2014/07/27	27.10972222	02:38:00	00:45:07	0.052478746	2.11	0.052478746	Weekend	41.9366203	0.052478746	0.052478746	
2014/07/27 04:32	0.178606865	2014/07/27	27.18912037	04:32:20	01:54:20	0.178606865	2.11	0.178606865	Weekend	41.9366203	0.178606865		0.178606865
2014/07/27 05:05	0.077098690	2014/07/27	27.21244213	05:05:55	00:33:35	0.07709869	2.11	0.07709869	Weekend	41.9366203	0.07709869		0.07709869
2014/07/27 06:23	0.633512824	2014/07/27	27.26649306	06:23:45	01:17:50	0.633512824	2.11	0.633512824	Weekend	41.9366203	0.633512824		0.633512824
2014/07/27 06:33	0.706242392	2014/07/27	27.27306713	06:33:13	00:09:28	0.706242392	2.11	0.706242392	Weekend	41.9366203	0.706242392		0.706242392
2014/07/27 06:41	0.490009252	2014/07/27	27.27896991	06:41:43	00:08:30	0.490009252	2.11	0.490009252	Weekend	41.9366203	0.490009252		0.490009252
2014/07/27 06:53	0.828462275	2014/07/27	27.28747685	06:53:58	00:12:15	0.828462275	2.11	0.828462275	Weekend	41.9366203	0.828462275		0.828462275
2014/07/27 07:01	0.399042295	2014/07/27	27.2925	07:01:12	00:07:14	0.399042295	2.11	0.399042295	Weekend	41.9366203	0.399042295		0.399042295
2014/07/27 07:16	0.839669723	2014/07/27	27.30293981	07:16:14	00:15:02	0.839669723	2.11	0.839669723	Weekend	41.9366203	0.839669723		0.839669723
2014/07/27 07:23	1.011065543	2014/07/27	27.30790509	07:23:23	00:07:09	1.011065543	2.11	1.011065543	Weekend	41.9366203	1.011065543		1.011065543
2014/07/27 07:29	0.822556316	2014/07/27	27.31202546	07:29:19	00:05:56	0.822556316	2.11	0.822556316	Weekend	41.9366203	0.822556316		0.822556316
2014/07/27 07:36	1.216216206	2014/07/27	27.31709491	07:36:37	00:07:18	1.216216206	2.11	1.216216206	Weekend	41.9366203	1.216216206		1.216216206
2014/07/27 07:41	0.761453524	2014/07/27	27.32052083	07:41:33	00:04:56	0.761453524	2.11	0.761453524	Weekend	41.9366203	0.761453524		0.761453524
2014/07/27 07:49	0.548646667	2014/07/27	27.3259838	07:49:25	00:07:52	0.548646667	2.11	0.548646667	Weekend	41.9366203	0.548646667		0.548646667
2014/07/27 08:00	0.778412033	2014/07/27	27.33358796	08:00:22	00:10:57	0.778412033	2.11	0.778412033	Weekend	41.9366203	0.778412033		0.778412033
2014/07/27 08:08	0.567859166	2014/07/27	27.33893519	08:08:04	00:07:42	0.567859166	2.11	0.567859166	Weekend	41.9366203	0.567859166		0.567859166
2014/07/27 08:18	1.315981858	2014/07/27	27.34627315	08:18:38	00:10:34	1.315981858	2.11	1.315981858	Weekend	41.9366203	1.315981858		1.315981858
2014/07/27 08:23	1.746555391	2014/07/27	27.34944444	08:23:12	00:04:34	1.746555391	2.11	1.746555391	Weekend	41.9366203	1.746555391		1.746555391
2014/07/27 08:26	0.788367198	2014/07/27	27.3518287	08:26:38	00:03:26	0.788367198	2.11	0.788367198	Weekend	41.9366203	0.788367198		0.788367198
2014/07/27 08:34	0.993048651	2014/07/27	27.35710648	08:34:14	00:07:36	0.993048651	2.11	0.993048651	Weekend	41.9366203	0.993048651		0.993048651
2014/07/27 08:40	1.237283465	2014/07/27	27.36130787	08:40:17	00:06:03	1.237283465	2.11	1.237283465	Weekend	41.9366203	1.237283465		1.237283465
2014/07/27 08:45	0.806270990	2014/07/27	27.36467593	08:45:08	00:04:51	0.80627099	2.11	0.80627099	Weekend	41.9366203	0.80627099		0.80627099
2014/07/27 08:52	1.681771452	2014/07/27	27.36983796	08:52:34	00:07:26	1.681771452	2.11	1.681771452	Weekend	41.9366203	1.681771452		1.681771452
2014/07/27 08:56	1.217697190	2014/07/27	27.37231481	08:56:08	00:03:34	1.21769719	2.11	1.21769719	Weekend	41.9366203	1.21769719		1.21769719
2014/07/27 09:01	1.373940910	2014/07/27	27.37574074	09:01:04	00:04:56	1.37394091	2.11	1.37394091	Weekend	41.9366203	1.37394091		1.37394091
2014/07/27 09:05	1.103752751	2014/07/27	27.37877315	09:05:26	00:04:22	1.103752751	2.11	1.103752751	Weekend	41.9366203	1.103752751		1.103752751
2014/07/27 09:10	2.063273711	2014/07/27	27.3825463	09:10:52	00:05:26	2.063273711	2.11	2.063273711	Weekend	41.9366203	2.063273711		2.063273711
2014/07/27 09:13	2.428822002	2014/07/27	27.38457176	09:13:47	00:02:55	2.428822002	2.11	2.428822002	Weekend	41.9366203	2.428822002		2.428822002
2014/07/27 09:16	2.086956505	2014/07/27	27.38628472	09:16:15	00:02:28	2.086956505	2.11	2.086956505	Weekend	41.9366203	2.086956505		2.086956505
2014/07/27 09:19	2.118893450	2014/07/27	27.38827546	09:19:07	00:02:52	2.11889345	2.11	2.11889345	Weekend	41.9366203	2.11889345		2.11889345
2014/07/27 09:21	1.384083034	2014/07/27	27.39024306	09:21:57	00:02:50	1.384083034	2.11	1.384083034	Weekend	41.9366203	1.384083034		1.384083034
2014/07/27 09:26	0.903478385	2014/07/27	27.39325231	09:26:17	00:04:20	0.903478385	2.11	0.903478385	Weekend	41.9366203	0.903478385		0.903478385
2014/07/27 09:32	1.549586764	2014/07/27	27.39787037	09:32:56	00:06:39	1.549586764	2.11	1.549586764	Weekend	41.9366203	1.549586764		1.549586764
2014/07/27 09:36	2.328288689	2014/07/27	27.40055556	09:36:48	00:03:52	2.328288689	2.11	2.328288689	Weekend	41.9366203	2.328288689		2.328288689
2014/07/27 09:39	2.295332805	2014/07/27	27.40234954	09:39:23	00:02:35	2.295332805	2.11	2.295332805	Weekend	41.9366203	2.295332805		2.295332805
2014/07/27 09:42	3.001500726	2014/07/27	27.40416667	09:42:00	00:02:37	3.001500726	2.11	3.001500726	Weekend	41.9366203	3.001500726		3.001500726
2014/07/27 09:44	2.209673442	2014/07/27	27.40555556	09:44:00	00:02:00	2.209673442	2.11	2.209673442	Weekend	41.9366203	2.209673442		2.209673442
2014/07/27 09:46	1.892744464	2014/07/27	27.40744213	09:46:43	00:02:43	1.892744464	2.11	1.892744464	Weekend	41.9366203	1.892744464		1.892744464
2014/07/27 09:49	2.266146274	2014/07/27	27.4096412	09:49:53	00:03:10	2.266146274	2.11	2.266146274	Weekend	41.9366203	2.266146274		2.266146274
2014/07/27 09:52	1.143728546	2014/07/27	27.41148148	09:52:32	00:02:39	1.143728546	2.11	1.143728546	Weekend	41.9366203	1.143728546		1.143728546
2014/07/27 09:57	0.862440700	2014/07/27	27.41511574	09:57:46	00:05:14	0.8624407	2.11	0.8624407	Weekend	41.9366203	0.8624407		0.8624407
2014/07/27 10:04	2.002893052	2014/07/27	27.4199537	10:04:44	00:06:58	2.002893052	2.11	2.002893052	Weekend	41.9366203	2.002893052		2.002893052
2014/07/27 10:07	1.773748508	2014/07/27	27.42203704	10:07:44	00:03:00	1.773748508	2.11	1.773748508	Weekend	41.9366203	1.773748508		1.773748508
2014/07/27 10:11	1.223740557	2014/07/27	27.424375	10:11:06	00:03:22	1.223740557	2.11	1.223740557	Weekend	41.9366203	1.223740557		1.223740557
2014/07/27 10:16	1.837484673	2014/07/27	27.42778935	10:16:01	00:04:55	1.837484673	2.11	1.837484673	Weekend	41.9366203	1.837484673		1.837484673
2014/07/27 10:19	2.410606650	2014/07/27	27.43005787	10:19:17	00:03:16	2.41060665	2.11	2.41060665	Weekend	41.9366203	2.41060665		2.41060665
2014/07/27 10:21	2.448646423	2014/07/27	27.43178241	10:21:46	00:02:29	2.448646423	2.11	2.448646423	Weekend	41.9366203	2.448646423		2.448646423
2014/07/27 10:24	2.437373034	2014/07/27	27.4334838	10:24:13	00:02:27	2.437373034	2.11	2.437373034	Weekend	41.9366203	2.437373034		2.437373034
2014/07/27 10:26	2.491349461	2014/07/27	27.43519676	10:26:41	00:02:28	2.491349461	2.11	2.491349461	Weekend	41.9366203	2.491349461		2.491349461
2014/07/27 10:29	1.872269592	2014/07/27	27.43686343	10:29:05	00:02:24	1.872269592	2.11	1.872269592	Weekend	41.9366203	1.872269592		1.872269592
2014/07/27 10:32	2.149510372	2014/07/27	27.43908565	10:32:17	00:03:12	2.149510372	2.11	2.149510372	Weekend	41.9366203	2.149510372		2.149510372
2014/07/27 10:35	1.760219035	2014/07/27	27.44103009	10:35:05	00:02:48	1.760219035	2.11	1.760219035	Weekend	41.9366203	1.760219035		1.760219035
2014/07/27 10:38	1.598011351	2014/07/27	27.4433912	10:38:29	00:03:24	1.598011351	2.11	1.598011351	Weekend	41.9366203	1.598011351		1.598011351
2014/07/27 10:42	1.640390035	2014/07/27	27.44600694	10:42:15	00:03:46	1.640390035	2.11	1.640390035	Weekend	41.9366203	1.640390035		1.640390035
2014/07/27 10:45	1.648351635	2014/07/27	27.44854167	10:45:54	00:03:39	1.648351635	2.11	1.648351635	Weekend	41.9366203	1.648351635		1.648351635
2014/07/27 10:49	1.092034208	2014/07/27	27.45107639	10:49:33	00:03:39	1.092034208	2.11	1.092034208	Weekend	41.9366203	1.092034208		1.092034208
2014/07/27 10:55	5.745292006	2014/07/27	27.45488426	10:55:02	00:05:29	5.745292006	2.11	5.745292006	Weekend	41.9366203	5.745292006		5.745292006
2014/07/27 10:56	5.392450526	2014/07/27	27.45561343	10:56:05	00:01:03	5.392450526	2.11	5.392450526	Weekend	41.9366203	5.392450526		5.392450526
2014/07/27 10:57	5.333333291	2014/07/27	27.45638889	10:57:12	00:01:07	5.333333291	2.11	5.333333291	Weekend	41.9366203	5.333333291		5.333333291
2014/07/27 10:58	5.557270718	2014/07/27	27.45716435	10:58:19	00:01:07	5.557270718	2.11	5.557270718	Weekend	41.9366203	5.557270718		5.557270718
2014/07/27 10:59	5.394066484	2014/07/27	27.45791667	10:59:24	00:01:05	5.394066484	2.11	5.394066484	Weekend	41.9366203	5.394066484		5.394066484
2014/07/27 11:00	5.077574007	2014/07/27	27.45869213	11:00:31	00:01:07	5.077574007	2.11	5.077574007	Weekend	41.9366203	5.077574007		5.077574007
2014/07/27 11:01	4.876727135	2014/07/27	27.45951389	11:01:42	00:01:11	4.876727135	2.11	4.876727135	Weekend	41.9366203	4.876727135		4.876727135

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/27 11:02	5.426590249	2014/07/27	27.4603588	11:02:55	00:01:13	5.426590249	2.11	5.426590249	Weekend	41.9366203	5.426590249		5.426590249
2014/07/27 11:04	5.298793010	2014/07/27	27.46113426	11:04:02	00:01:07	5.29879301	2.11	5.29879301	Weekend	41.9366203	5.29879301		5.29879301
2014/07/27 11:05	1.233214569	2014/07/27	27.4619213	11:05:10	00:01:08	1.233214569	2.11	1.233214569	Weekend	41.9366203	1.233214569		1.233214569
2014/07/27 11:10	1.784828940	2014/07/27	27.46530093	11:10:02	00:04:52	1.78482894	2.11	1.78482894	Weekend	41.9366203	1.78482894		1.78482894
2014/07/27 11:13	1.496632565	2014/07/27	27.46762731	11:13:23	00:03:21	1.496632565	2.11	1.496632565	Weekend	41.9366203	1.496632565		1.496632565
2014/07/27 11:17	0.805729627	2014/07/27	27.47041667	11:17:24	00:04:01	0.805729627	2.11	0.805729627	Weekend	41.9366203	0.805729627		0.805729627
2014/07/27 11:24	1.383338446	2014/07/27	27.47559028	11:24:51	00:07:27	1.383338446	2.11	1.383338446	Weekend	41.9366203	1.383338446		1.383338446
2014/07/27 11:29	1.193159211	2014/07/27	27.47859954	11:29:11	00:04:20	1.193159211	2.11	1.193159211	Weekend	41.9366203	1.193159211		1.193159211
2014/07/27 11:34	0.915238717	2014/07/27	27.48209491	11:34:13	00:05:02	0.915238717	2.11	0.915238717	Weekend	41.9366203	0.915238717		0.915238717
2014/07/27 11:40	1.397190084	2014/07/27	27.48664352	11:40:46	00:06:33	1.397190084	2.11	1.397190084	Weekend	41.9366203	1.397190084		1.397190084
2014/07/27 11:45	5.275498200	2014/07/27	27.48962963	11:45:04	00:04:18	5.2754982	2.11	5.2754982	Weekend	41.9366203	5.2754982		5.2754982
2014/07/27 11:46	5.366726254	2014/07/27	27.49041667	11:46:12	00:01:08	5.366726254	2.11	5.366726254	Weekend	41.9366203	5.366726254		5.366726254
2014/07/27 11:47	6.273963003	2014/07/27	27.49119213	11:47:19	00:01:07	6.273963003	2.11	6.273963003	Weekend	41.9366203	6.273963003		6.273963003
2014/07/27 11:48	5.665722334	2014/07/27	27.49185185	11:48:16	00:00:57	5.665722334	2.11	5.665722334	Weekend	41.9366203	5.665722334		5.665722334
2014/07/27 11:49	5.365126634	2014/07/27	27.49259259	11:49:20	00:01:04	5.365126634	2.11	5.365126634	Weekend	41.9366203	5.365126634		5.365126634
2014/07/27 11:50	5.662157866	2014/07/27	27.49336806	11:50:27	00:01:07	5.662157866	2.11	5.662157866	Weekend	41.9366203	5.662157866		5.662157866
2014/07/27 11:51	5.389221514	2014/07/27	27.49409722	11:51:30	00:01:03	5.389221514	2.11	5.389221514	Weekend	41.9366203	5.389221514		5.389221514
2014/07/27 11:52	5.278592333	2014/07/27	27.49487269	11:52:37	00:01:07	5.278592333	2.11	5.278592333	Weekend	41.9366203	5.278592333		5.278592333
2014/07/27 11:53	4.496627493	2014/07/27	27.49565972	11:53:45	00:01:08	4.496627493	2.11	4.496627493	Weekend	41.9366203	4.496627493		4.496627493
2014/07/27 11:55	3.667481633	2014/07/27	27.49659722	11:55:06	00:01:21	3.667481633	2.11	3.667481633	Weekend	41.9366203	3.667481633		3.667481633
2014/07/27 11:56	3.361344511	2014/07/27	27.49773148	11:56:44	00:01:38	3.361344511	2.11	3.361344511	Weekend	41.9366203	3.361344511		3.361344511
2014/07/27 11:58	3.541912604	2014/07/27	27.49896991	11:58:31	00:01:47	3.541912604	2.11	3.541912604	Weekend	41.9366203	3.541912604		3.541912604
2014/07/27 12:00	4.532863222	2014/07/27	27.50013889	12:00:12	00:01:41	4.532863222	2.11	4.532863222	Weekend	41.9366203	4.532863222		4.532863222
2014/07/27 12:01	5.005561695	2014/07/27	27.50106481	12:01:32	00:01:20	5.005561695	2.11	5.005561695	Weekend	41.9366203	5.005561695		5.005561695
2014/07/27 12:02	4.570848110	2014/07/27	27.50189815	12:02:44	00:01:12	4.57084811	2.11	4.57084811	Weekend	41.9366203	4.57084811		4.57084811
2014/07/27 12:04	1.975633834	2014/07/27	27.5028125	12:04:03	00:01:19	1.975633834	2.11	1.975633834	Weekend	41.9366203	1.975633834		1.975633834
2014/07/27 12:07	1.253132822	2014/07/27	27.50491898	12:07:05	00:03:02	1.253132822	2.11	1.253132822	Weekend	41.9366203	1.253132822		1.253132822
2014/07/27 12:11	2.044989759	2014/07/27	27.50824074	12:11:52	00:04:47	2.044989759	2.11	2.044989759	Weekend	41.9366203	2.044989759		2.044989759
2014/07/27 12:14	1.779359416	2014/07/27	27.51027778	12:14:48	00:02:56	1.779359416	2.11	1.779359416	Weekend	41.9366203	1.779359416		1.779359416
2014/07/27 12:18	2.065641480	2014/07/27	27.51261574	12:18:10	00:03:22	2.06564148	2.11	2.06564148	Weekend	41.9366203	2.06564148		2.06564148
2014/07/27 12:21	0.481850301	2014/07/27	27.5146412	12:21:05	00:02:55	0.481850301	2.11	0.481850301	Weekend	41.9366203	0.481850301		0.481850301
2014/07/27 12:33	0.930328709	2014/07/27	27.52328704	12:33:32	00:12:27	0.930328709	2.11	0.930328709	Weekend	41.9366203	0.930328709		0.930328709
2014/07/27 12:39	1.147081306	2014/07/27	27.5277662	12:39:59	00:06:27	1.147081306	2.11	1.147081306	Weekend	41.9366203	1.147081306		1.147081306
2014/07/27 12:45	0.640501009	2014/07/27	27.53140046	12:45:13	00:05:14	0.640501009	2.11	0.640501009	Weekend	41.9366203	0.640501009		0.640501009
2014/07/27 12:54	0.455638523	2014/07/27	27.53790509	12:54:35	00:09:22	0.455638523	2.11	0.455638523	Weekend	41.9366203	0.455638523		0.455638523
2014/07/27 13:07	0.519840578	2014/07/27	27.54704861	13:07:45	00:13:10	0.519840578	2.11	0.519840578	Weekend	41.9366203	0.519840578		0.519840578
2014/07/27 13:19	0.489556132	2014/07/27	27.55505787	13:19:17	00:11:32	0.489556132	2.11	0.489556132	Weekend	41.9366203	0.489556132		0.489556132
2014/07/27 13:31	0.892812849	2014/07/27	27.56357639	13:31:33	00:12:16	0.892812849	2.11	0.892812849	Weekend	41.9366203	0.892812849		0.892812849
2014/07/27 13:38	1.172332933	2014/07/27	27.56824074	13:38:16	00:06:43	1.172332933	2.11	1.172332933	Weekend	41.9366203	1.172332933		1.172332933
2014/07/27 13:43	0.400355869	2014/07/27	27.57179398	13:43:23	00:05:07	0.400355869	2.11	0.400355869	Weekend	41.9366203	0.400355869		0.400355869
2014/07/27 13:58	0.628294176	2014/07/27	27.58219907	13:58:22	00:14:59	0.628294176	2.11	0.628294176	Weekend	41.9366203	0.628294176		0.628294176
2014/07/27 14:07	0.724112956	2014/07/27	27.58883102	14:07:55	00:09:33	0.724112956	2.11	0.724112956	Weekend	41.9366203	0.724112956		0.724112956
2014/07/27 14:16	0.783119419	2014/07/27	27.59458333	14:16:12	00:08:17	0.783119419	2.11	0.783119419	Weekend	41.9366203	0.783119419		0.783119419
2014/07/27 14:23	1.269572567	2014/07/27	27.59990741	14:23:52	00:07:40	1.269572567	2.11	1.269572567	Weekend	41.9366203	1.269572567		1.269572567
2014/07/27 14:28	0.681973170	2014/07/27	27.60319444	14:28:36	00:04:44	0.68197317	2.11	0.68197317	Weekend	41.9366203	0.68197317		0.68197317
2014/07/27 14:37	0.391295838	2014/07/27	27.60929398	14:37:23	00:08:47	0.391295838	2.11	0.391295838	Weekend	41.9366203	0.391295838		0.391295838
2014/07/27 14:52	0.622880471	2014/07/27	27.61994213	14:52:43	00:15:20	0.622880471	2.11	0.622880471	Weekend	41.9366203	0.622880471		0.622880471
2014/07/27 15:02	0.831985202	2014/07/27	27.62663194	15:02:21	00:09:38	0.831985202	2.11	0.831985202	Weekend	41.9366203	0.831985202		0.831985202
2014/07/27 15:09	0.804002138	2014/07/27	27.63164352	15:09:34	00:07:13	0.804002138	2.11	0.804002138	Weekend	41.9366203	0.804002138		0.804002138
2014/07/27 15:17	0.887311439	2014/07/27	27.6368287	15:17:02	00:07:28	0.887311439	2.11	0.887311439	Weekend	41.9366203	0.887311439		0.887311439
2014/07/27 15:23	0.878477299	2014/07/27	27.64152778	15:23:48	00:06:46	0.878477299	2.11	0.878477299	Weekend	41.9366203	0.878477299		0.878477299
2014/07/27 15:30	0.646180351	2014/07/27	27.64626157	15:30:37	00:06:49	0.646180351	2.11	0.646180351	Weekend	41.9366203	0.646180351		0.646180351
2014/07/27 15:39	0.391508610	2014/07/27	27.65271991	15:39:55	00:09:18	0.39150861	2.11	0.39150861	Weekend	41.9366203	0.39150861		0.39150861
2014/07/27 15:55	0.479475769	2014/07/27	27.66335648	15:55:14	00:15:19	0.479475769	2.11	0.479475769	Weekend	41.9366203	0.479475769		0.479475769
2014/07/27 16:07	0.725017113	2014/07/27	27.67204861	16:07:45	00:12:31	0.725017113	2.11	0.725017113	Weekend	41.9366203	0.725017113		0.725017113
2014/07/27 16:16	0.596856551	2014/07/27	27.67778935	16:16:01	00:08:16	0.596856551	2.11	0.596856551	Weekend	41.9366203	0.596856551		0.596856551
2014/07/27 16:26	0.964371811	2014/07/27	27.68478009	16:26:05	00:10:04	0.964371811	2.11	0.964371811	Weekend	41.9366203	0.964371811		0.964371811
2014/07/27 16:32	2.406738850	2014/07/27	27.68909722	16:32:18	00:06:13	2.40673885	2.11	2.40673885	Weekend	41.9366203	2.40673885		2.40673885
2014/07/27 16:34	1.274155862	2014/07/27	27.69082176	16:34:47	00:02:29	1.274155862	2.11	1.274155862	Weekend	41.9366203	1.274155862		1.274155862
2014/07/27 16:39	0.563980444	2014/07/27	27.69409722	16:39:30	00:04:43	0.563980444	2.11	0.563980444	Weekend	41.9366203	0.563980444		0.563980444
2014/07/27 16:50	0.558312651	2014/07/27	27.70148148	16:50:08	00:10:38	0.558312651	2.11	0.558312651	Weekend	41.9366203	0.558312651		0.558312651
2014/07/27 17:00	0.515611568	2014/07/27	27.70894676	17:00:53	00:10:45	0.515611568	2.11	0.515611568	Weekend	41.9366203	0.515611568		0.515611568
2014/07/27 17:12	0.511538020	2014/07/27	27.71702546	17:12:31	00:11:38	0.51153802	2.11	0.51153802	Weekend	41.9366203	0.51153802		0.51153802
2014/07/27 17:24	0.530832518	2014/07/27	27.72517361	17:24:15	00:11:44	0.530832518	2.11	0.530832518	Weekend	41.9366203	0.530832518		0.530832518
2014/07/27 17:35	1.211957976	2014/07/27	27.73302083	17:35:33	00:11:18	1.211957976	2.11	1.211957976	Weekend	41.9366203	1.211957976		1.211957976
2014/07/27 17:40	1.221747089	2014/07/27	27.73645833	17:40:30	00:04:57	1.221747089	2.11	1.221747089	Weekend	41.9366203	1.221747089		1.221747089
2014/07/27 17:45	2.084781081	2014/07/27	27.73987269	17:45:25	00:04:55	2.084781081	2.11	2.084781081	Weekend	41.9366203	2.084781081		2.084781081
2014/07/27 17:48	0.935405075	2014/07/27	27.741875	17:48:18	00:02:53	0.935405075	2.11	0.935405075	Weekend	41.9366203	0.935405075		0.935405075
2014/07/27 17:54	1.215805461	2014/07/27	27.74631944	17:54:42	00:06:24	1.215805461	2.11	1.215805461	Weekend	41.9366203	1.215805461		1.215805461
2014/07/27 17:59	0.666592595	2014/07/27	27.74975694	17:59:39	00:04:57	0.666592595	2.11	0.666592595	Weekend	41.9366203	0.666592595		0.666592595
2014/07/27 18:08	0.965768852	2014/07/27	27.75600694	18:08:39	00:09:00	0.965768852	2.11	0.965768852	Weekend	41.9366203	0.965768852		0.965768852
2014/07/27 18:14	0.822067951	2014/07/27	27.7603125	18:14:51	00:06:12	0.822067951	2.11	0.822067951	Weekend	41.9366203	0.822067951		0.822067951
2014/07/27 18:22	0.704418262	2014/07/27	27.76538194	18:22:09	00:07:18	0.704418262	2.11	0.704418262	Weekend	41.9366203	0.704418262		0.704418262
2014/07/27 18:30	0.976509513	2014/07/27	27.7712963	18:30:40	00:08:31	0.976509513	2.11	0.976509513	Weekend	41.9366203	0.976509513		0.976509513
2014/07/27 18:36	0.830794787	2014/07/27	27.77556713	18:36:49	00:06:09	0.830794787	2.11	0.830794787	Weekend	41.9366203	0.830794787		0.830794787
2014/07/27 18:44	1.004912900	2014/07/27	27.7805787	18:44:02	00:07:13	1.0049129	2.11	1.0049129	Weekend	41.9366203	1.0049129		1.0049129
2014/07/27 18:50	1.429479023	2014/07/27	27.7847338	18:50:01	00:05:59	1.429479023	2.11	1.429479023	Weekend	41.9366203	1.429479023		1.429479023
2014/07/27 18:54	1.184600188	2014/07/27	27.78763889	18:54:12	00:04:11	1.184600188	2.11	1.184600188	Weekend	41.9366203	1.184600188		1.184600188
2014/07/27 18:59	2.350176244	2014/07/27	27.79115741	18:59:16	00:05:04	2.350176244	2.11	2.350176244	Weekend	41.9366203	2.350176244		2.350176244
2014/07/27 19:01	2.030227820	2014/07/27	27.79293981	19:01:50	00:02:34	2.03022782	2.11	2.03022782	Weekend	41.9366203	2.03022782		2.03022782
2014/07/27 19:04	0.862234138	2014/07/27	27.79498843	19:04:47	00:02:57	0.862234138	2.11	0.862234138	Weekend	41.9366203	0.862234138		0.862234138
2014/07/27 19:11	1.128385146	2014/07/27	27.79981481	19:11:44	00:06:57	1.128385146	2.11	1.128385146	Weekend	41.9366203	1.128385146		1.128385146
2014/07/27 19:17	1.404932864	2014/07/27	27.80350694	19:17:03	00:05:19	1.404932864	2.11	1.404932864	Weekend	41.9366203	1.404932864		1.404932864
2014/07/27 19:21	1.442307681	2014/07/27	27.80648148	19:21:20	00:04:17	1.442307681	2.11	1.442307681	Weekend	41.9366203	1.442307681		1.442307681
2014/07/27 19:25	2.043596714	2014/07/27	27.80936343	19:25:29	00:04:09	2.043596714	2.11	2.043596714	Weekend	41.9366203	2.043596714		2.043596714
2014/07/27 19:28	2.325280953	2014/07/27	27.81140046	19:28:25	00:02:56	2.325280953	2.11	2.325280953	Weekend	41.9366203	2.325280953		2.325280953
2014/07/27 19:31	1.726618691	2014/07/27	27.81319444	19:31:00	00:02:35	1.726618691	2.11	1.726618691	Weekend	41.9366203	1.726618691		1.726618691
2014/07/27 19:34	1.218934100	2014/07/27	27.81561343	19:34:29	00:03:29	1.2189341	2.11	1.2189341	Weekend	41.9366203	1.2189341		1.2189341
2014/07/27 19:39	1.639642909	2014/07/27	27.81902778	19:39:24	00:04:55	1.639642909	2.11	1.639642909	Weekend	41.9366203	1.639642909		1.639642909
2014/07/27 19:43	1.851090072	2014/07/27	27.82157407	19:43:04	00:03:40	1.851090072	2.11	1.851090072	Weekend	41.9366203	1.851090072		1.851090072
2014/07/27 19:46	1.460920368	2014/07/27	27.82381944	19:46:18	00:03:14	1.460920368	2.11	1.460920368	Weekend	41.9366203	1.460920368		1.460920368
2014/07/27 19:50	0.925164466	2014/07/27	27.82667824	19:50:25	00:04:07	0.925164466	2.11	0.925164466	Weekend	41.9366203	0.925164466		0.925164466
2014/07/27 19:56	0.788747200	2014/07/27	27.83118056	19:56:54	00:06:29	0.7887472	2.11	0.7887472	Weekend	41.9366203	0.7887472		0.7887472
2014/07/27 20:04	1.012601252	2014/07/27	27.83645833	20:04:30	00:07:36	1.012601252	2.11	1.012601252	Weekend	41.9366203	1.012601252		1.012601252
2014/07/27 20:10	1.220752788	2014/07/27	27.8405787	20:10:26	00:05:56	1.220752788	2.11	1.220752788	Weekend	41.9366203	1.220752788		1.220752788
2014/07/27 20:15	2.059260938	2014/07/27	27.84398148	20:15:20	00:04:54	2.059260938	2.11	2.059260938	Weekend	41.9366203	2.059260938		2.059260938
2014/07/27 20:18	2.484129155	2014/07/27	27.84600694	20:18:15	00:02:55	2.484129155	2.11	2.484129155	Weekend	41.9366203	2.484129155		2.484129155
2014/07/27 20:20	1.569311234	2014/07/27	27.84768519	20:20:40	00:02:25	1.569311234	2.11	1.569311234	Weekend	41.9366203	1.569311234		1.569311234
2014/07/27 20:24	2.025886309	2014/07/27	27.85034722	20:24:30	00:03:50	2.025886309	2.11	2.025886309	Weekend	41.9366203	2.025886309		2.025886309
2014/07/27 20:27	1.540963946	2014/07/27	27.85239583	20:27:27	00:02:57	1.540963946	2.11	1.540963946	Weekend	41.9366203	1.540963946		1.540963946
2014/07/27 20:31	1.538461526	2014/07/27	27.85510417	20:31:21	00:03:54	1.538461526	2.11	1.538461526	Weekend	41.9366203	1.538461526		1.538461526
2014/07/27 20:35	1.354707598	2014/07/27	27.8578125	20:35:15	00:03:54	1.354707598	2.11	1.354707598	Weekend	41.9366203	1.354707598		1.354707598
2014/07/27 20:39	1.445899257	2014/07/27	27.8608912	20:39:41	00:04:26	1.445899257	2.11	1.445899257	Weekend	41.9366203	1.445899257		1.445899257
2014/07/27 20:43	2.007584191	2014/07/27	27.86377315	20:43:50	00:04:09	2.007584191	2.11	2.007584191	Weekend	41.9366203	2.007584191		2.007584191
2014/07/27 20:46	1.895534947	2014/07/27	27.86584491	20:46:49	00:02:59	1.895534947	2.11	1.895534947	Weekend	41.9366203	1.895534947		1.895534947
2014/07/27 20:49	1.993576238	2014/07/27	27.86804398	20:49:59	00:03:10	1.993576238	2.11	1.993576238	Weekend	41.9366203	1.993576238		1.993576238
2014/07/27 20:52	1.981942288	2014/07/27	27.87012731	20:52:59	00:03:00	1.981942288	2.11	1.981942288	Weekend	41.9366203	1.981942288		1.981942288
2014/07/27 20:56	1.944894636	2014/07/27	27.8722338	20:56:01	00:03:02	1.944894636	2.11	1.944894636	Weekend	41.9366203	1.944894636		1.944894636
2014/07/27 20:59	1.579917481	2014/07/27	27.874375	20:59:06	00:03:05	1.579917481	2.11	1.579917481	Weekend	41.9366203	1.579917481		1.579917481
2014/07/27 21:02	1.256369083	2014/07/27	27.87701389	21:02:54	00:03:48	1.256369083	2.11	1.256369083	Weekend	41.9366203	1.256369083		1.256369083
2014/07/27 21:07	1.094424506	2014/07/27	27.88033565	21:07:41	00:04:47	1.094424506	2.11	1.094424506	Weekend	41.9366203	1.094424506		1.094424506
2014/07/27 21:13	1.464367056	2014/07/27	27.88414352	21:13:10	00:05:29	1.464367056	2.11	1.464367056	Weekend	41.9366203	1.464367056		1.464367056
2014/07/27 21:17	1.372683585	2014/07/27	27.88697917	21:17:15	00:04:05	1.372683585	2.11	1.372683585	Weekend	41.9366203	1.372683585		1.372683585
2014/07/27 21:21	1.381109480	2014/07/27	27.89002315	21:21:38	00:04:23	1.38110948	2.11	1.38110948	Weekend	41.9366203	1.38110948		1.38110948
2014/07/27 21:25	1.559521734	2014/07/27	27.89303241	21:25:58	00:04:20	1.559521734	2.11	1.559521734	Weekend	41.9366203	1.559521734		1.559521734
2014/07/27 21:29	0.518000514	2014/07/27	27.89570602	21:29:49	00:03:51	0.518000514	2.11	0.518000514	Weekend	41.9366203	0.518000514		0.518000514
2014/07/27 21:41	0.187047966	2014/07/27	27.90375	21:41:24	00:11:35	0.187047966	2.11	0.187047966	Weekend	41.9366203	0.187047966		0.187047966
2014/07/27 22:13	0.408376247	2014/07/27	27.92603009	22:13:29	00:32:05	0.408376247	2.11	0.408376247	Weekend	41.9366203	0.408376247		0.408376247
2014/07/27 22:28	0.206332101	2014/07/27	27.93622685	22:28:10	00:14:41	0.206332101	2.11	0.206332101	Weekend	41.9366203	0.206332101		0.206332101
2014/07/27 22:57	0.045004838	2014/07/27	27.95642361	22:57:15	00:29:05	0.045004838	2.11	0.045004838	Weekend	41.9366203	0.045004838		0.045004838
2014/07/28 01:10	0.033596945	2014/07/28	28.04900463	01:10:34	02:13:19	0.033596945	2.11	0.033596945	Weekday	32.15580132	0.033596945	0.033596945	
2014/07/28 04:09	0.158746956	2014/07/28	28.17302083	04:09:09	02:58:35	0.158746956	2.11	0.158746956	Weekday	32.15580132	0.158746956		0.158746956
2014/07/28 04:46	0.375234519	2014/07/28	28.19927083	04:46:57	00:37:48	0.375234519	2.11	0.375234519	Weekday	32.15580132	0.375234519		0.375234519
2014/07/28 05:02	0.509597414	2014/07/28	28.21038194	05:02:57	00:16:00	0.509597414	2.11	0.509597414	Weekday	32.15580132	0.509597414		0.509597414
2014/07/28 05:14	0.973709827	2014/07/28	28.21855324	05:14:43	00:11:46	0.973709827	2.11	0.973709827	Weekday	32.15580132	0.973709827		0.973709827

Raw Logging Data		Logging Data Details					Daily Average			Consumption Calculations			
Meas. Point	Curve 1 (m^3/h) All values	Date formatted		Time	Logging Intervals	cumperhour factored	Average Logged = 2.11 kL/hour	Logging data	Day of Week	cum/day	Cumperhour (no zeros)	night flow	day flow
2014/07/28 05:20	0.838457232	2014/07/28	28.22283565	05:20:53	00:06:10	0.838457232	2.11	0.838457232	Weekday	32.15580132	0.838457232		0.838457232
2014/07/28 05:28	0.724725203	2014/07/28	28.22780093	05:28:02	00:07:09	0.724725203	2.11	0.724725203	Weekday	32.15580132	0.724725203		0.724725203
2014/07/28 05:36	0.826218666	2014/07/28	28.23355324	05:36:19	00:08:17	0.826218666	2.11	0.826218666	Weekday	32.15580132	0.826218666		0.826218666
2014/07/28 05:43	1.113310234	2014/07/28	28.23859954	05:43:35	00:07:16	1.113310234	2.11	1.113310234	Weekday	32.15580132	1.113310234		1.113310234
2014/07/28 05:48	1.617977515	2014/07/28	28.24233796	05:48:58	00:05:23	1.617977515	2.11	1.617977515	Weekday	32.15580132	1.617977515		1.617977515
2014/07/28 05:52	0.741167745	2014/07/28	28.24490741	05:52:40	00:03:42	0.741167745	2.11	0.741167745	Weekday	32.15580132	0.741167745		0.741167745
2014/07/28 06:00	0.491668939	2014/07/28	28.25053241	06:00:46	00:08:06	0.491668939	2.11	0.491668939	Weekday	32.15580132	0.491668939		0.491668939
2014/07/28 06:12	0.959181491	2014/07/28	28.25900463	06:12:58	00:12:12	0.959181491	2.11	0.959181491	Weekday	32.15580132	0.959181491		0.959181491
2014/07/28 06:19	0.512455512	2014/07/28	28.26335648	06:19:14	00:06:16	0.512455512	2.11	0.512455512	Weekday	32.15580132	0.512455512		0.512455512
2014/07/28 06:30	0.801996073	2014/07/28	28.27148148	06:30:56	00:11:42	0.801996073	2.11	0.801996073	Weekday	32.15580132	0.801996073		0.801996073
2014/07/28 06:38	1.157854101	2014/07/28	28.27667824	06:38:25	00:07:29	1.157854101	2.11	1.157854101	Weekday	32.15580132	1.157854101		1.157854101
2014/07/28 06:43	0.883175500	2014/07/28	28.28027778	06:43:36	00:05:11	0.8831755	2.11	0.8831755	Weekday	32.15580132	0.8831755		0.8831755
2014/07/28 06:50	1.425516738	2014/07/28	28.285	06:50:24	00:06:48	1.425516738	2.11	1.425516738	Weekday	32.15580132	1.425516738		1.425516738
2014/07/28 06:54	0.936329581	2014/07/28	28.28791667	06:54:36	00:04:12	0.936329581	2.11	0.936329581	Weekday	32.15580132	0.936329581		0.936329581
2014/07/28 07:01	2.357563832	2014/07/28	28.29237269	07:01:01	00:06:25	2.357563832	2.11	2.357563832	Weekday	32.15580132	2.357563832		2.357563832
2014/07/28 07:03	2.442996723	2014/07/28	28.29413194	07:03:33	00:02:32	2.442996723	2.11	2.442996723	Weekday	32.15580132	2.442996723		2.442996723
2014/07/28 07:06	2.375610381	2014/07/28	28.29584491	07:06:01	00:02:28	2.375610381	2.11	2.375610381	Weekday	32.15580132	2.375610381		2.375610381
2014/07/28 07:08	1.451027800	2014/07/28	28.29759259	07:08:32	00:02:31	1.4510278	2.11	1.4510278	Weekday	32.15580132	1.4510278		1.4510278
2014/07/28 07:12	1.364877150	2014/07/28	28.30046296	07:12:40	00:04:08	1.36487715	2.11	1.36487715	Weekday	32.15580132	1.36487715		1.36487715
2014/07/28 07:17	1.542945299	2014/07/28	28.30351852	07:17:04	00:04:24	1.542945299	2.11	1.542945299	Weekday	32.15580132	1.542945299		1.542945299
2014/07/28 07:20	1.243781085	2014/07/28	28.30621528	07:20:57	00:03:53	1.243781085	2.11	1.243781085	Weekday	32.15580132	1.243781085		1.243781085
2014/07/28 07:25	0.553437457	2014/07/28	28.30957176	07:25:47	00:04:50	0.553437457	2.11	0.553437457	Weekday	32.15580132	0.553437457		0.553437457
2014/07/28 07:36	1.226742988	2014/07/28	28.31709491	07:36:37	00:10:50	1.226742988	2.11	1.226742988	Weekday	32.15580132	1.226742988		1.226742988
2014/07/28 07:41	0.920857413	2014/07/28	28.32049769	07:41:31	00:04:54	0.920857413	2.11	0.920857413	Weekday	32.15580132	0.920857413		0.920857413
2014/07/28 07:48	2.089378973	2014/07/28	28.32502315	07:48:02	00:06:31	2.089378973	2.11	2.089378973	Weekday	32.15580132	2.089378973		2.089378973
2014/07/28 07:50	1.914079100	2014/07/28	28.32701389	07:50:54	00:02:52	1.9140791	2.11	1.9140791	Weekday	32.15580132	1.9140791		1.9140791
2014/07/28 07:54	0.721500716	2014/07/28	28.32918981	07:54:02	00:03:08	0.721500716	2.11	0.721500716	Weekday	32.15580132	0.721500716		0.721500716
2014/07/28 08:02	1.609873880	2014/07/28	28.33496528	08:02:21	00:08:19	1.60987388	2.11	1.60987388	Weekday	32.15580132	1.60987388		1.60987388
2014/07/28 08:06	2.017258753	2014/07/28	28.33755787	08:06:05	00:03:44	2.017258753	2.11	2.017258753	Weekday	32.15580132	2.017258753		2.017258753
2014/07/28 08:09	2.608695631	2014/07/28	28.33961806	08:09:03	00:02:58	2.608695631	2.11	2.608695631	Weekday	32.15580132	2.608695631		2.608695631
2014/07/28 08:11	0.901939162	2014/07/28	28.34121528	08:11:21	00:02:18	0.901939162	2.11	0.901939162	Weekday	32.15580132	0.901939162		0.901939162
2014/07/28 08:18	1.804330378	2014/07/28	28.34583333	08:18:00	00:06:39	1.804330378	2.11	1.804330378	Weekday	32.15580132	1.804330378		1.804330378
2014/07/28 08:21	2.788968059	2014/07/28	28.34814815	08:21:20	00:03:20	2.788968059	2.11	2.788968059	Weekday	32.15580132	2.788968059		2.788968059
2014/07/28 08:23	3.293687073	2014/07/28	28.3496412	08:23:29	00:02:09	3.293687073	2.11	3.293687073	Weekday	32.15580132	3.293687073		3.293687073
2014/07/28 08:25	3.149055258	2014/07/28	28.35090278	08:25:18	00:01:49	3.149055258	2.11	3.149055258	Weekday	32.15580132	3.149055258		3.149055258
2014/07/28 08:27	2.685765422	2014/07/28	28.3522338	08:27:13	00:01:55	2.685765422	2.11	2.685765422	Weekday	32.15580132	2.685765422		2.685765422
2014/07/28 08:29	1.933404925	2014/07/28	28.35378472	08:29:27	00:02:14	1.933404925	2.11	1.933404925	Weekday	32.15580132	1.933404925		1.933404925
2014/07/28 08:32	2.084781081	2014/07/28	28.3559375	08:32:33	00:03:06	2.084781081	2.11	2.084781081	Weekday	32.15580132	2.084781081		2.084781081
2014/07/28 08:35	1.015744024	2014/07/28	28.35792824	08:35:25	00:02:52	1.015744024	2.11	1.015744024	Weekday	32.15580132	1.015744024		1.015744024
2014/07/28 08:41	0.621118007	2014/07/28	28.36203704	08:41:20	00:05:55	0.621118007	2.11	0.621118007	Weekday	32.15580132	0.621118007		0.621118007
2014/07/28 08:50	0.750844694	2014/07/28	28.36873843	08:50:59	00:09:39	0.750844694	2.11	0.750844694	Weekday	32.15580132	0.750844694		0.750844694
2014/07/28 08:58	0.659437275	2014/07/28	28.37429398	08:58:59	00:08:00	0.659437275	2.11	0.659437275	Weekday	32.15580132	0.659437275		0.659437275
2014/07/28 09:08	0.733556111	2014/07/28	28.38061343	09:08:05	00:09:06	0.733556111	2.11	0.733556111	Weekday	32.15580132	0.733556111		0.733556111
2014/07/28 09:16	1.514131886	2014/07/28	28.3862963	09:16:16	00:08:11	1.514131886	2.11	1.514131886	Weekday	32.15580132	1.514131886		1.514131886
2014/07/28 09:20	1.491053666	2014/07/28	28.38903935	09:20:13	00:03:57	1.491053666	2.11	1.491053666	Weekday	32.15580132	1.491053666		1.491053666
2014/07/28 09:24	2.273014251	2014/07/28	28.39184028	09:24:15	00:04:02	2.273014251	2.11	2.273014251	Weekday	32.15580132	2.273014251		2.273014251
2014/07/28 09:26	1.875781561	2014/07/28	28.39366898	09:26:53	00:02:38	1.875781561	2.11	1.875781561	Weekday	32.15580132	1.875781561		1.875781561
2014/07/28 09:30	1.401214375	2014/07/28	28.3958912	09:30:05	00:03:12	1.401214375	2.11	1.401214375	Weekday	32.15580132	1.401214375		1.401214375
2014/07/28 09:34	1.200400124	2014/07/28	28.39886574	09:34:22	00:04:17	1.200400124	2.11	1.200400124	Weekday	32.15580132	1.200400124		1.200400124
2014/07/28 09:39	1.785005936	2014/07/28	28.40233796	09:39:22	00:05:00	1.785005936	2.11	1.785005936	Weekday	32.15580132	1.785005936		1.785005936
2014/07/28 09:42	0.827890712	2014/07/28	28.40467593	09:42:44	00:03:22	0.827890712	2.11	0.827890712	Weekday	32.15580132	0.827890712		0.827890712
2014/07/28 09:49	0.674915630	2014/07/28	28.40969907	09:49:58	00:07:14	0.67491563	2.11	0.67491563	Weekday	32.15580132	0.67491563		0.67491563
2014/07/28 09:58	0.968366680	2014/07/28	28.41587963	09:58:52	00:08:54	0.96836668	2.11	0.96836668	Weekday	32.15580132	0.96836668		0.96836668
2014/07/28 10:05	1.512477931	2014/07/28	28.42018519	10:05:04	00:06:12	1.512477931	2.11	1.512477931	Weekday	32.15580132	1.512477931		1.512477931
2014/07/28 10:09	1.086497245	2014/07/28	28.42293981	10:09:02	00:03:58	1.086497245	2.11	1.086497245	Weekday	32.15580132	1.086497245		1.086497245
2014/07/28 10:14	1.585065151	2014/07/28	28.42677083	10:14:33	00:05:31	1.585065151	2.11	1.585065151	Weekday	32.15580132	1.585065151		1.585065151
2014/07/28 10:18	1.608435337	2014/07/28	28.42939815	10:18:20	00:03:47	1.608435337	2.11	1.608435337	Weekday	32.15580132	1.608435337		1.608435337
2014/07/28 10:22	1.484168854	2014/07/28	28.43199074	10:22:04	00:03:44	1.484168854	2.11	1.484168854	Weekday	32.15580132	1.484168854		1.484168854
2014/07/28 10:26	1.205545500	2014/07/28	28.43479167	10:26:06	00:04:02	1.2055455	2.11	1.2055455	Weekday	32.15580132	1.2055455		1.2055455
2014/07/28 10:31	1.369341944	2014/07/28	28.43825231	10:31:05	00:04:59	1.369341944	2.11	1.369341944	Weekday	32.15580132	1.369341944		1.369341944
2014/07/28 10:35	0.620968015	2014/07/28	28.4412963	10:35:28	00:04:23	0.620968015	2.11	0.620968015	Weekday	32.15580132	0.620968015		0.620968015
2014/07/28 10:45		2014/07/28	28.44800926	10:45:08	00:09:40	0	2.11	0	Weekday	32.15580132	0		

Daily Average

Time	Ave. Flow	Weekdays	Weekends
00:00:00	0.054889	0.038415	0.082345
01:00:00	0.071448	0.038081	0.127059
02:00:00	0.059746	0.061514	0.058862
03:00:00	0.104186	0.138454	0.035649
04:00:00	1.419466	1.583300	0.108796
05:00:00	0.989013	1.046517	0.155202
06:00:00	1.128158	1.213583	0.725438
07:00:00	1.260264	1.368333	0.998279
08:00:00	3.277425	4.045849	1.234541
09:00:00	2.156068	2.449261	1.534499
10:00:00	2.044059	1.918508	2.232384
11:00:00	2.252872	1.998830	2.575868
12:00:00	2.258465	2.509961	1.867249
13:00:00	5.808263	6.512728	0.877007
14:00:00	5.342316	6.158314	0.718328
15:00:00	1.165367	1.346147	0.623028
16:00:00	1.091123	1.159236	0.865824
17:00:00	1.080886	1.117414	1.016597
18:00:00	1.068766	1.141890	0.948634
19:00:00	1.001197	0.889142	1.109956
20:00:00	0.920414	0.656382	1.184447
21:00:00	0.571167	0.471706	0.703781
22:00:00	0.376115	0.373250	0.381437
23:00:00	0.239500	0.244434	0.226669
23:59:59	0.054889	0.038415	0.082345

Date	Daily Average (kL/day)
2014/07/15	19.38882707
2014/07/16	21.28729687
2014/07/17	124.5665517
2014/07/18	35.41475537
2014/07/19	29.68129218
2014/07/20	29.92809694
2014/07/21	29.93743714
2014/07/22	36.20575745
2014/07/23	26.09971093
2014/07/24	85.37726372
2014/07/25	32.10136415
2014/07/26	29.73036184
2014/07/27	41.9366203
2014/07/28	32.15580132

AADD Calculated from:		
Sum hourly Ave:	35.741	kL/day
Ave. of Daily:	40.98650978	kL/day
Mean:	50.72805289	kL/day

Logged Data

Time	A3 A1684
FactoredRange	G3 G1684
AverageLogged	H3 H1684

	Copy this sheet and rename with Meter Reference
	Copy Logging Data; Input meter information and indicate Day-Night period
	AutoFill entries (Calculations)
	Check input data
	Output data - Check if logical

Meter Input Data

Meter Reference:	S-W1-9		Meter Serial No.: [redacted]
Stand Type:	Multi-Residential		
Stand Size:	10 546	m^2	
No. of Units:	20		
AADD (S):	16.763	kL/day	***Based on Swift data***
Diameter:	80	mm	
Meter Type:	[redacted]	Single Bulk	
Multiplication factor:	1		
Meter Installation Date:	2010/02/04		
Estimated Meter Age:	4.42	***Years, at time of Ncube's (2019) logging***	
Pipe Diameter:	80	mm	
Pipe DiameterDown:	80	mm	

Night period:	23:00:00	03:59:59
Day period:	04:00:00	22:59:59

Logging Data

Start Date:	2014/07/15	
End Date:	2014/07/28	
Start Time:	10:57:39	
End Time:	10:45:08	
Logging Duration:	311.79	hours
Logging Duration (d):	12.99	days
No. Of Intervals:	1682	observations

Logging Intervals (Pulse Based)

Mean (L):	00:11:08	min
Median (L):	00:04:46	min
Mode (L):	00:00:31	min
Standard Deviation (L):	00:34:06	min
Variance (L):	00:00:48	min^2
Min (L):	00:00:29	min
Max (L):	10:04:44	min

Consumption Statistics

Mean (C):	2.11	kL/hour
Standard Error (C):	0.06	
Median (C):	1.26	kL/hour
Mode (C):	1.22	kL/hour
Standard Deviation (C):	2.49	kL/hour
Variance (C):	6.22	$(kL/hour)^2$
Kurtosis (C):	5.15	
Skewness (C):	2.37	
Range (C):	12.54	
Min (C):	0.00	kL/hour
Max (C):	12.54	kL/hour
Sum:	3555.19	kL
Count:	1681	observations

Consumption Analysis

Average Night Flow:	0.15	kL/hour
Average Day Flow:	2.16	kL/hour
Maximum Flow:	12.54	kL/hour
Minimum Night Flow:	0.03	kL/hour
Night Flow Ratio:	0.01	
AADD:	50.75	kL/day

Diameter:	80 mm	Meter Type:	[redacted]	Single Bulk
Meter Reference:	S-W1-9	Estimated Meter Age:	4.4 year(s)	At time of Ncube's (2019) logging
Stand Type:	Multi-Residential	No. of Units:	20	
Stand Size:	10546 m^2	AADD (S):	16.763 kL/day	Based on Swift data

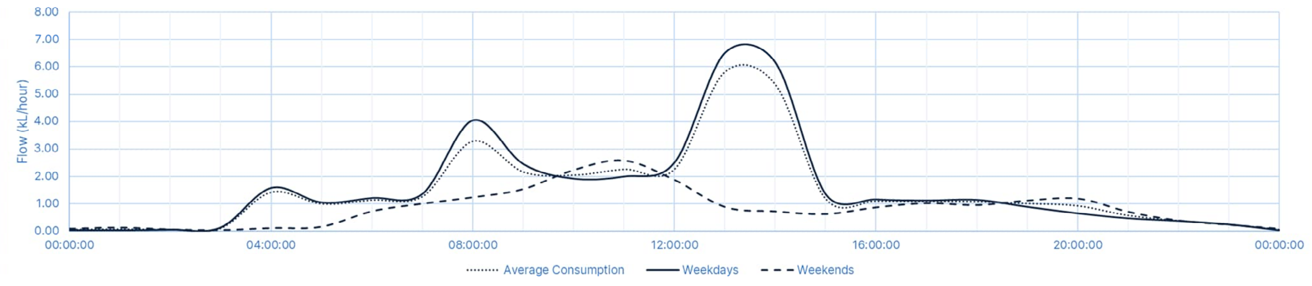
Logging Intervals:	Pulse Based		No. Of Intervals:	1 682	Observations
Start Time:	10:57:39		End Time:	10:45:08	
Start Date:	2014/07/15		End Date:	2014/07/28	
Logging Duration:	311.8	hrs	AADD:	50.75	kL/day

LOGGED CONSUMPTION CHARACTERISTICS

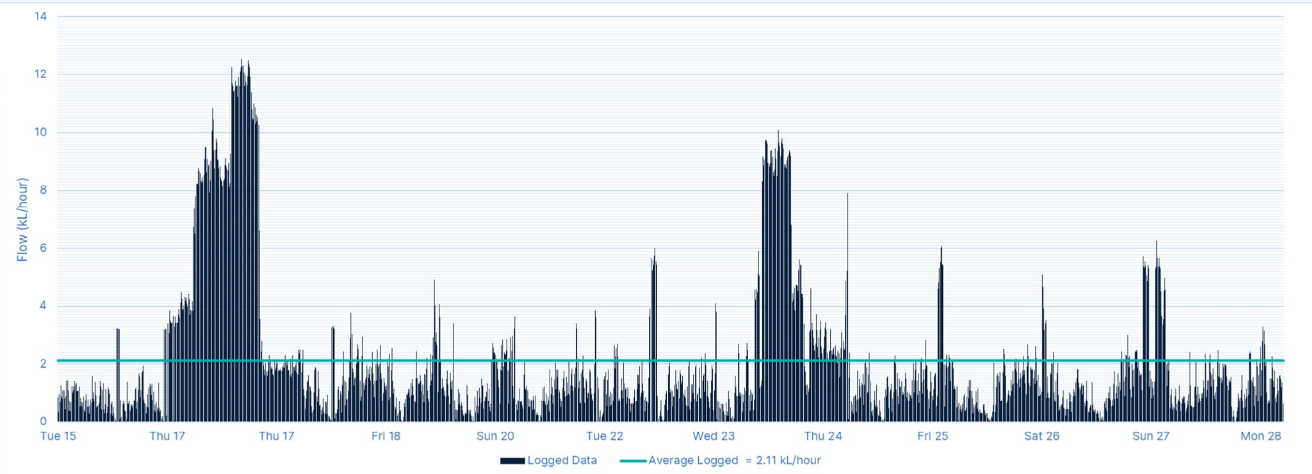
Maximum Flow:	12.54	kL/hour	Average Day Flow:	2.16	kL/hour	Day Period: 04h00 - 23h00
Minimum Night Flow:	0.03	kL/hour	Average Night Flow:	0.15	kL/hour	Night Period: 23h00 - 04h00
Night Flow Ratio:	1.20%		Average Flow:	2.11	kL/hour	

CONSUMPTION PROFILE

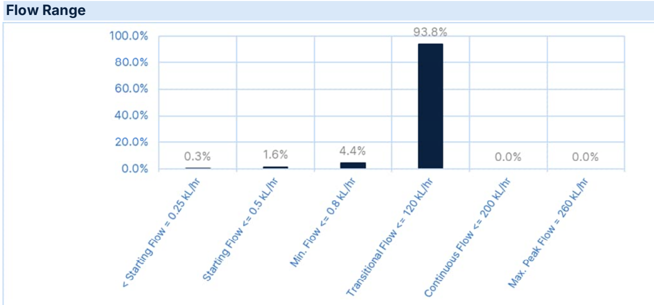
Daily Average



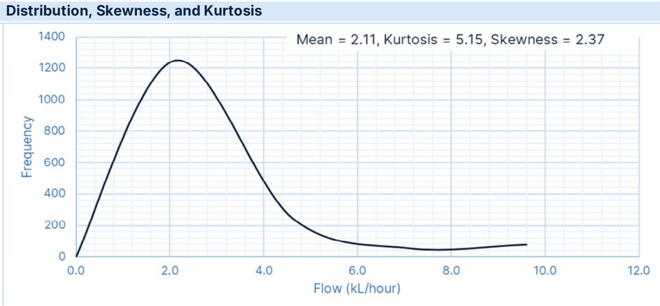
Logged Consumption



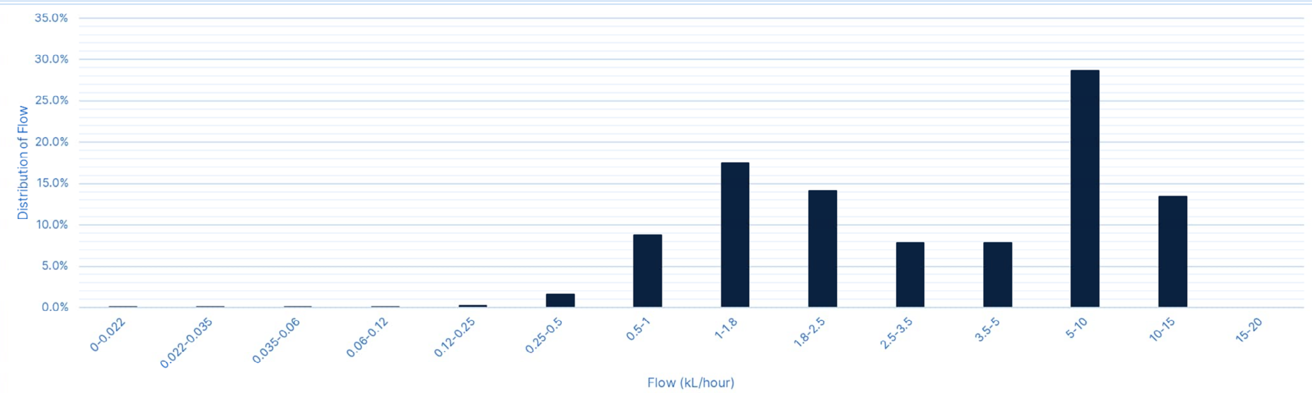
Flow Range



Distribution, Skewness, and Kurtosis



Distribution of Flow



MULTI-RESIDENTIAL_80 MM_(S-W1-9)

S-W1-9 Logged Daily Average

TimeHHMM	DailyAvera	Weekdays	Weekends
X3	Y3	Z3	AA3
X27	Y27	Z27	AA27

Logged Range — Average Logged = 2.11 kL/hour

TimeRange	Total	Average
A3	G3	H3
A1684	G1684	H1684

Diameter **80**

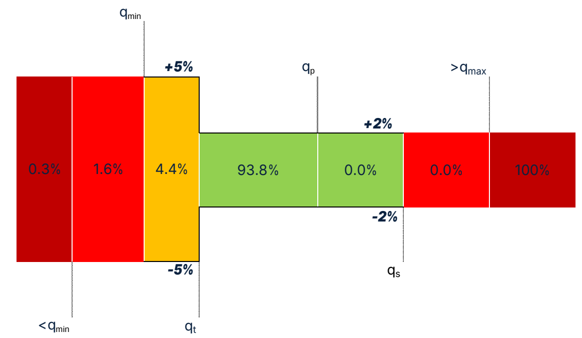
Standard Deviation (C): **2.49 kL/hour**

MeterFlow[#All]	MeterFlow[#Headers]				
Meter - 80 mm			% Volume in Ran(	Error Limits	Weighted Accuracy
< Starting Flow	0.25	< Starting	0.3%	100%	0.297%
sf - q_{min}	0.5	Starting Fl	1.6%	15%	0.234%
q_{min} - q_t	0.8	Min. Flow	4.4%	8%	0.349%
q_t - q_p	120	Transition	93.8%	4%	3.283%
q_p - q_s	200	Continuou	0.0%	4%	0.000%
q_s -1.3 q_s	260	Max. Peak	0.0%	8%	0.000%
			100.00%	**95.84%**	**4.161%**

Standard Deviation Intervals		Frequency
3 Std Dev Below	0.00	1
2 Std Dev Below	0.00	0
1 Std Dev Below	0.00	0
Mean	2.11	1250
1 Std Dev Above	4.61	248
2 Std Dev Above	7.10	54
3 Std Dev Above	9.60	77
(Outside of 3 Std Dev)		52

Kurtosis (C): 5.15015
Skewness (C): 2.37124

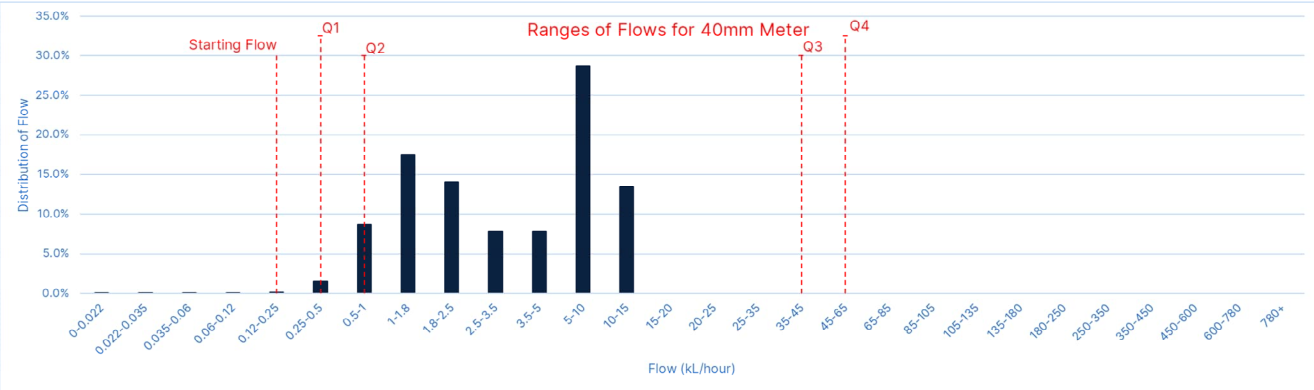
Kurtosis = 5.15 Mean = 2.11
Skewness = 2.37
Mean = 2.11, Kurtosis = 5.15, Skewness = 2.37

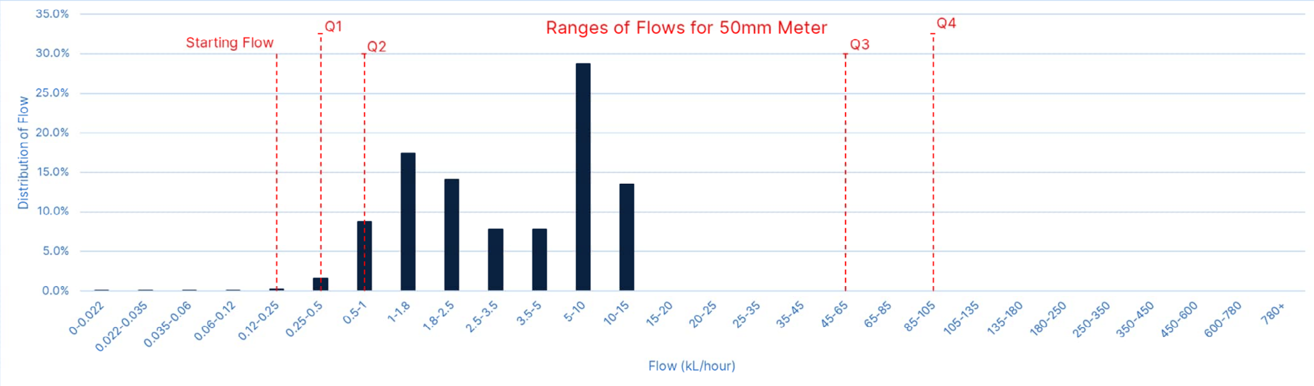


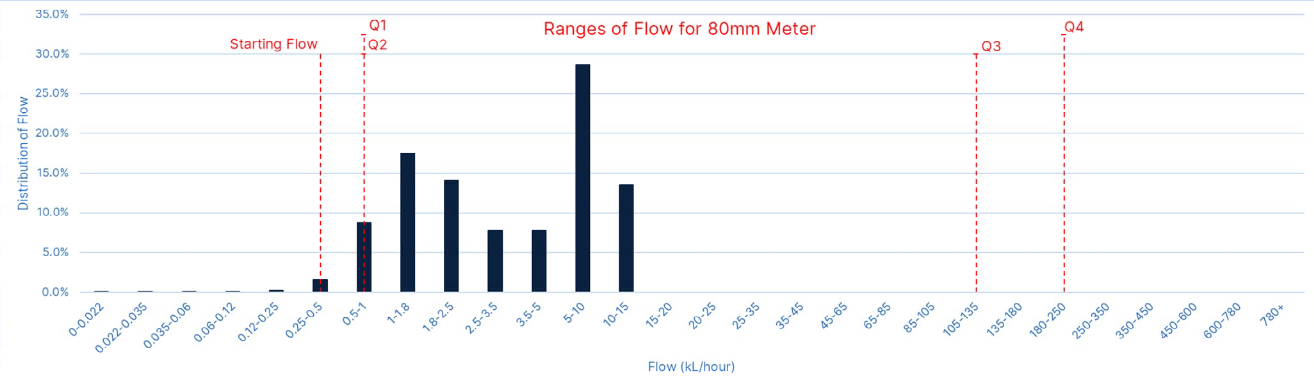
S-W1-9 Meter Size Comparison
SumRange:
F3
F1684

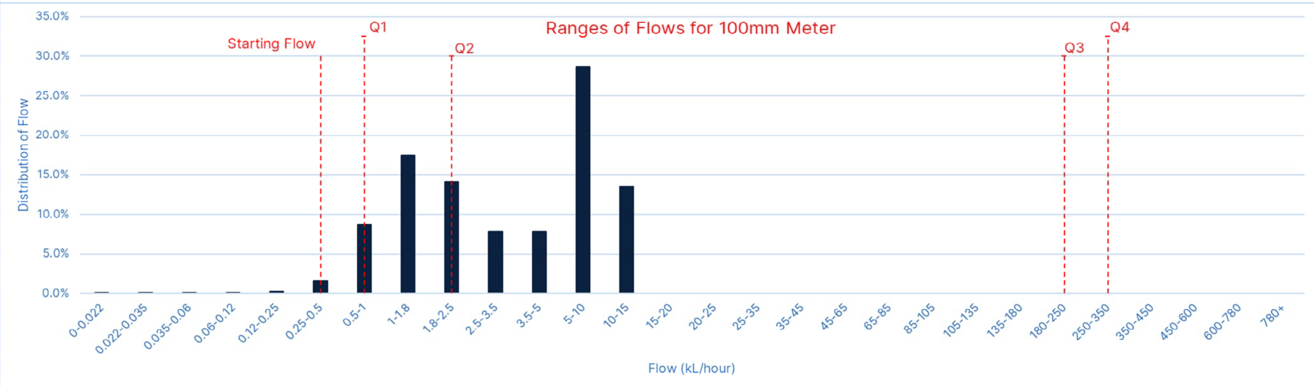
Diameter	40		50		80		100		150		15		25		32		
MeterFlow[#All]	MeterFlow[#Headers]										DomFlow[	DomFlow[#Headers]					
	Meter - 40		**Meter - 50**		**Meter - 80**		**Meter - 100**		**Meter - 150**		**DOM - 15**		**DOM - 25**		**DOM - 32**		
< Starting Flow	0.15	0.1%	0.15	0.1%	0.25	0.3%	0.25	0.3%	1	10.6%	0.002	0.0%	0.0132	0.0%	-	0.0%	<Starting Flow
sf - qmin	0.3	0.4%	0.3	0.4%	0.5	1.6%	0.8	5.9%	1.8	17.5%	0.0156	0.0%	0.035	0.0%	0.063	0.0%	Starting Flow
qmin - qt	0.8	5.7%	0.7	4.1%	0.8	4.4%	1.8	21.9%	4	24.9%	0.025	0.0%	0.0525	0.0%	0.1	0.0%	Minimum Flow Rate (Q1)
qt - qp	40	93.8%	50	95.5%	120	93.8%	230	71.9%	450	47.0%	2.5	42.2%	3.5	50.0%	10	86.4%	Transitional Flow Rate (Q2)
qp - qs	60	0.0%	90	0.0%	200	0.0%	300	0.0%	600	0.0%	3.125	4.0%	7	14.7%	12.5	12.8%	Permanent Flow Rate (Q3)
qs -1.3 qs	78	0.0%	117	0.0%	260	0.0%	390	0.0%	780	0.0%	4.0625	7.0%	9.1	13.8%	16.25	0.7%	Maximum Flow Rate (Q4)
		0.0%		0.0%		0.0%		0.0%		0.0%		46.8%		21.5%		0.0%	>Maximum Flow Rate
		100%		**100%**		**100%**		**100%**		**100%**		**53%**		**79%**		**100%**	

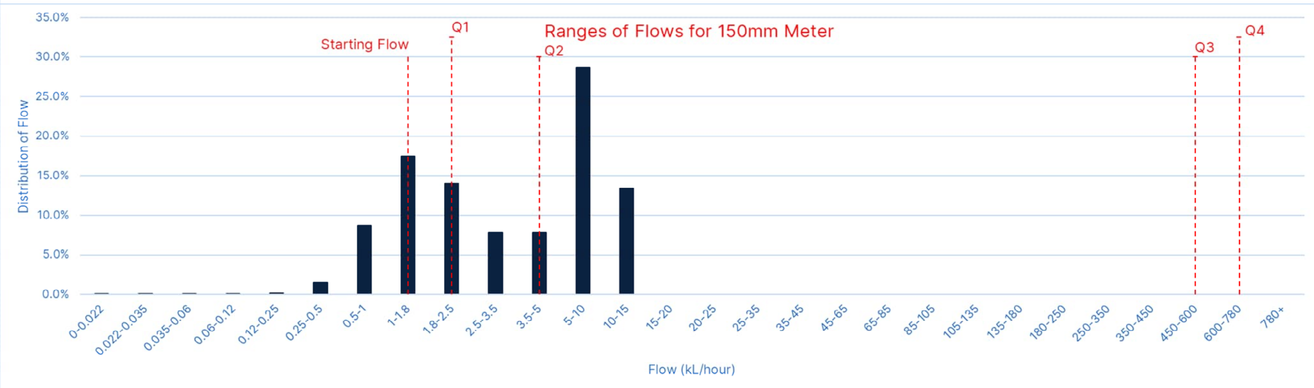
METER SIZING COMPARISON











S-W1-9 Consumption Distribution | Indicate which bar interval the vertical line must plot

Meter - 80 mm	0.000			1	**Meter - 40**		**Meter - 50**		**Meter - 80**		**Meter - 100**		**Meter - 150**		
	0.022	0.0%	***0-0.022***	2	0.15	5	0.15	5	0.25	6	0.25	6	1	8	***Starting Flow***
	0.035	0.0%	***0.022-0.035***	3	0.3	6	0.3	6	0.5	7	0.8	7	1.8	9	***Q1***
	0.060	0.0%	***0.035-0.06***	4	0.8	7	0.7	7	0.8	7	1.8	9	4	11	***Q2***
	0.120	0.0%	***0.06-0.12***	5	40	17	50	18	120	21	230	23	450	26	***Q3***
	0.250	0.2%	***0.12-0.25***	6	60	18	90	20	200	23	300	24	600	27	***Q4***
	0.500	1.6%	***0.25-0.5***	7											
	1.000	8.7%	***0.5-1***	8											
	1.800	17.5%	***1-1.8***	9											
	2.500	14.1%	***1.8-2.5***	10											
	3.500	7.8%	***2.5-3.5***	11											
	5.000	7.8%	***3.5-5***	12											
	10.000	28.7%	***5-10***	13											
	15.000	13.5%	***10-15***	14											
	20.000	0.0%	***15-20***	15											
	25.000	0.0%	***20-25***	16											
	35.000	0.0%	***25-35***	17											
	45.000	0.0%	***35-45***	18											
	65.000	0.0%	***45-65***	19											
	85.000	0.0%	***65-85***	20											
	105.000	0.0%	***85-105***	21											
	135.000	0.0%	***105-135***	22											
	180.000	0.0%	***135-180***	23											
	250.000	0.0%	***180-250***	24											
	350.000	0.0%	***250-350***	25											
	450.000	0.0%	***350-450***	26											
	600.000	0.0%	***450-600***	27											
	780.000	0.0%	***600-780***	28											
		0.0%	780+												

WEIGHTED ACCURACY

ESTIMATED APPARENT LOSSES DUE TO METER SIZE

Existing Meter Size:	80 mm		Alternative Meter Size:	50 mm	***Domestic size not viable***
Existing Meter Accuracy:	95.84%		Alternative Meter Accuracy:	96.17%	***N/A***
Apparent Losses Due To Meter Size:	4.16%		Apparent Losses Due To Meter Size:	3.83%	***Reduction in losses: -0.34%***
	2.20	kL/day		2.02	kL/day
	66.08	kL/month		60.71	kL/month
	803.99	kL/year		738.61	kL/year
Existing Meter Comment:	Alternative meter is more suitable		Additional consumption registered:	8.13%	***based on AADD and alternative meter size***

ESTIMATED EFFECT ON MUNICIPAL REVENUE

Billed Consumption:		1522.42	kL/month	***based on the AADD determined for the existing logged meter***					
Billed Amount (2013/2014):	R	32 961.38	/month	***using the CoJ rising block tariffs***	Billed Amount (2023/2024):	R	109 229.47	/month	***using the CoJ rising block tariffs***
Revenue Loss (2013/2014):	R	1 447.84	***based on the Apparent Losses determined for the existing meter***		Revenue Loss (2013/2014):	R	1 330.10	***based on the Apparent Losses determined for the alternative meter***	
Revenue Loss (2023/2024):	R	4 807.43			Revenue Loss (2023/2024):	R	4 416.46		
Additional revenue that would have been generated if the alternative meter was employed:						R	390.97	/month	***comparing 2023/2024***

S-W1-9 Weighted Accuracy
Meter - 80 mm
80

	Meter	**Existing Meter**		
Diameter	MeterAccuracy[#All]			
40	96.09%			
50	96.17%		Apparent Loss	Consumption not read over logging period
80		95.84%	2.62%	1.367413 kL/day
100	94.55%			41.0224 kL/month
150	83.14%			499.1059 kL/year
		95.84%		

% Accuracy

	Make A Type 1	**Make B Type 2**	**Make C Type 3**	**Make C Type 4**	**Make C Type 5**	**Make C Type 6**	**Make C Type 7**	**Dom**
Diameter	Accuracy[#	Accuracy[	Accuracy[#All]	Accuracy[#All]	Accuracy[#	Accuracy[#	Accuracy[#All]	DomAccuracy[#All]
40	96.5%	95.9%	96.4%	-	96.1%	-	-	
50	96.5%	95.9%	96.4%	96.5%	96.2%	-	96.0%	
80	96.5%	94.7%	96.3%	96.5%	95.8%	-	94.5%	
100	96.4%	94.6%	96.1%	96.5%	94.5%	-	94.4%	
150	96.4%	85.0%	94.6%	-	83.1%	96.5%	91.9%	
15								51.0%
25								75.2%
32								96.5%

S-W1-9 Alternative Domestic Size Viable

Diameter	qs -1.3 qs	>1.3qs	
15	7.0%	46.8%	15mm not viable
25	13.8%	21.5%	25mm not viable
32	12.8%	0.7%	32mm not viable
	% flow within flow range		

S-W1-9 Municipal Revenue (Step Tariffs)
Multi-Residential
1522.42 kL/month

Residential Tariffs

	2013/2014 Tariffs		**Billed**	**Check**	**2023/2024 Tariffs**		**Billed**	**Check**
6	0-6	R -	R -		0-6	R -	R -	
10	>6-10	R 5.84	R 23.36	R 23.36	>6-10	R 24.33	R 97.32	R 97.32
15	>10-15	R 9.27	R 46.35	R 46.35	>10-15	R 25.39	R 126.95	R 126.95
20	>15-20	R 12.91	R 64.55	R 64.55	>15-20	R 35.60	R 178.00	R 178.00
30	>20-30	R 16.86	R 168.60	R 168.60	>20-30	R 49.20	R 492.00	R 492.00
40	>30-40	R 17.88	R 178.80	R 178.80	>30-40	R 53.81	R 538.10	R 538.10
50	>40	R 21.91	R 32 479.72	R 32 479.72	>40-50	R 67.89	R 678.90	R 678.90
					>50	R 72.75	R 107 118.20	R 107 118.20
		Total Billed	**R 32 961.38**				**R 109 229.47**	

Business Tariffs

	2013/2014 Tariffs		**Billed**	**Check**	**2023/2024 Tariffs**		**Billed**	**Check**
200	<200	R 20.96	R 4 192.00	R 4 192.00	<200	R 57.61	R 11 522.00	R 11 522.00
	>200	R 21.72	R 28 722.86	R 28 722.86	>200	R 60.78	R 80 376.39	R 80 376.39
		Total Billed	**R 69 633.09**				**R 308 924.96**	