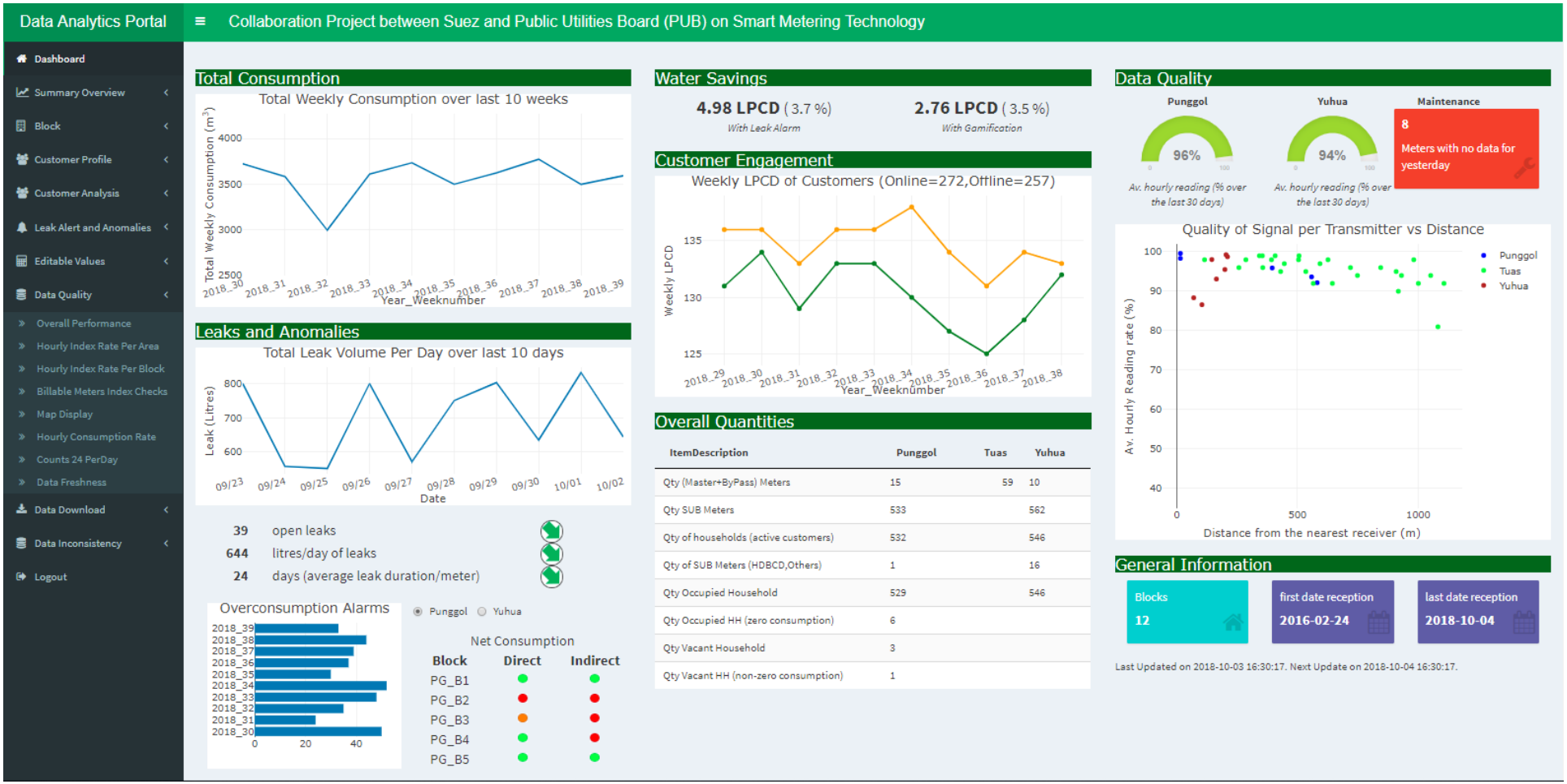
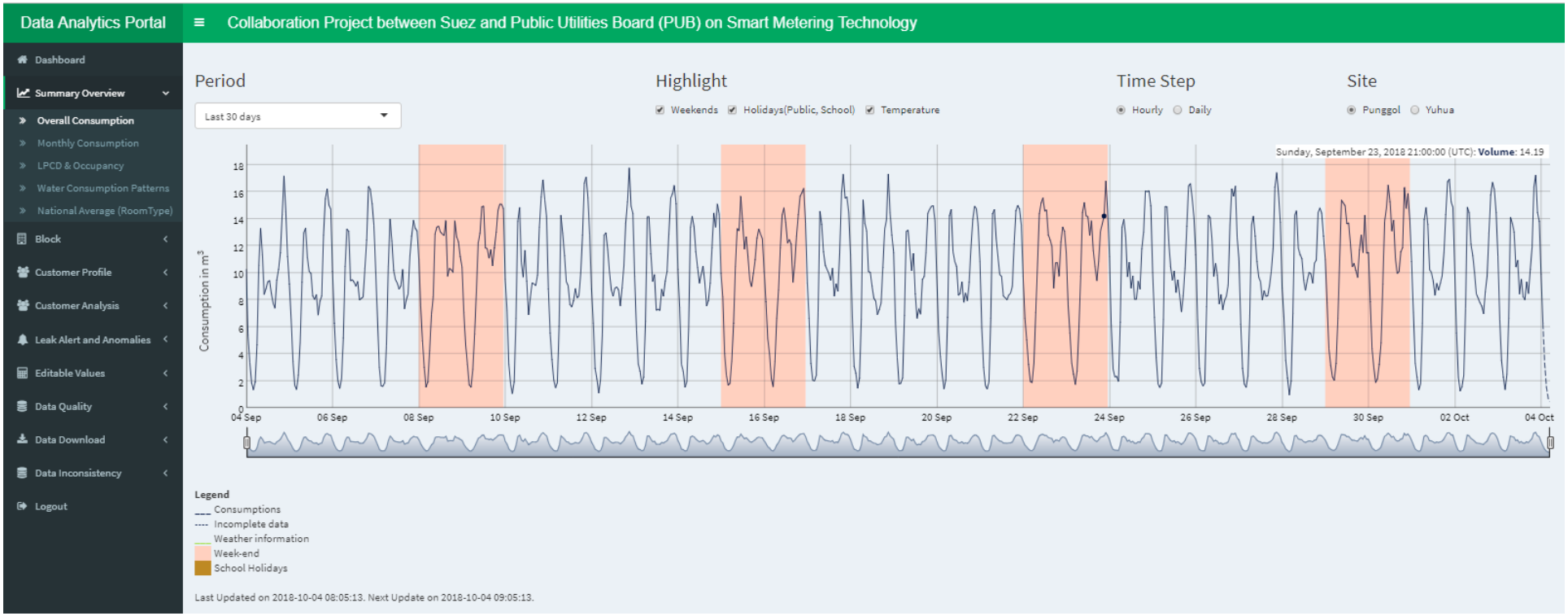
Data Analytics Portal Printscreens




Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Overall Consumption
Monthly Consumption
LPCD & Occupancy
Water Consumption Patterns
National Average (RoomType)
Block
Customer Profile
Customer Analysis
Leak Alert and Anomalies
Editable Values
Data Quality
Data Download
Data Inconsistency
Logout
Period
Last 30 days
Highlight
Weekends
Holidays(Public, School)
Temperature
Time Step
Hourly
Daily
Site
Punggol
Yuhua
Sunday, September 23, 2018 21:00:00 (UTC): Volume: 14.19
Consumption in m³
0
2
4
6
8
10
12
14
16
18
04 Sep
06 Sep
08 Sep
10 Sep
12 Sep
14 Sep
16 Sep
18 Sep
20 Sep
22 Sep
24 Sep
26 Sep
28 Sep
30 Sep
02 Oct
04 Oct
Legend
Consumptions
Incomplete data
Weather information
Week-end
School Holidays
Last Updated on 2018-10-04 08:05:13. Next Update on 2018-10-04 09:05:13.


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Overall Consumption
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Block
Customer Profile
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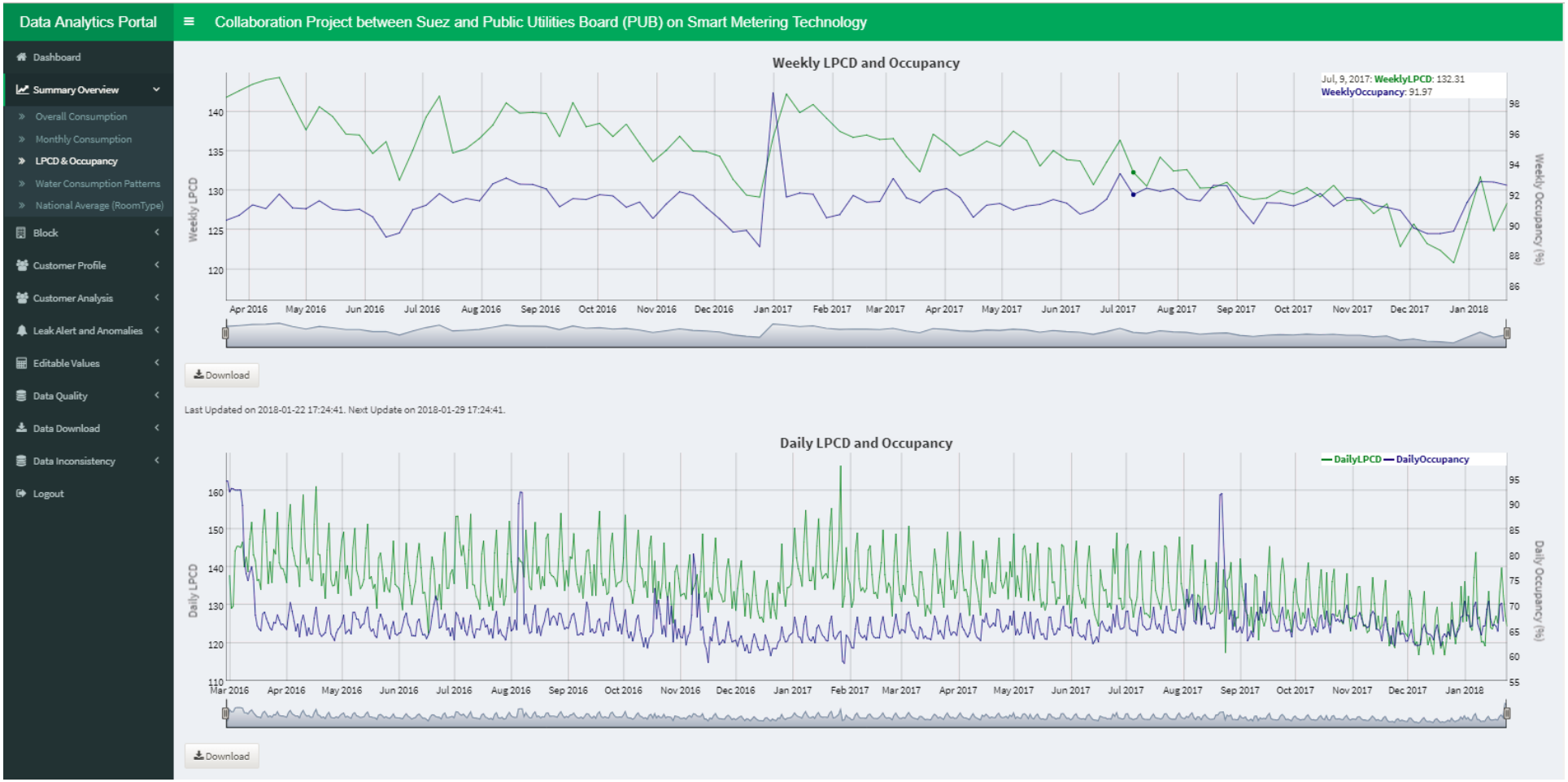
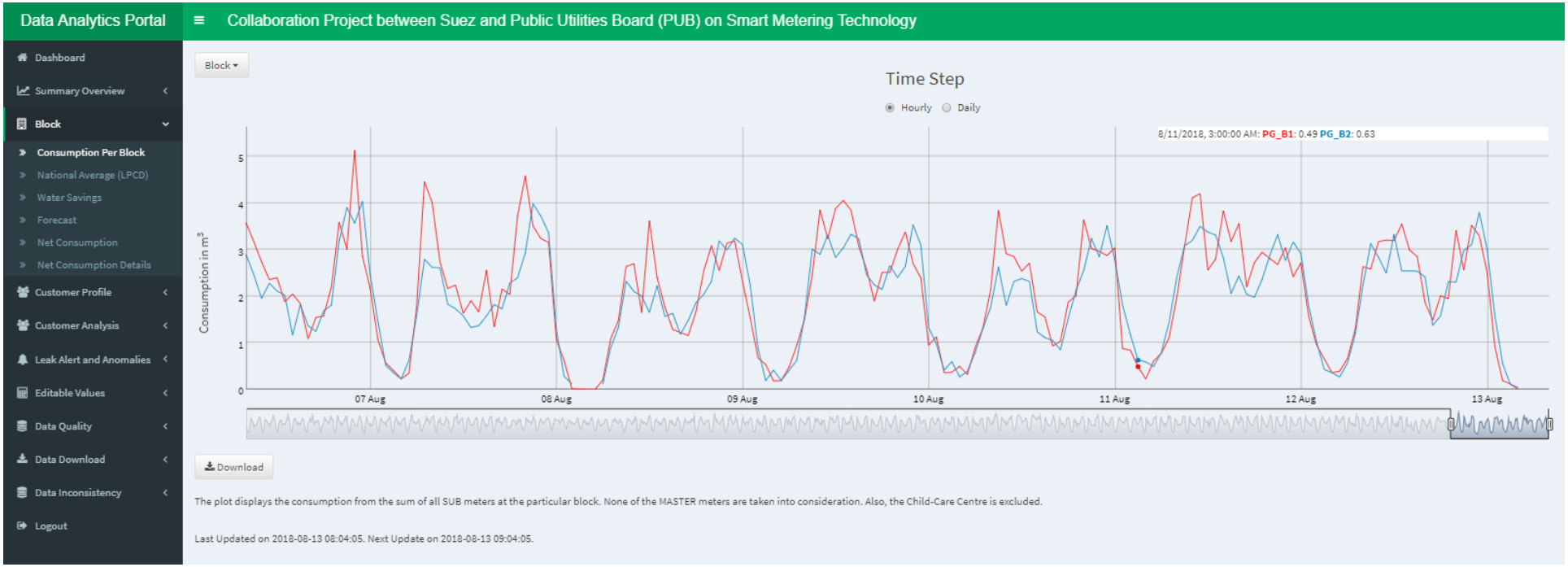
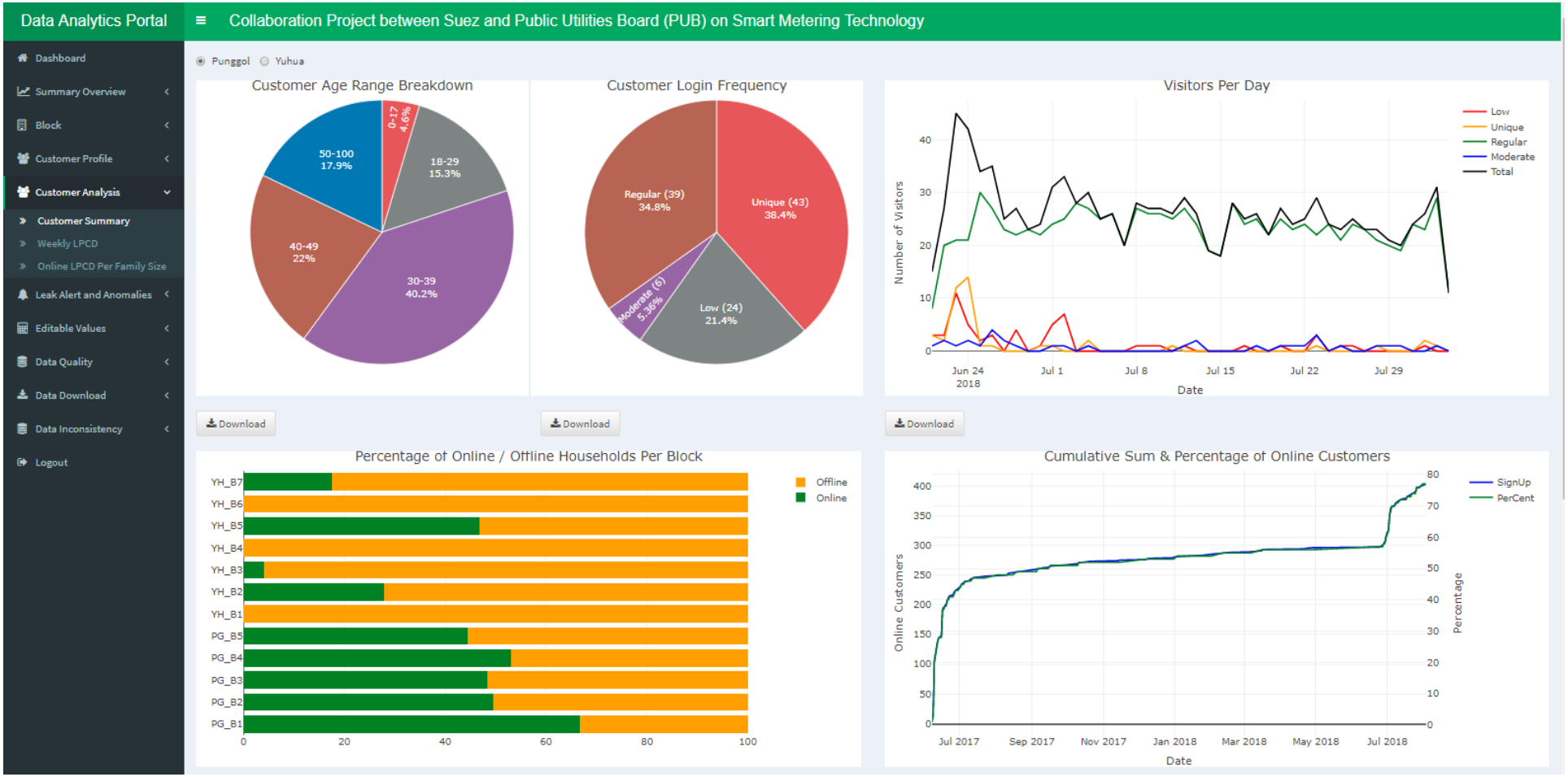
Editable Values
Data Quality
Data Download
Data Inconsistency
Logout
Punggol
Yuhua
Monthly Consumption
Consumption (m3)
Month
Year 2016 2017 2018
Total consumption of only the submeters per month, excluding Child Care Centre.
Download
Average LPCD
Average LPCD (Litres Per Capita Per Day)
Month
Year 2016 2017 2018


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Overall Consumption
Monthly Consumption
LPCD & Occupancy
Water Consumption Patterns
National Average (RoomType)
Block
Customer Profile
Customer Analysis
Leak Alert and Anomalies
Editable Values
Data Quality
Data Download
Data Inconsistency
Logout
Weekly LPCD and Occupancy
Jul, 9, 2017: WeeklyLPCD: 132.31
WeeklyOccupancy: 91.97
Weekly LPCD
Weekly Occupancy (%)
Download
Last Updated on 2018-01-22 17:24:41. Next Update on 2018-01-29 17:24:41.
Daily LPCD and Occupancy
DailyLPCD
DailyOccupancy
Daily LPCD
Daily Occupancy (%)
Download


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Block
Consumption Per Block
National Average (LPCD)
Water Savings
Forecast
Net Consumption
Net Consumption Details
Customer Profile
Customer Analysis
Leak Alert and Anomalies
Editable Values
Data Quality
Data Download
Data Inconsistency
Logout
Block
Time Step
Hourly
Daily
8/11/2018, 3:00:00 AM: PG_B1: 0.49 PG_B2: 0.63
Consumption in m³
0
1
2
3
4
5
07 Aug
08 Aug
09 Aug
10 Aug
11 Aug
12 Aug
13 Aug
Download
The plot displays the consumption from the sum of all SUB meters at the particular block. None of the MASTER meters are taken into consideration. Also, the Child-Care Centre is excluded.
Last Updated on 2018-08-13 08:04:05. Next Update on 2018-08-13 09:04:05.


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Block
Customer Profile
Customer Analysis
Customer Summary
Weekly LPCD
Online LPCD Per Family Size
Leak Alert and Anomalies
Editable Values
Data Quality
Data Download
Data Inconsistency
Logout
Punggol
Yuhua
Customer Age Range Breakdown
0-17 4.6%
18-29 15.3%
30-39 40.2%
40-49 22%
50-100 17.9%
Customer Login Frequency
Unique (43) 38.4%
Low (24) 21.4%
Moderate (6) 5.36%
Regular (39) 34.8%
Visitors Per Day
Low
Unique
Regular
Moderate
Total
Number of Visitors
Jun 24 2018
Jul 1
Jul 8
Jul 15
Jul 22
Jul 29
Date
Download
Download
Download
Percentage of Online / Offline Households Per Block
Offline
Online
YH_B7
YH_B6
YH_B5
YH_B4
YH_B3
YH_B2
YH_B1
PG_B5
PG_B4
PG_B3
PG_B2
PG_B1
Cumulative Sum & Percentage of Online Customers
SignUp
PerCent
Online Customers
Percentage
Jul 2017
Sep 2017
Nov 2017
Jan 2018
Mar 2018
May 2018
Jul 2018
Date

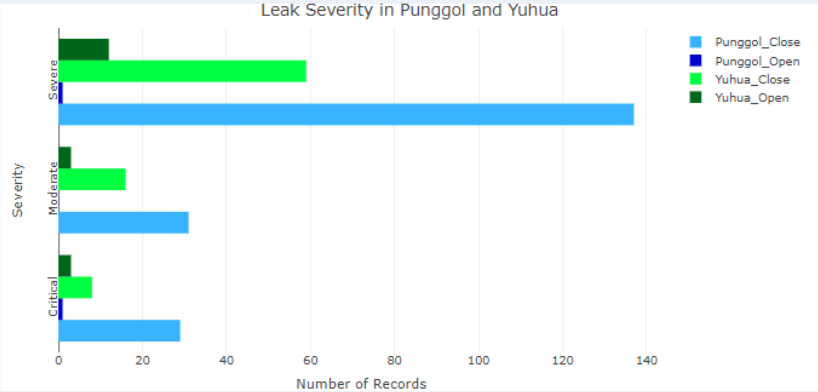
Data Analytics Portal ≡ Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology

- Dashboard
- Summary Overview
- Block
- Customer Profile
- Customer Analysis
- Leak Alert and Anomalies
  - Leaks
  - Leak Volume
  - Overconsumption
  - Zero Consumption
  - Meters Stop Suspicion
  - Unexpected Consumption
- Editable Values
- Data Quality
- Data Download
- Data Inconsistency
- Logout

Page 1 of 30 Rows per page 10

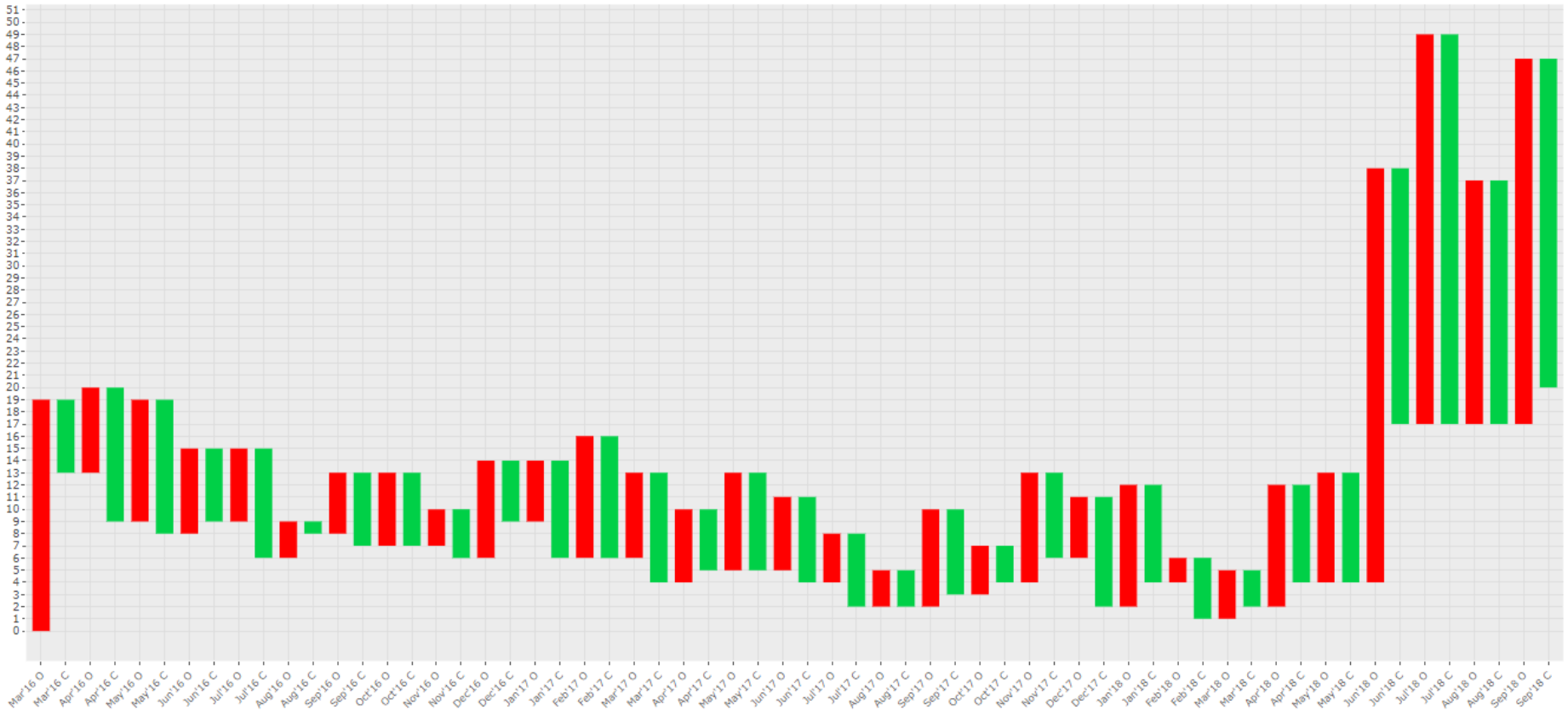
family_id	service_point_sn	meter_type	site	start_date	end_date	duration	min5flow_ave	severity	status	online_status	Comments
2269	3003506974	SUB	Yuhua	2018-09-25		8	1	Severe	Open	ACTIVE	
2081	3000977099	SUB	Yuhua	2018-08-24		40	3	Severe	Open	INACTIVE	
2198	3001098882	SUB	Yuhua	2018-08-29		6	11	Critical	Open	ACTIVE	
2249	3003505641	SUB	Yuhua	2018-09-08		25	1	Severe	Open	INACTIVE	
2387	3000727226	SUB	Yuhua	2018-09-30		3	2	Moderate	Open	INACTIVE	
2386	3000726669	SUB	Yuhua	2018-09-23		10	1	Severe	Open	INACTIVE	
1993	3003366453	SUB	Yuhua	2018-09-26		7	3	Severe	Open	INACTIVE	
1994	3003367219	SUB	Yuhua	2018-09-30		3	1	Moderate	Open	INACTIVE	
2055	3003368424	SUB	Yuhua	2018-09-27		6	1	Severe	Open	INACTIVE	
1931	3000852270	SUB	Yuhua	2018-09-12		21	2	Severe	Open	INACTIVE	

SUEZ INTELLECTUAL PROPERTY Save Download

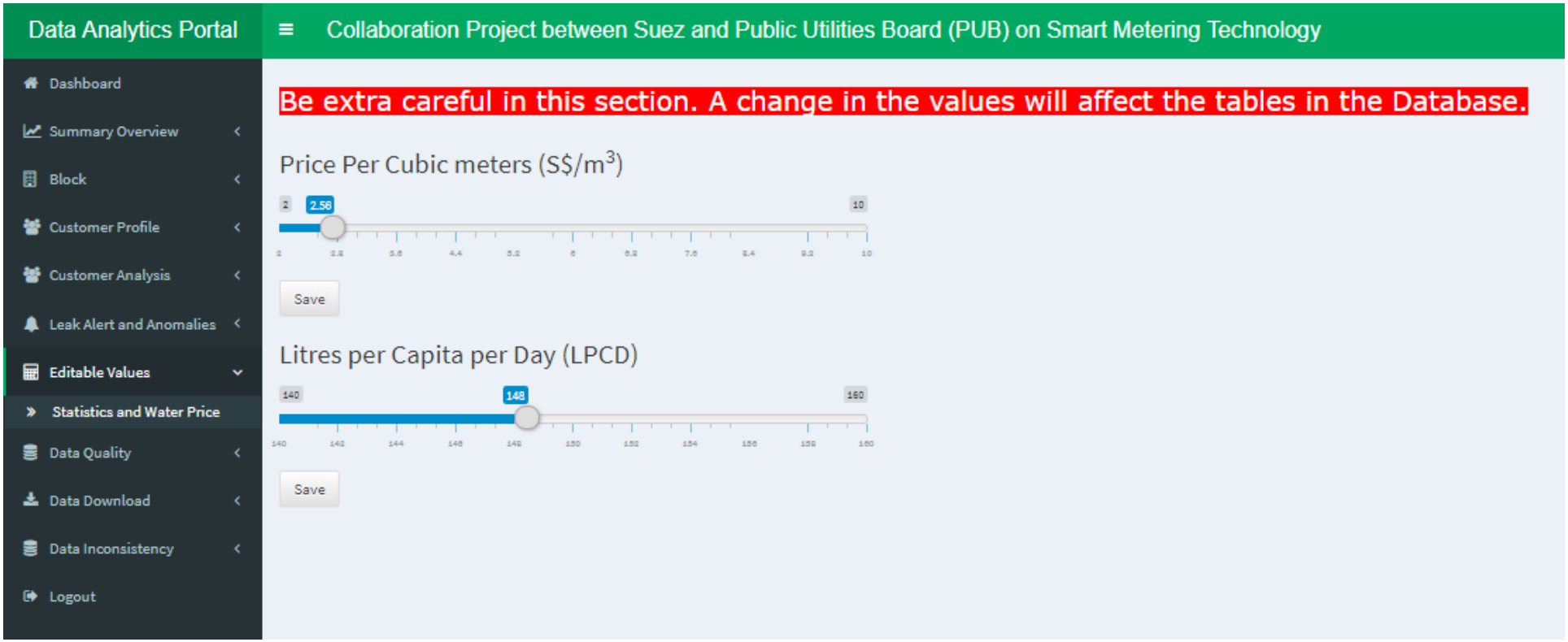


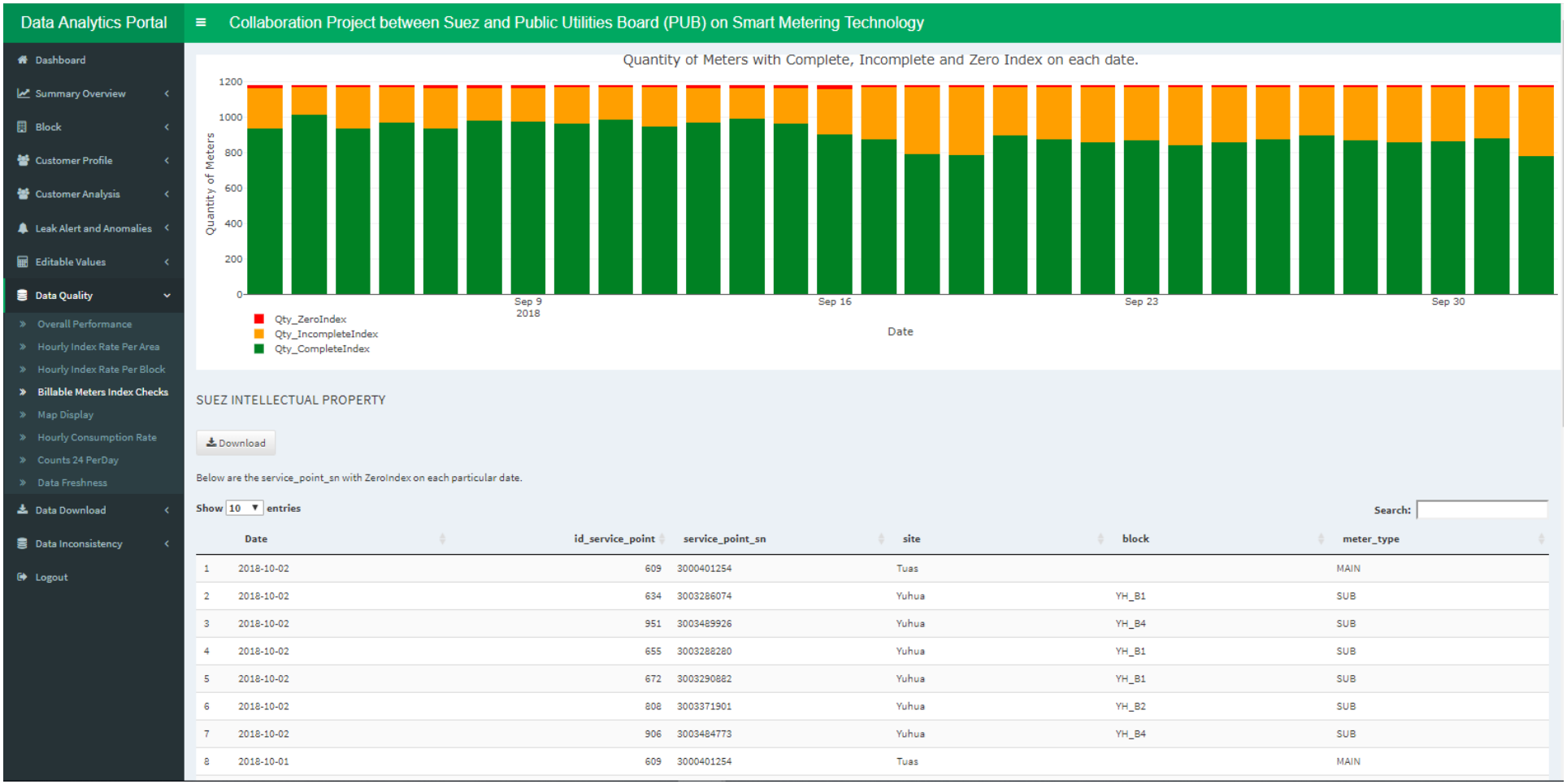
The table above displays one row per leak case, which can be sorted by clicking on the column name.
The leak status is:
- Open if the Min5_flow of the last 3 days is above 0
- Close if the Min5_flow of the last 3 days is = 0
The column "min5flow_ave" is the average of the min flow 5 over the last 3 days from:
- now if the leak is opened.
- the end_date if the leak is closed.
The duration is either the number of days between:
- start_date and end_date (inclusively), for Close status.
- start_date and yesterday (inclusively), for Open status.
Severity of leak is based on its duration and min5flow_ave.
a) Moderate: duration < 5 consecutive days & min5flow_ave < 10 litres per hour.
b) Severe: duration < 5 consecutive days & min5flow_ave >= 10 litres per hour OR duration >= 5 consecutive days & min5flow_ave < 10 litres per hour.
c) Critical: duration >= 5 consecutive days & min5flow_ave >= 10 litres per hour.
The column online_status = ACTIVE refers to online customers whereas online_status = INACTIVE refers to offline customers.
If start_date is < AccountActivatedDate, the online_status is INACTIVE.
Take note here for site = Yuhua cases, min5flow_ave refers to the minimum consumption above zero for 3 consecutive days.

Waterfall plot of number of Open (red) and Close (green) leaks for each month.

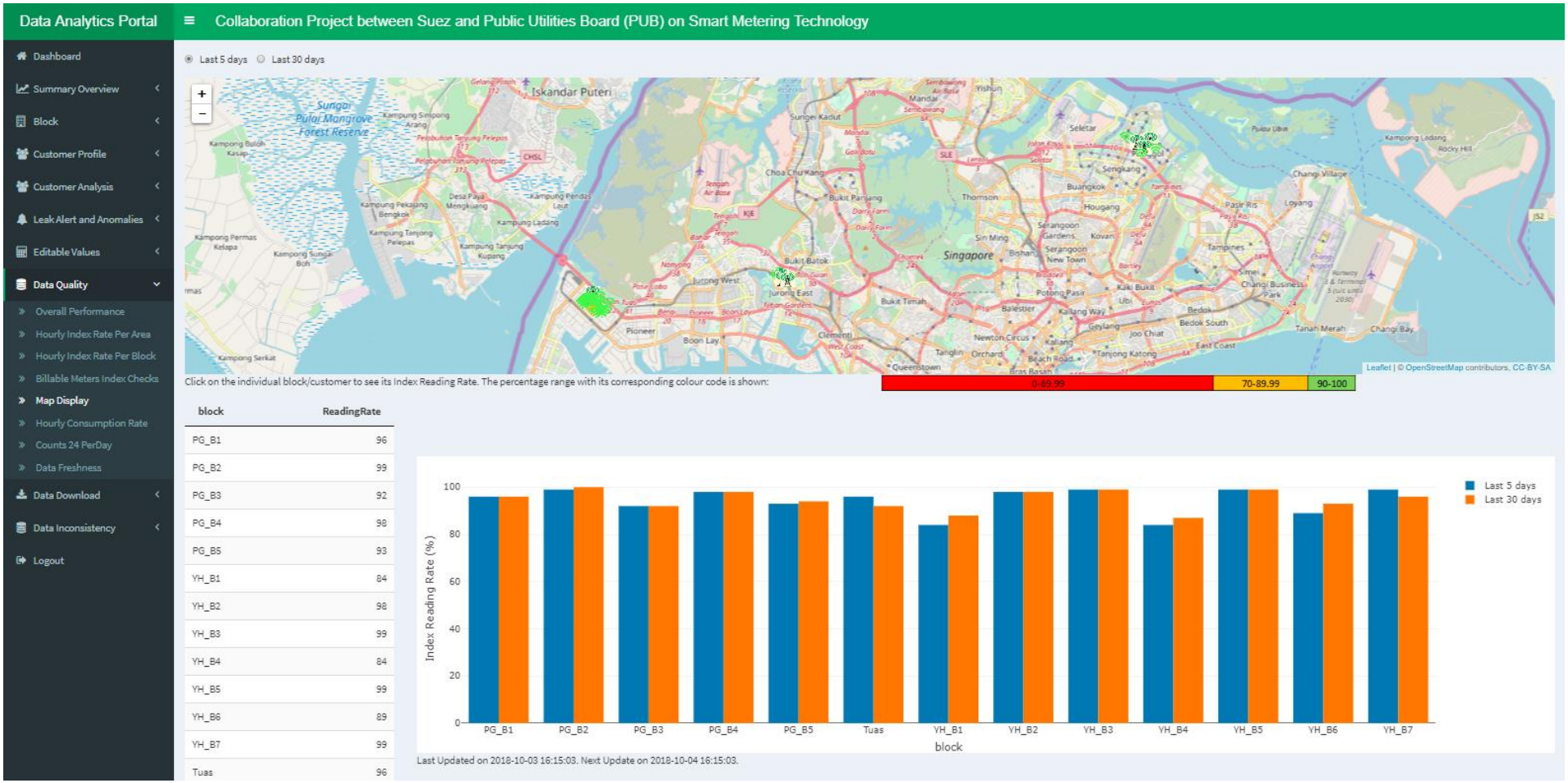


The waterfall plot above shows the number of Leak Alarm which is Open and Close per month. For example, there are 9 Leak Alarms which are Open for the month of Nov in year 2017, and 7 Leak Alarms which are Close for the month of Nov in year 2017.
In June 2018, the number of Open Leaks is significantly higher at 34 due to the Yuhua leaks.


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Block
Customer Profile
Customer Analysis
Leak Alert and Anomalies
Editable Values
Statistics and Water Price
Data Quality
Data Download
Data Inconsistency
Logout
Be extra careful in this section. A change in the values will affect the tables in the Database.
Price Per Cubic meters (S$/m3)
2
2.56
10
Save
Litres per Capita per Day (LPCD)
140
148
160
Save



	Date	id_service_point	service_point_sn	site	block	meter_type
1	2018-10-02	609	3000401254	Tuas		MAIN
2	2018-10-02	634	3003286074	Yuhua	YH_B1	SUB
3	2018-10-02	951	3003489926	Yuhua	YH_B4	SUB
4	2018-10-02	655	3003288280	Yuhua	YH_B1	SUB
5	2018-10-02	672	3003290882	Yuhua	YH_B1	SUB
6	2018-10-02	808	3003371901	Yuhua	YH_B2	SUB
7	2018-10-02	906	3003484773	Yuhua	YH_B4	SUB
8	2018-10-01	609	3000401254	Tuas		MAIN


Data Analytics Portal
Collaboration Project between Suez and Public Utilities Board (PUB) on Smart Metering Technology
Dashboard
Summary Overview
Block
Customer Profile
Customer Analysis
Leak Alert and Anomalies
Editable Values
Data Quality
Overall Performance
Hourly Index Rate Per Area
Hourly Index Rate Per Block
Billable Meters Index Checks
Map Display
Hourly Consumption Rate
Counts 24 PerDay
Data Freshness
Data Download
Data Inconsistency
Logout
Last 5 days
Last 30 days
Iskandar Puteri
Singapore
Leaflet | © OpenStreetMap contributors, CC-BY-SA
Click on the individual block/customer to see its Index Reading Rate. The percentage range with its corresponding colour code is shown:
0-69.99
70-89.99
90-100
block
ReadingRate
PG_B1 96
PG_B2 99
PG_B3 92
PG_B4 98
PG_B5 93
YH_B1 84
YH_B2 98
YH_B3 99
YH_B4 84
YH_B5 99
YH_B6 89
YH_B7 99
Tuas 96
Index Reading Rate (%)
0
20
40
60
80
100
PG_B1
PG_B2
PG_B3
PG_B4
PG_B5
Tuas
YH_B1
YH_B2
YH_B3
YH_B4
YH_B5
YH_B6
YH_B7
block
Last 5 days
Last 30 days
Last Updated on 2018-10-03 16:15:03. Next Update on 2018-10-04 16:15:03.

Short Summary of Data Analytics Portal

(0)Dashboard shows a summarized information of what is contained inside the Data Analytics Portal. Data Analytics Portal was developed to monitor water consumption patterns and identify anomalies in the water network, aiming towards water conservation and improvement of operations.

(1)Feature Engineering: From its hourly consumption data, a few additional tables were created, like occupancy rate (Daily, Weekly, Monthly). This occupancy rate information is used in other parts of the analysis.

(2) From the hourly index data, Data Quality Performance metrics such as Index Rate (Hourly, Daily) are monitored. This Index Rate can be segregated accordingly to different regions and blocks.

(3) The water consumption is forecasted for each customer using Machine Learning algorithms like Random Forest and Support Vector Machine.

(4) Customer Segmentation is performed via Principal Component Analysis and Hierarchical K-Means Clustering to separate cusotmers into distinct groups, for customer engagement purpose.

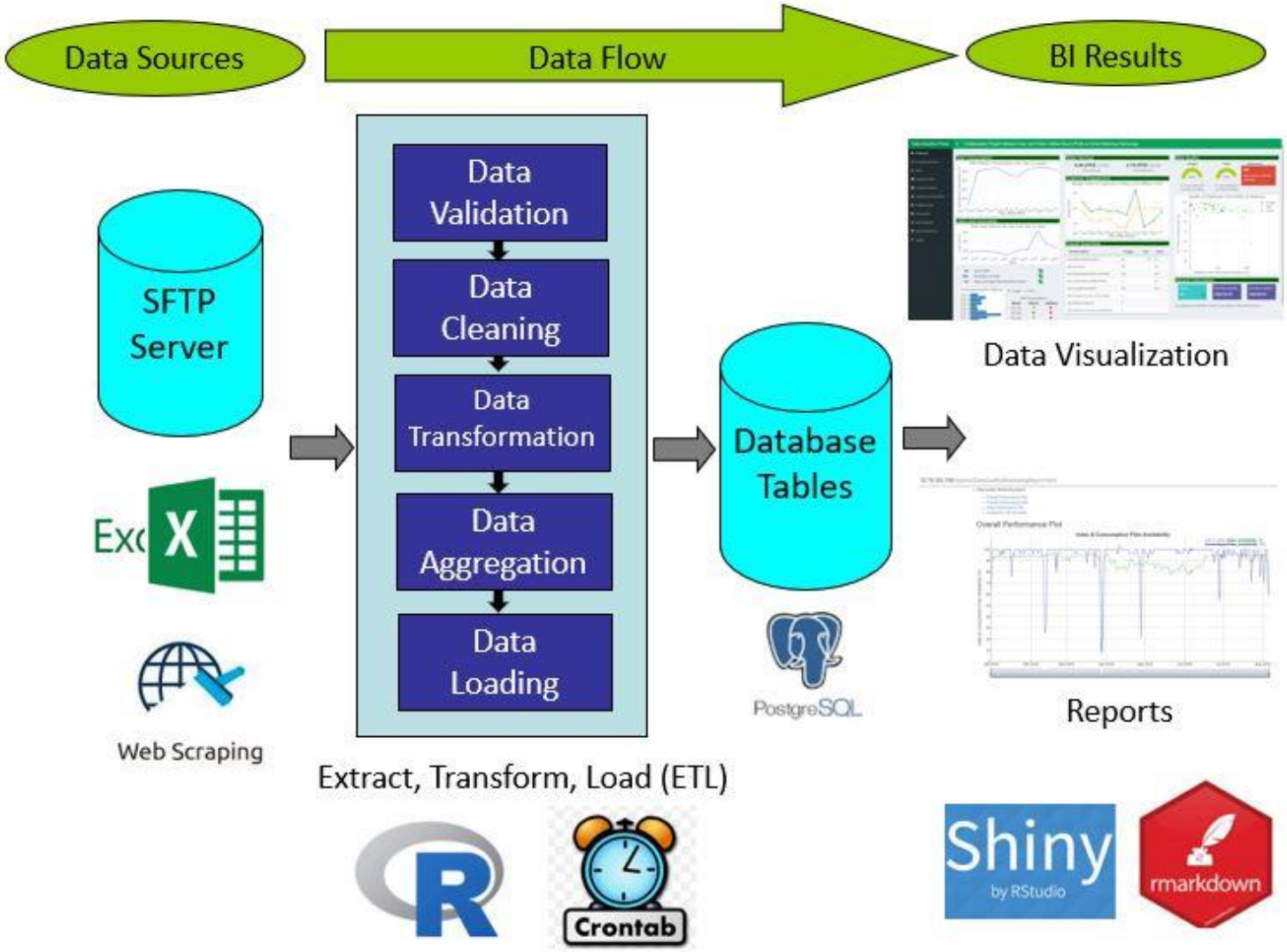
(5) Leaks for individual customer is monitored closely using the Suez IP of Min5_Flow (minimum flow in 5 mins over 3 consecutive days). Its Waterfall plot of the number of Open and Close leaks for each month is displayed graphically.

(6) Water Savings due to Leak and Gamification separately is tabulated using Linear Regression.

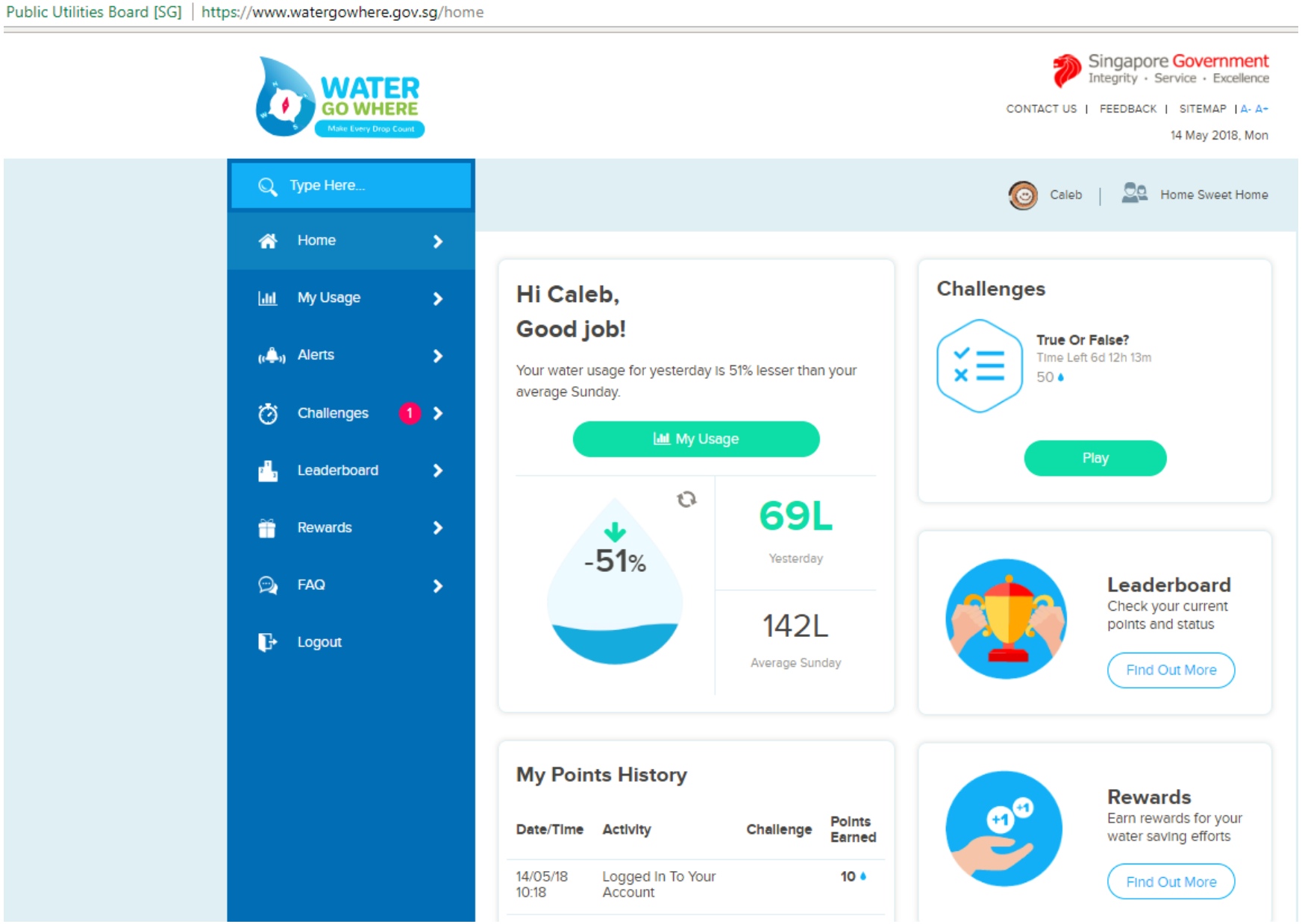
(7) Map Display shows different locations (Punggol, Yuhua and Tuas) with their Index Reading Rate per block for residential customers, and individual Index Reading Rate per meter for the commercial customers. This is very useful to detect any issues with the water meters.

(8) The Data Analytics Portal is updated automatically and periodically using Cron, i.e. a command to the server for a job to be executed at a specified time.

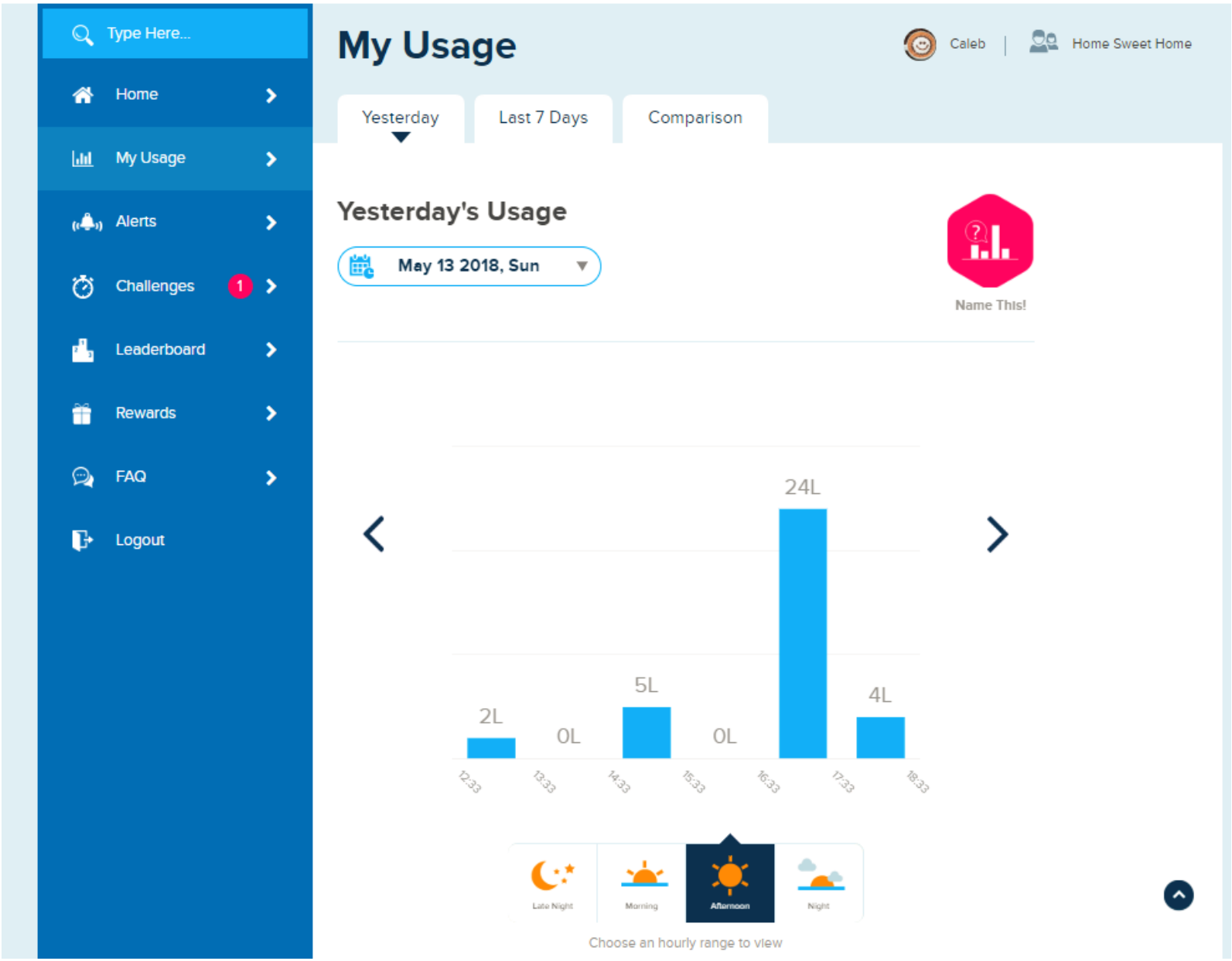
Data Pipeline Architecture



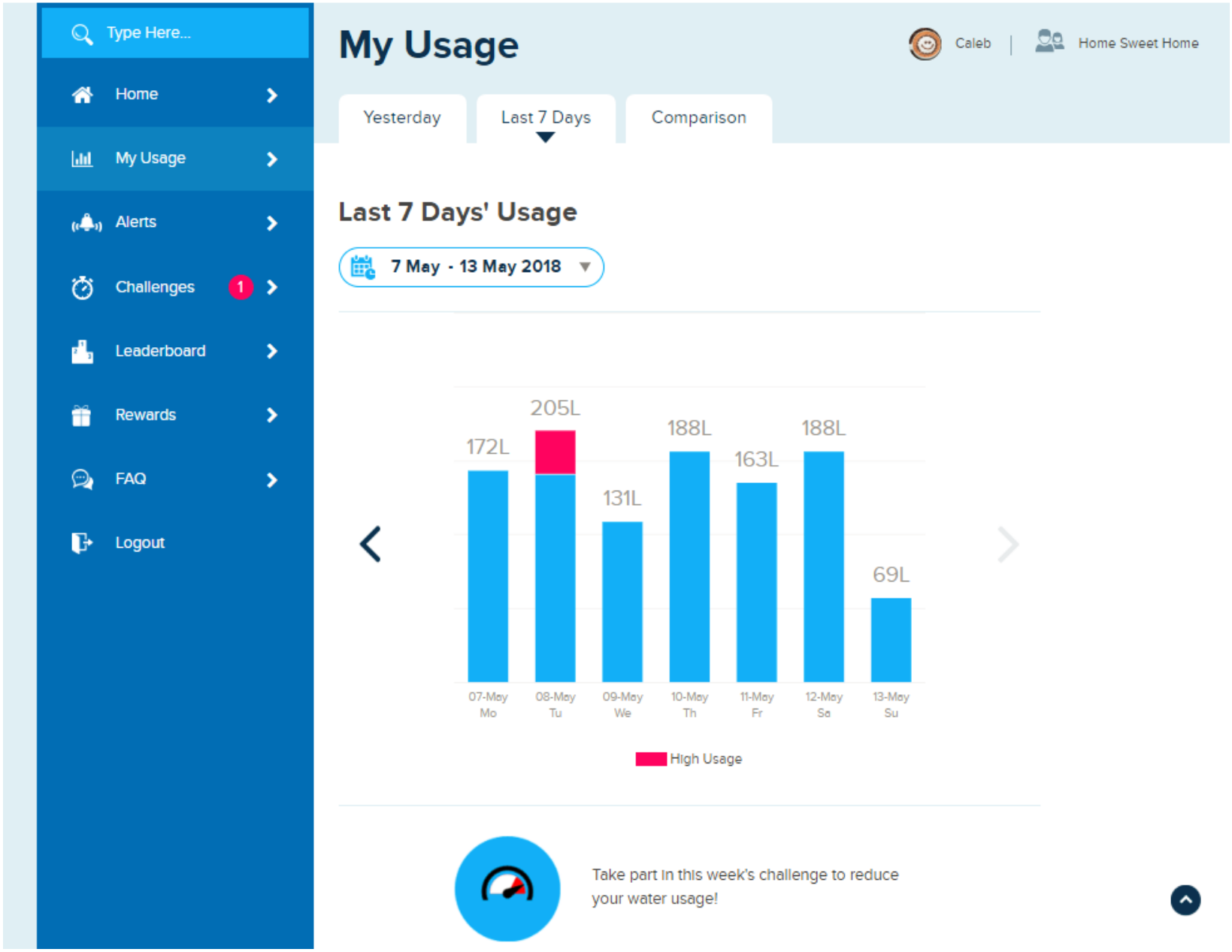
WaterGoWhere Printscreens



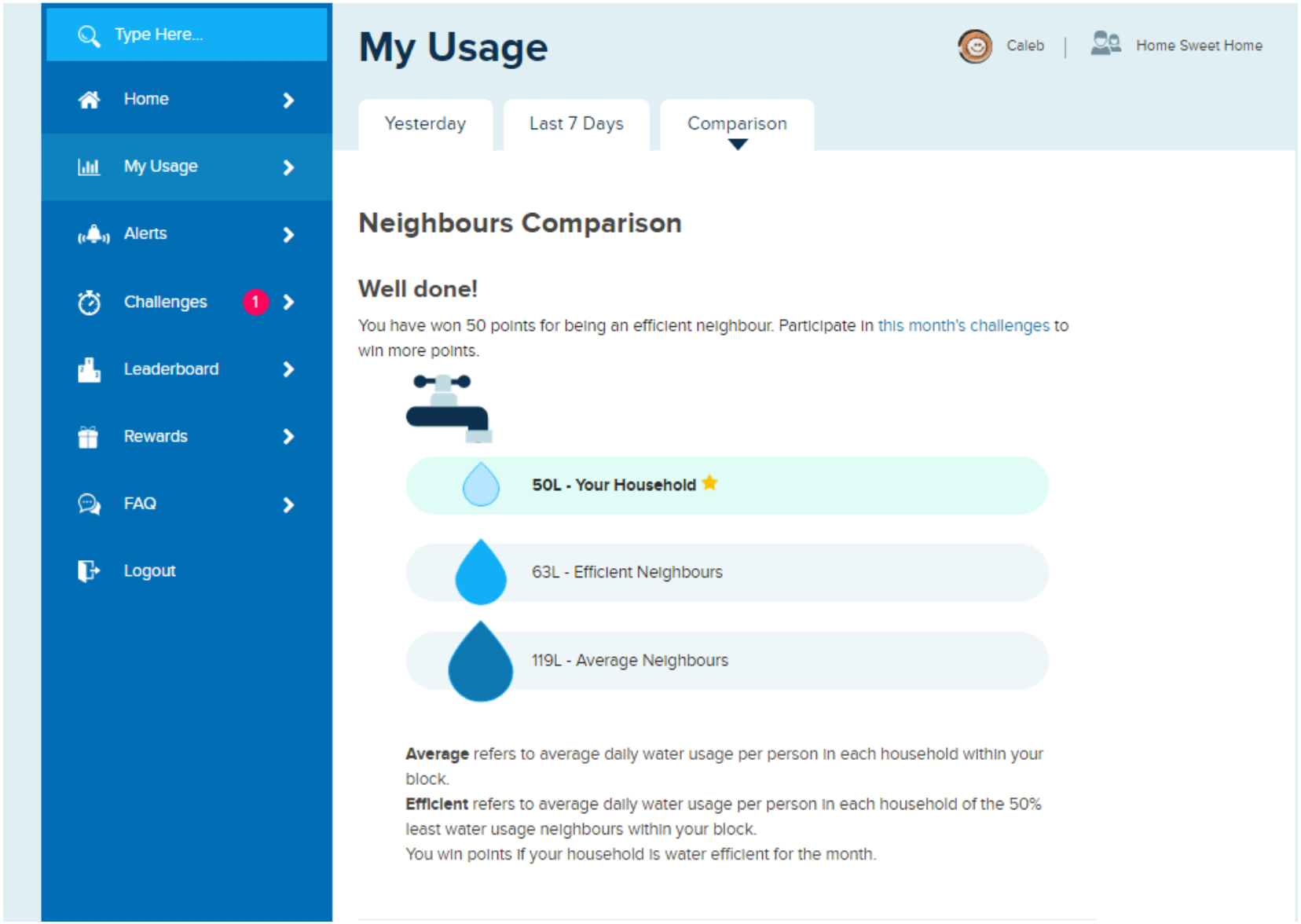
https://www.watergowhere.gov.sg/my-activity



https://www.watergowhere.gov.sg/my-activity

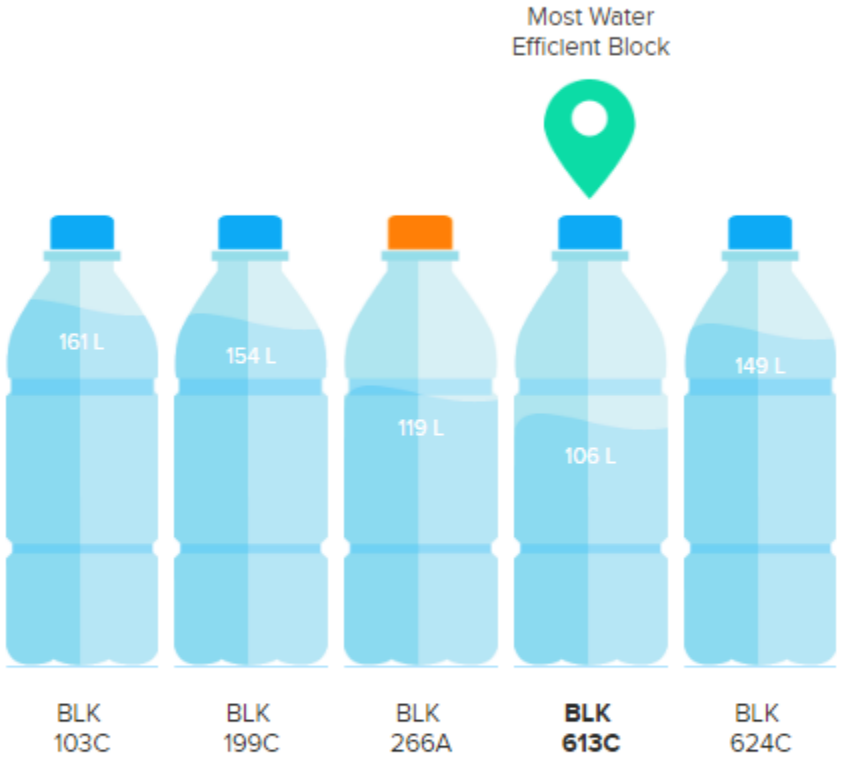


https://www.watergowhere.gov.sg/my-activity



Block Comparison

Try harder this month, Blk 266A!



April 2018

This chart shows the average daily water usage per person for all participating blocks.
You win points if your block is the most water efficient for the month.