

**GE**  
**SMART**  
**ASIA 2018**



**Locate**  
#Locate18



WHEN

**9 – 11 APRIL 2018**

WHERE

**ADELAIDE, AUSTRALIA**

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**GEOSMART ASIA 2017**  
**22-24 AUGUST 2017**  
**PUTRAJAYA INTERNATIONAL CONVENTION CENTRE**

**SMART WATER MANAGEMENT**  
**- LEAK CONTROL & PREVENTION**

BY

HJ. IBRAHIM BIN ABDUL RAHMAN

DIRECTOR NRW MANAGEMENT SECTION

WATER SUPPLY DIVISION- MINISTRY OF ENERGY, GREEN  
TECHNOLOGY AND WATER MALAYSIA

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- ▶ 2) NRW IN MALAYSIA
- ▶ 3) FINANCIAL ALLOCATIONS FOR 11<sup>th</sup>  
MALAYSIA PLAN
- ▶ 4) HOLISTIC & SMART NRW MANAGEMENT SYSTEM

# 1.0 INTRODUCTION



# Global NRW Scenarios

WASTED  
WATER



MORE THAN 1/3 of the world's drinking water supply is **LOST** before it ever reaches consumers, mostly from **UNSEEN LEAKS**



In **DEVELOPING COUNTRIES**



the percentage is even higher:

**40-50%**

This wasted water is called non-revenue water **(NRW)** with estimated **LOST REVENUE** to utilities of

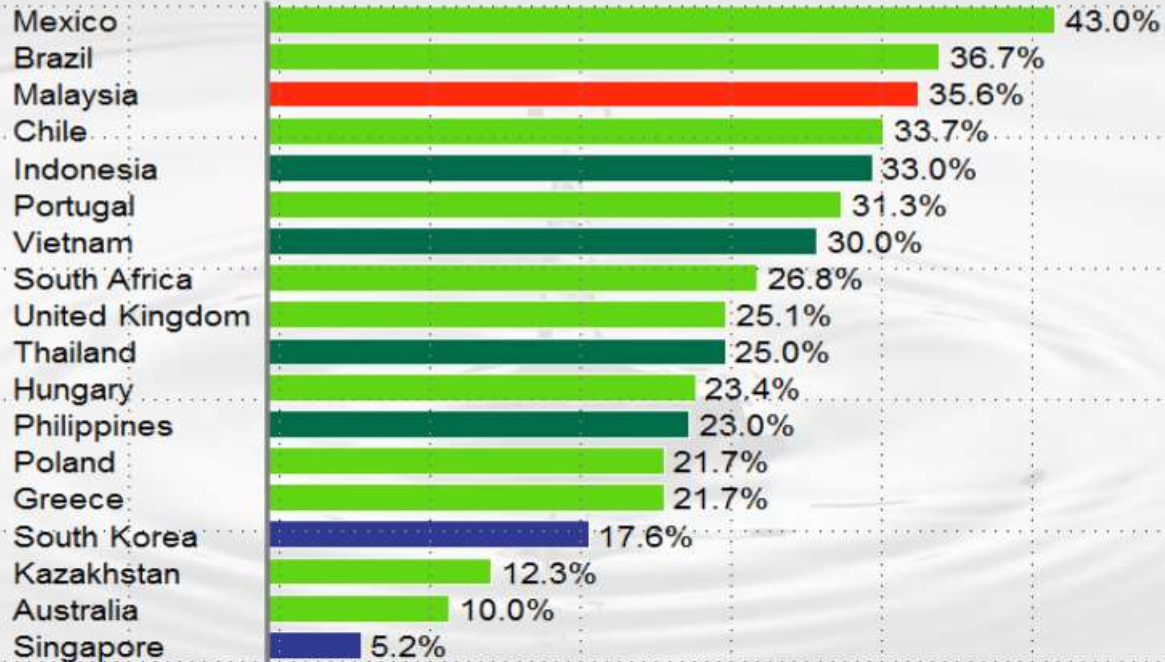
**\$14B** ANNUALLY

Source: *Miya & The World Bank with Clean Edge analysis*

**Benchmarking: NRW is relatively high, and per capita use is among the highest of the benchmark set**

**Non-revenue water**  
Percent of total water

■ ASEAN peer  
■ Aspirational peer  
■ Malaysia  
■ Similar system peer



SOURCE: Information on Malaysian's water tariffs taken from Syarikat Bekalan Air Selangor Sdn Bhd for Kuala Lumpur, SAJ Holdings for Johor Baru, and Perbadanan Bekalan Air Pulau Pinang Sdn Bhd for George Town (Penang). Information on Malaysian's wastewater tariffs taken from IWK.

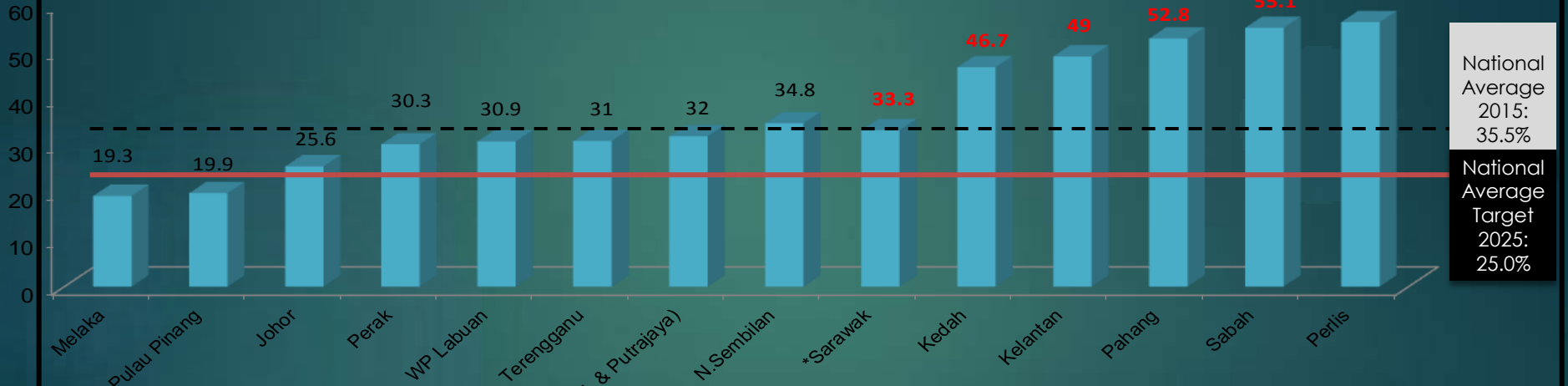




## 2.0 NRW IN MALAYSIA

# Non Revenue Water (NRW) Malaysia 2015

NRW Level (%)



National Average  
2015: 35.5%

National Average Target  
2025: 25.0%

State Water Operators

\*Sarawak State Operator :

- LAKU : 24.1%
- Lembaga Air Sibul : 32.2%
- KWB : 34.9%
- JBALB : 53.0%



# MALAYSIA NRW LEVEL

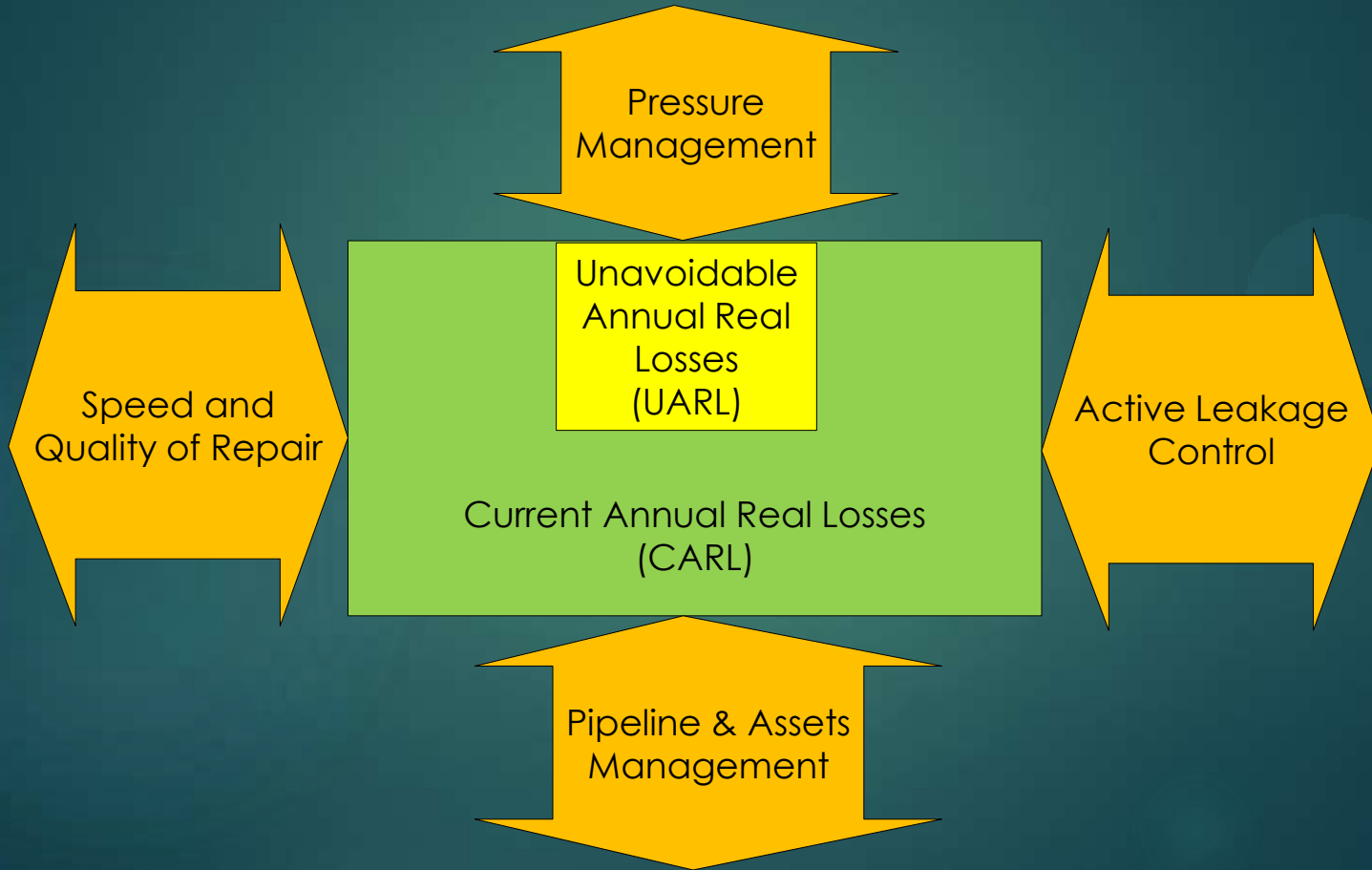


- ▶ 35.5%
- ▶ 5,743 mld (SIV= 16,965 mld)
- ▶ Loss in term of RM- estimated 1.08 Billion annually

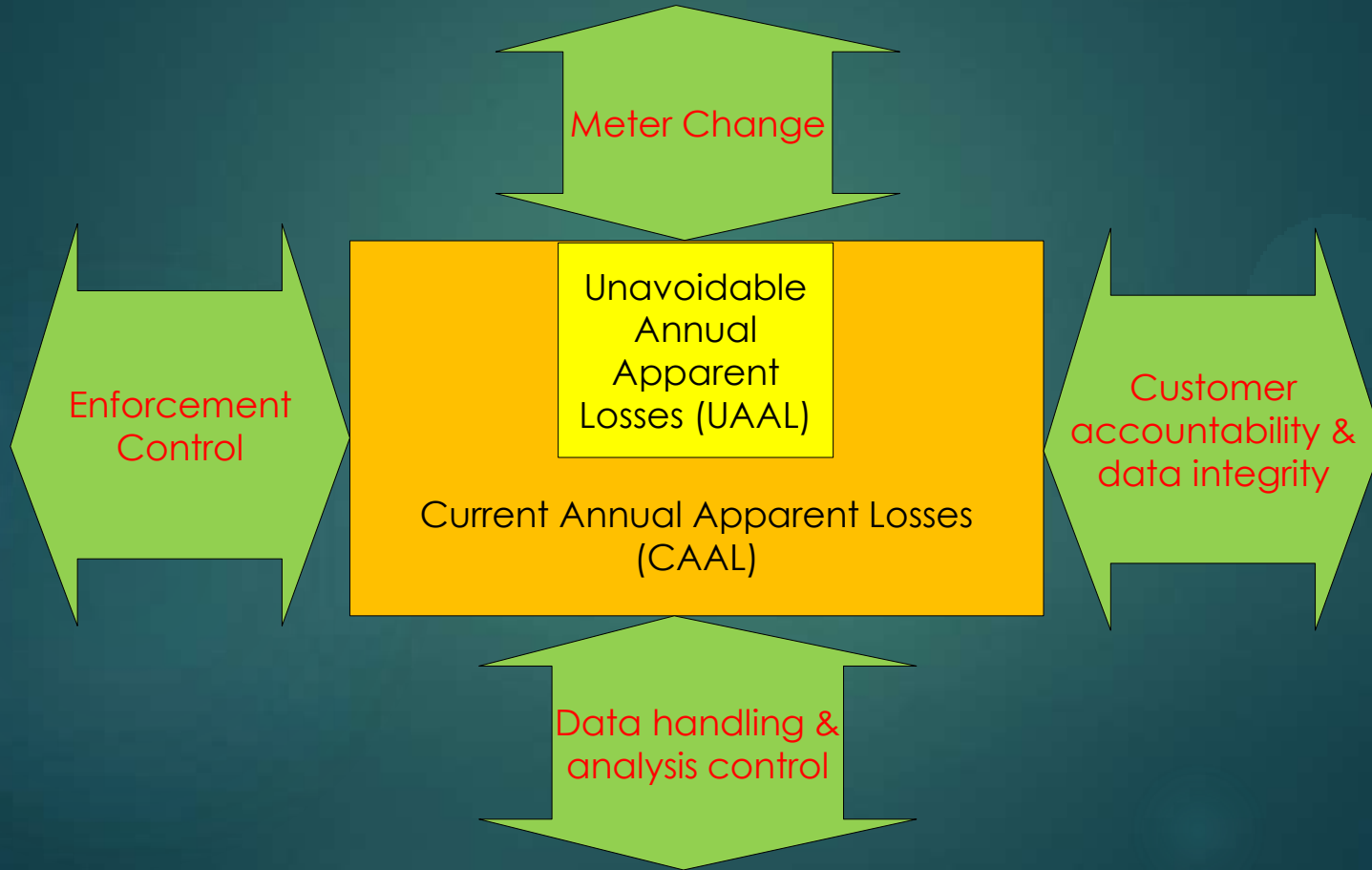
## IWA Standard Water Balance

System Input Volume	Authorised Consumption	Billed Authorised Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorised Consumption	Unbilled Metered Consumption	NRW
			Unbilled Unmetered Consumption	
	Apparent Losses	Unauthorised Consumption		
		Customer Meter Inaccuracies		
	Real Losses	Leakage on Transmission & Distribution Mains		
		Leakage and Overflows at Reservoirs		
		Leakage on Service Connections up to metering point		
	Water Losses			

# Squeezing the Box – Real Losses



# Squeezing the Box – Apparent Losses



# 3.0 FINANCIAL ALLOCATIONS FOR 11<sup>TH</sup> MALAYSIA PLAN



## LIST OF STATE GROUPINGS FOR NATIONAL NRW PROGRAMME IMPLEMENTATION

STATE	YEAR OF 2015				CATEGORY	IMPLEMENTATION
	SIV	Billed Metered Consumption	NRW Volume	NRW		
	Million Liter Per Day (MLD)			(%)		
Melaka	481	388	93	19.3	1 (GOOD)	APPROACH ( 2 )
Pulau Pinang	1,014	813	202	19.9		
Johor	1,702	1,266	436	25.6		
WP Labuan	71	49	22	30.9	2 (MODERATE)	
Perak	1,260	878	382	30.3		
Terengganu	621	428	192	31.0		
Selangor, WP Kuala Lumpur and WP Putrajaya	4,675	3,178	1,497	32.0		
Negeri Sembilan	757	493	264	34.8	3 (NOT SATISFIED)	
Kedah	1,316	702	614	46.7		
Kelantan	454	231	222	49.0		
Pahang	1,128	532	596	52.8		
Sarawak (JBALB)	439	206	233	53.0		
Sabah	1,229	552	677	55.1		
Perlis	220	96	124	56.3		
<b>MALAYSIA</b>	<b>16,195</b>	<b>10,452</b>	<b>5,743</b>	<b>35.5</b>		

# NATIONAL NRW PROGRAMME FOR 11<sup>th</sup> MALAYSIA PLAN

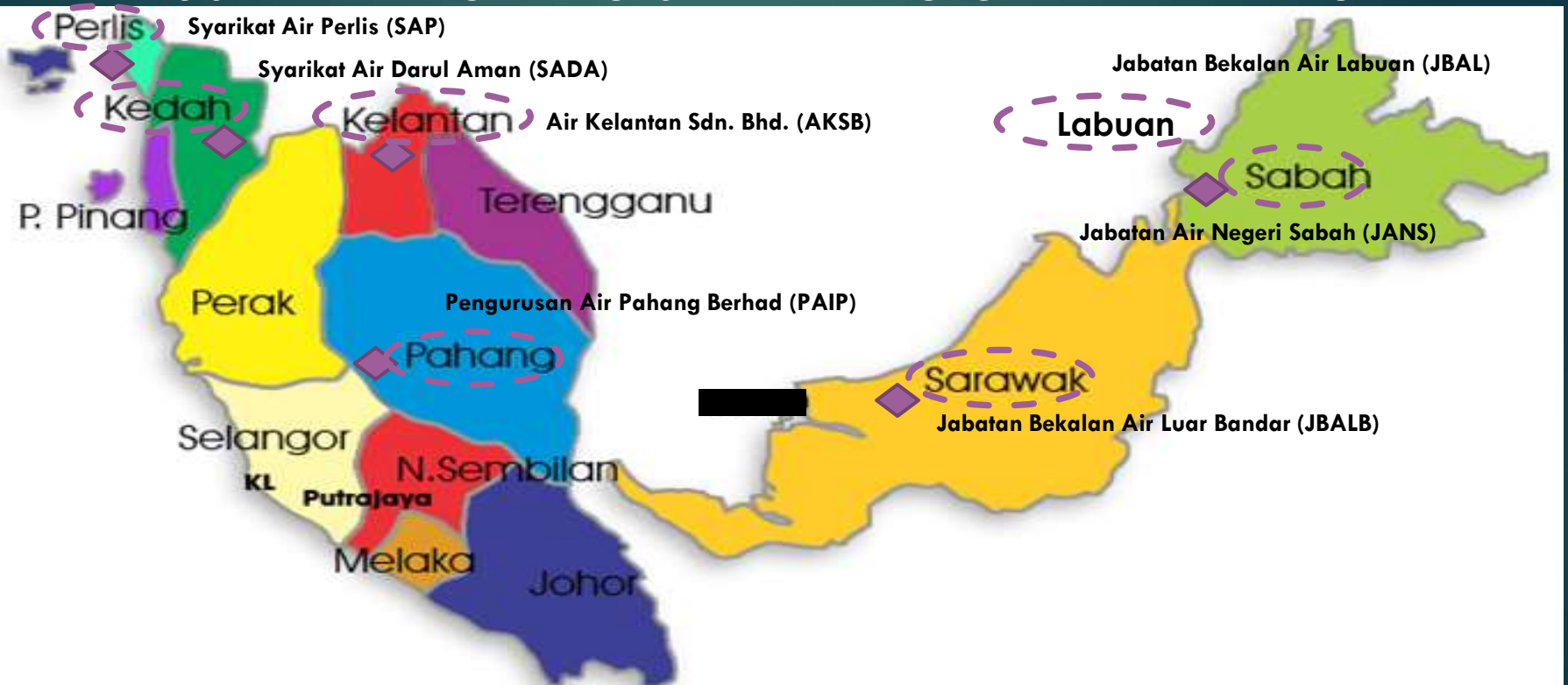
Approach	Federal Govt . Intervention For Effective & Holistic NRW Reduction Programme	Implementation
1.	One off grant to Upgrade /Improve Basic Infrastructure for accurate NRW measurement for 6 state water operators with NRW > 40%	By BBA KeTTHA/ State Water Operators under Group 3 - Perlis, Kedah, Pahang, Kelantan, Sabah & Sarawak
2.	Holistic & Continuous NRW Management through matching grant ringgit to ringgit (MGR2R)	By State Water Operators under Group 1 & 2 and regulated by SPAN

# FINANCIAL ALLOCATION FOR GIS & NRW CONTROL PROGRAMME

9 <sup>th</sup> MP	10 <sup>th</sup> MP	11 <sup>th</sup> MP
RM 1.08 Billion	RM 844 Billion	RM 510 Million (Approach 1)
		RM 1.39 Billion (Approach 2)



## 6 STATE WATER OPERATORS IN THE APPROACH 1 IMPLEMENTATION



# 4.0 Holistic & Smart NRW Management System



An online data viewing and reporting system  
for Non-Revenue Water management.

Always-on NRW data, anytime, anywhere.



## Non-Revenue Water Management System

for

JABATAN AIR  
NEGERI SABAH

[Login here](#)

or select an item from the menu above

## nrwmanager - online data viewing and reporting system

**nrwmanager** is an online data viewing and reporting system that gives you instant access to your latest water distribution flow and pressure data on any computer, anywhere you need it, at any time of night or day. No more waiting for engineers or technicians to process the data into reports. **nrwmanager** provides fully automated data reporting with a wide range of intelligent, standardised reports. The reports draw on our long experience of managing non-revenue water and provides a quick and easy way to see what is happening in your water distribution system. Data analysis tools are included with the data viewer as well so that sense can be made of the large amount of data that modern data logging generates.

See more information at [nrwmanager.com](http://nrwmanager.com)



23<sup>rd</sup> August 2017

## Map Control

## Regions

Kota Kinabalu

## Layers

Selected

## Features

Select a Layer

Select a Feature

## Zoom

Select a Layer

Select a Feature

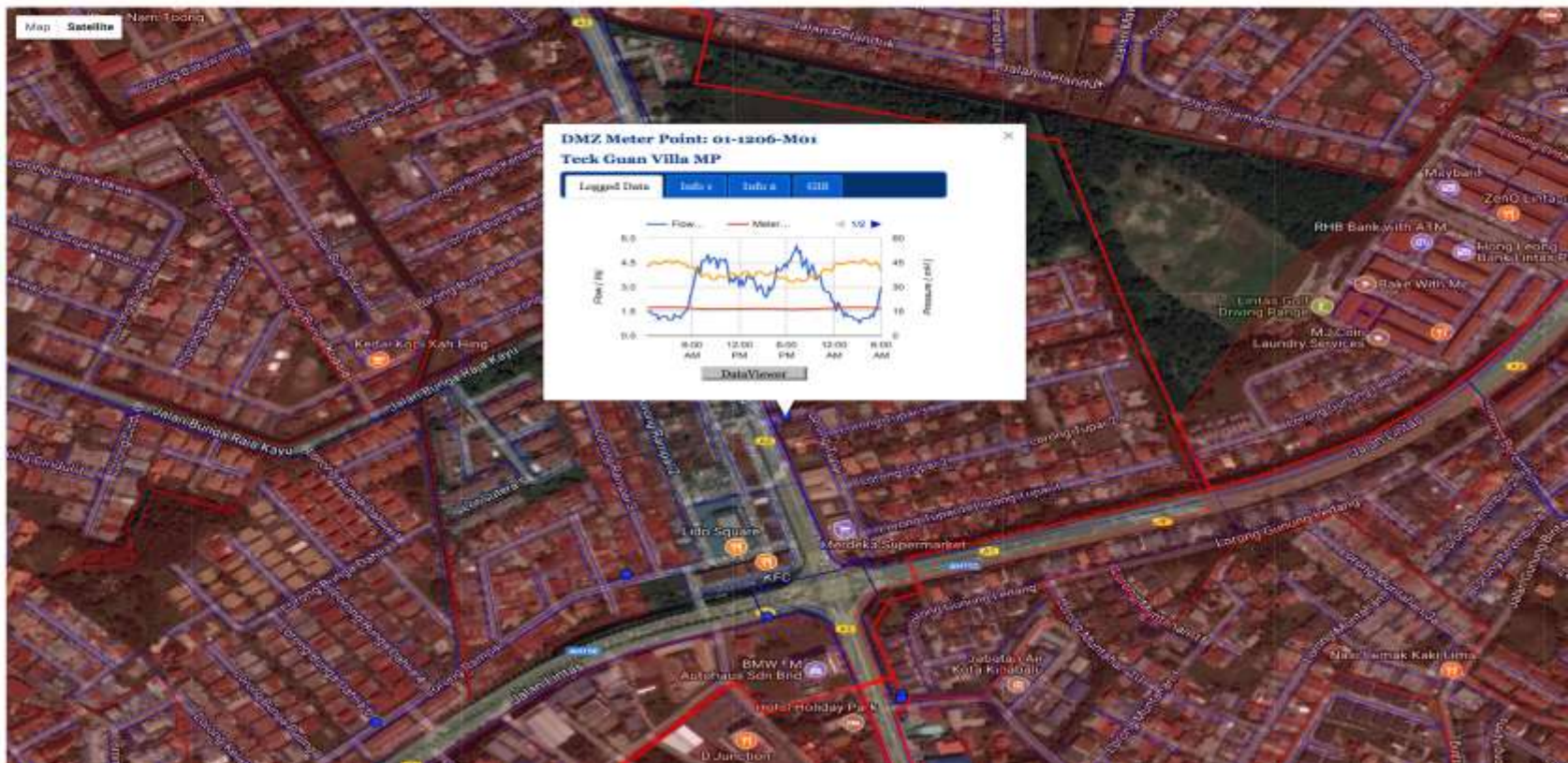
## Thematics


DMZ boundaries

Select a Layer Theme


Re-center map

Reset map





The **nrvmanager** is a web based, holistic Water Network and NRW Management system with full integration of all relevant data such as, flow, pressure, level, water quality parameters, entire billing data systems and GIS components.



The **nrvmanager** follows the trend of smart and green technology because it is fully web based and the data from the sensors and data loggers goes direct to the web server. No host PC, no transportation, no heavy IT infrastructure and no human interference is required.



**nrvmanager** is a product of Water Systems Optimisation (WSO).

WSO are an international engineering group specializing in water loss reduction technologies including water audits, leakage modelling, hydraulic modelling, leak detection and repair, and pressure management with advanced pressure controllers.

WSO has established operations in USA, UK, Australia, Turkey, Malaysia and Papua New Guinea where they carry out a range of projects related to non-revenue water management.


**nrvmanager**

Copyright © 2010 Water Systems Optimisation



## Where is it in use...

- ▶ State of Sabah (JANS)
- ▶ Sibu Water Board (SWB)
- ▶ State of Johor (SAJ)
- ▶ City of Sacramento (US)
- ▶ City of Fulsom (US)
- ▶ Port Moresby (PNG)
- ▶ Manila (Maynilad) - Trial Systems in Progress
- ▶ Thailand (PWA) - Trial Systems in Progress




**Processing of data  
into information is a necessity  
for a modern water utilities**




**Centralisation is the solution.**

**nrvmanager**


Copyright © 2020 Water Systems Optimization



Without implementing a centralised and holistic Data Management Scheme, it will be difficult to maintain and manage all the investments made.

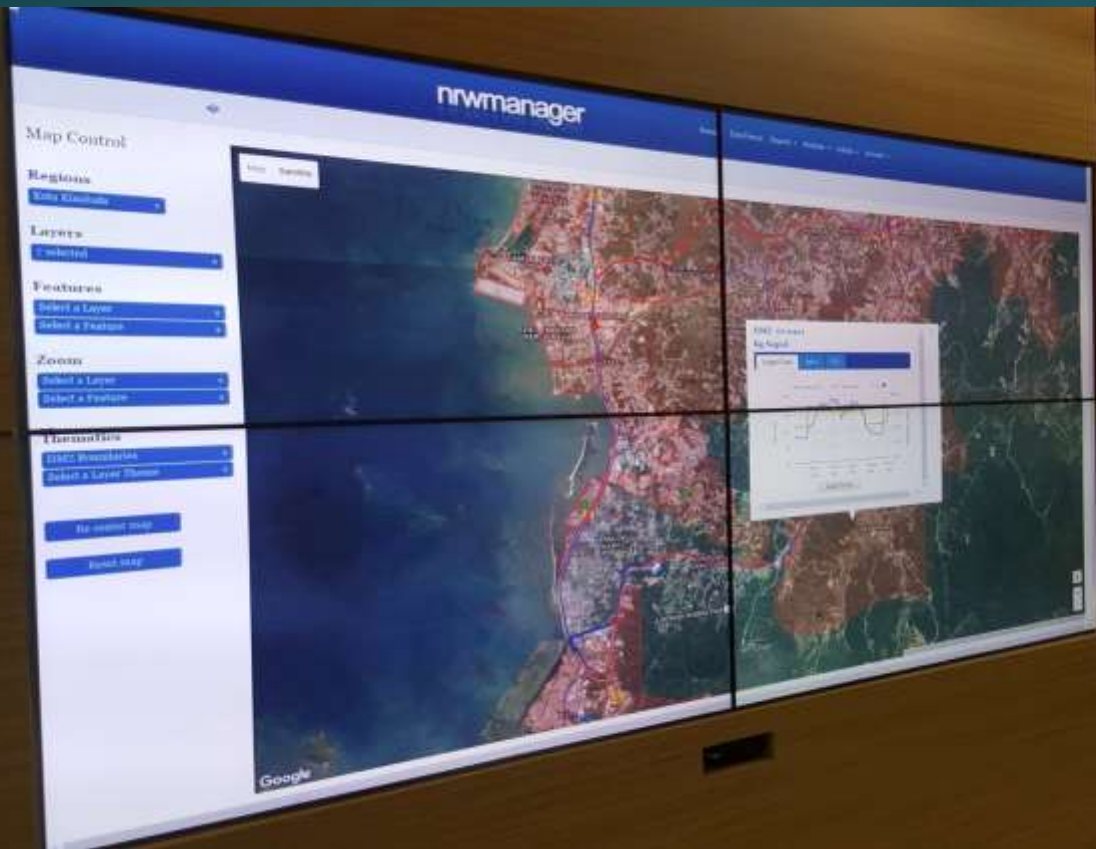


Centralise the data from all data collection devices, billing systems, GIS, Asset and Work Management Systems and manage them from one platform and from one location.



Manage and monitor all the activities for DMAs, Trunk Mains, WTP Production and Billed Metered Consumption, Maintenance, Customer Complaints, Leak Detection, Leak Repair Works etc from one centralised location.









## DataViewer

**Region**

Kota Kinabalu

**Group**

Distribution Zones - Phase 3

**Site**

01-1006 Teck Guan Villa

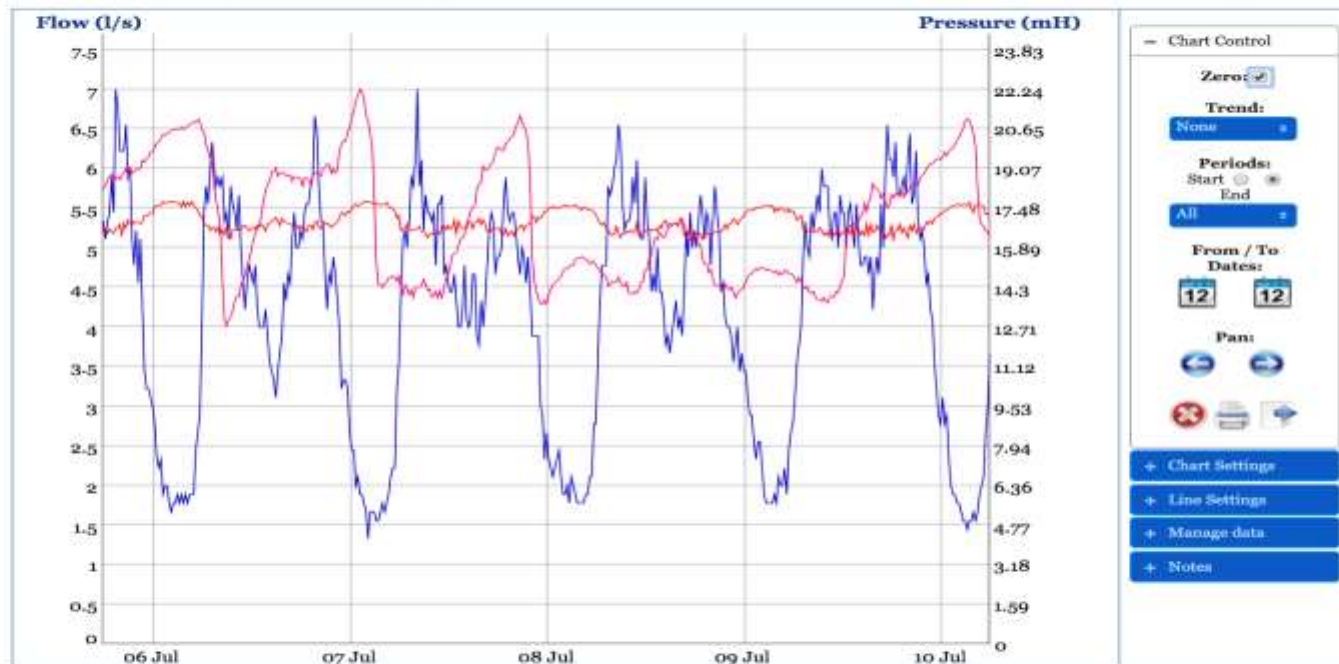
**Datapoint(s)**

3 selected

**Period**

30 days

Add to chart



- Chart Control

 Zero: 
**Trend:**

None

**Periods:**

 Start  End 

All

**From / To Dates:**

12 12

**Pan:**


+ Chart Settings

+ Line Settings

+ Manage data

+ Notes

**Legend**

- 1: Teck Guan Villa - Zone Inflow
- 2: Teck Guan Villa - Meter Point Downstream Pressure
- 3: Teck Guan Villa - Critical Point Pressure

	Units	Min	Avg	Max	Volume (MLD)
1	l/s	1.33	4.14	7	0.358
2	mH	16.2	16.9	17.8	
3	mH	12.8	17	22.2	

## Monthly Summary Report - Individual NRW Zone

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

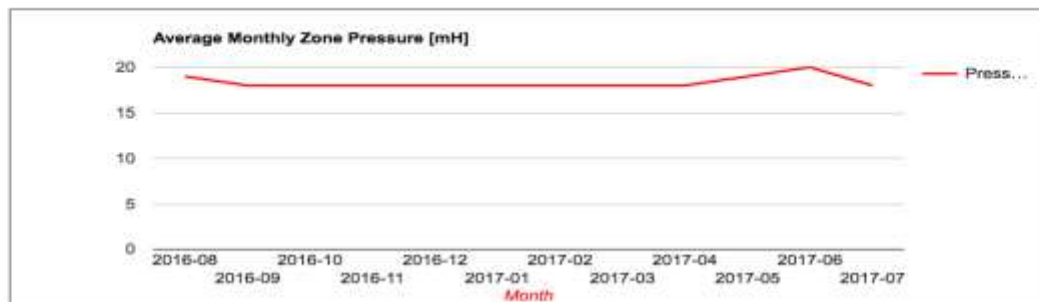
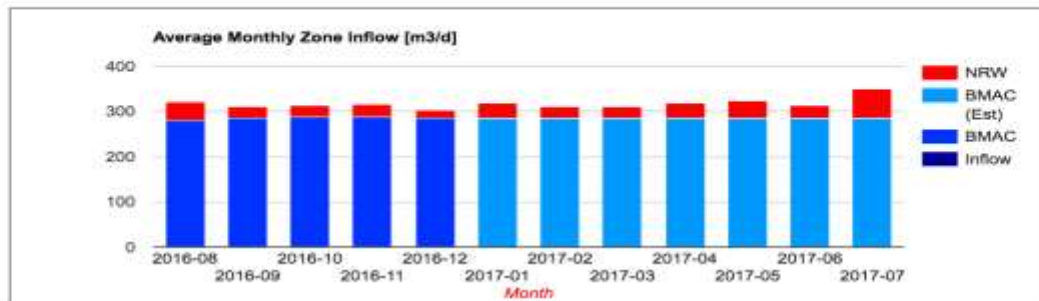
NRW Report

Zone Status Report

Region: 01 Kota Kinabalu

Group: DM3 Distribution Zones - Phase 3

Site: 01-1206 Teck Guan Villa



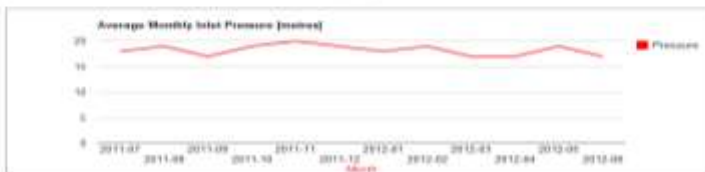
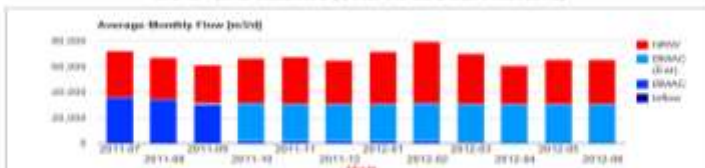


## Monthly Summary Report - All NRW Zones

Select Region:

Kota Kinabalu 

JANS - Kota Kinabalu (Total for all DMZ combined)

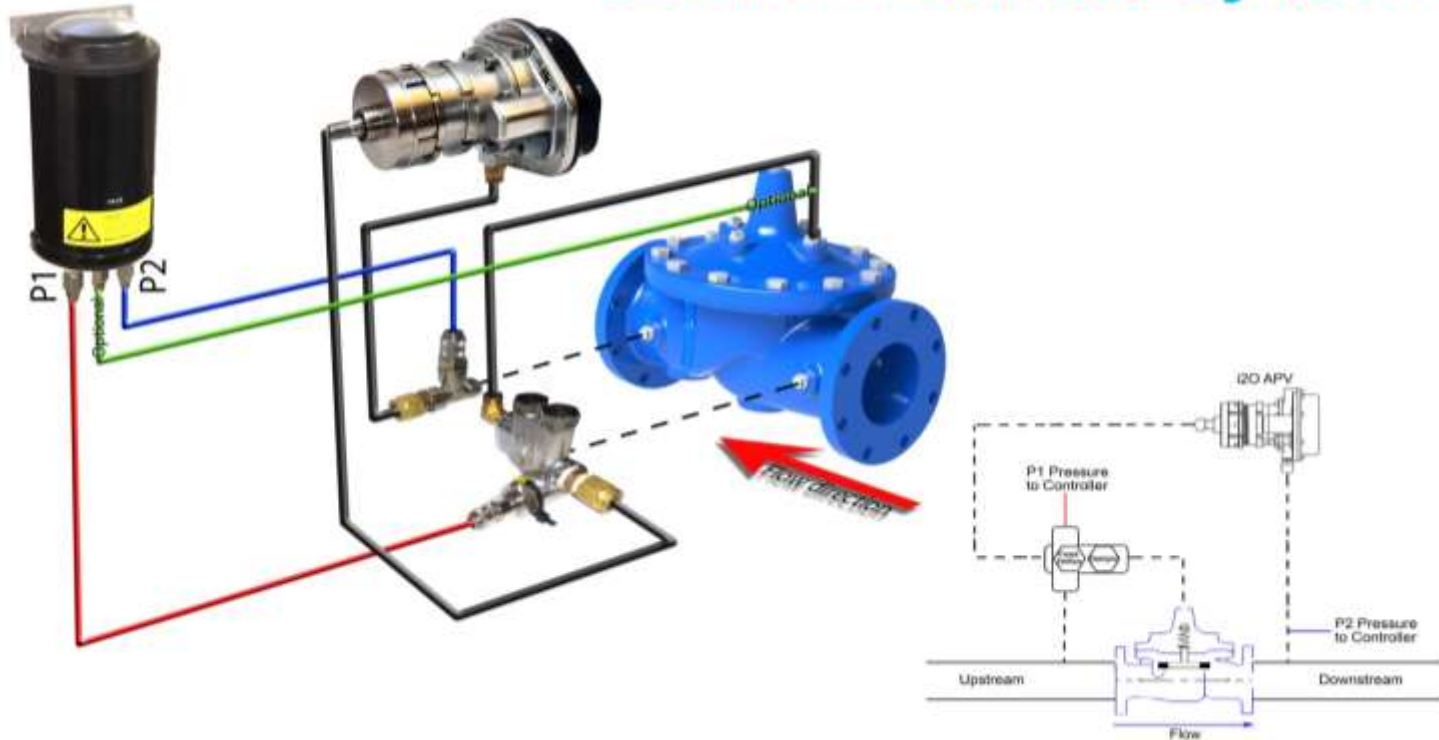


# Pressure Management – PRV



# Pressure Management – Smart PRV


## i2O PRV Control System



# Smart AMR Ultrasonic Water Meter







This is the most effective and efficient way so that all the data and the implemented assets are professionally and efficiently monitored, maintained and managed.

## Advantages:

- ... instant access to all the data on any PC or mobile device, anywhere and anytime
- ... automated and intelligent reports
- ... no extra IT infrastructure required
- ... no more data loss - secure auto back up
- ... no more host PC required (direct to web server)
- ... all the data from different data collection devices combined and viewed with one application

A central graphic of a water splash, showing a single drop falling from the top, creating a crown-like shape as it hits a surface, with concentric ripples spreading outwards. The background is a gradient from light blue at the top to a darker blue at the bottom.

Save Water  
Save Earth  
before its too late

Thank You



[www.nrwmanager.com](http://www.nrwmanager.com)

**nrwmanager**  
INTEGRATED SOLUTIONS

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## Map Control

## Regions

Select a Region

## Layers

Select a Layer

## Features

Select a Layer

Select a Feature

## Zoom

Select a Layer

Select a Feature

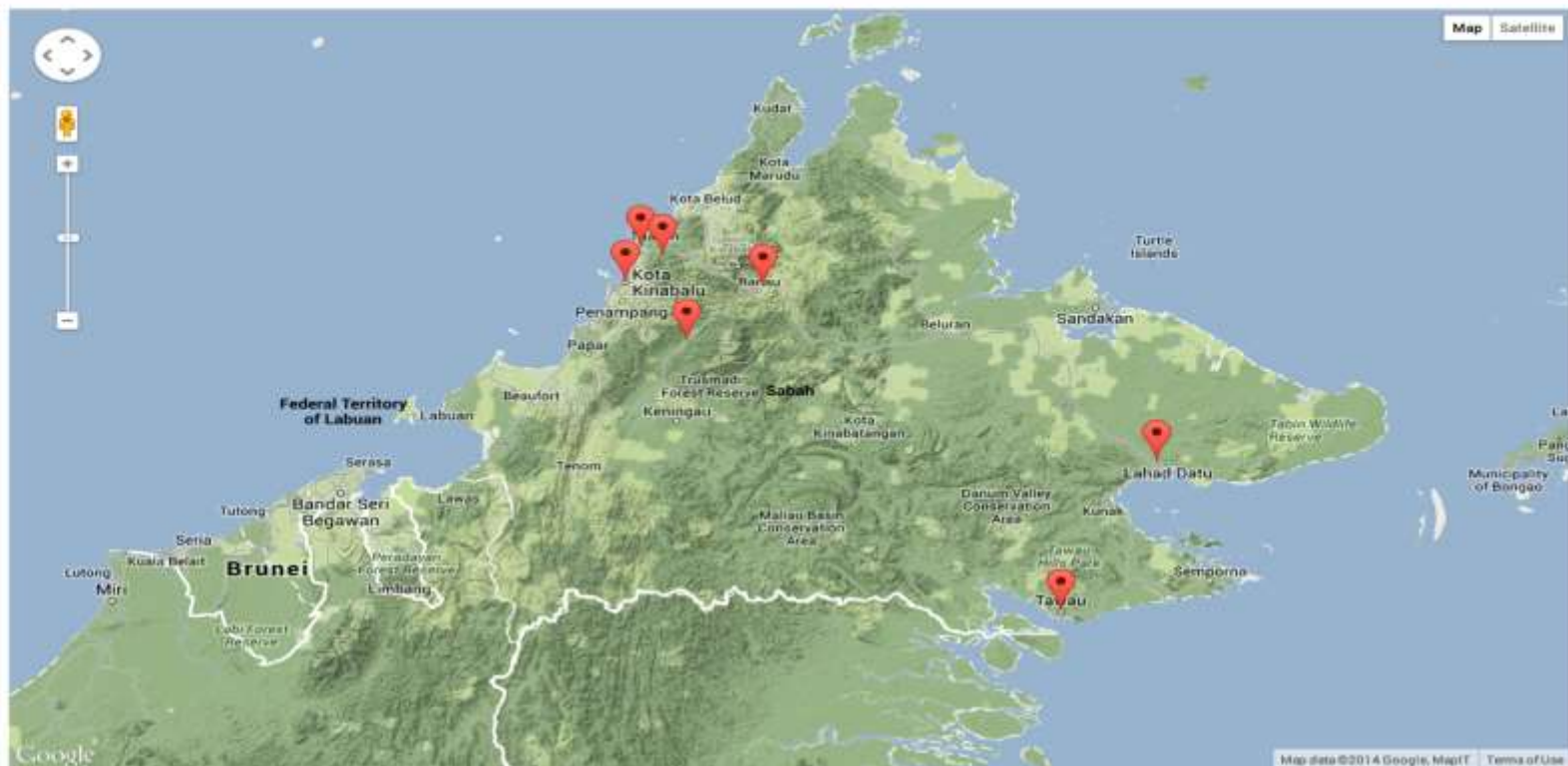
## Thematics

Select a Layer

Select a Layer Theme

Re-center map

Reset map



## Map Control

## Regions

Select a Region

Select a Region

Kota Kinabalu

Lahad Datu

Ranau

Tambunan

Tamparuli

Tawau

Tuaran

Select a Layer

Select a Feature

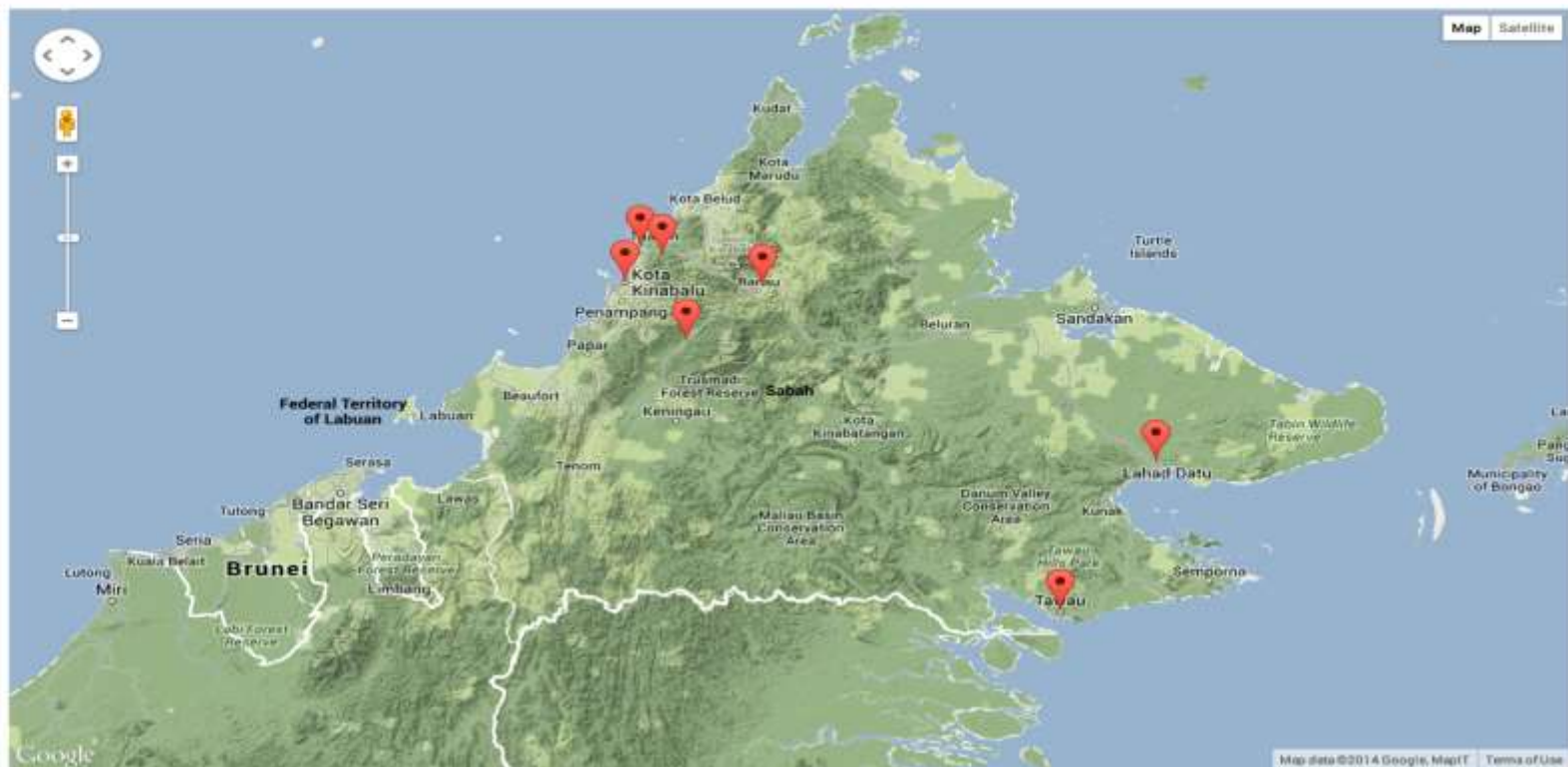
## Thematics

Select a Layer

Select a Layer Theme

Re-center map

Reset map





## Map Control

## Regions

Kota Kinabalu

## Layers

All selected

## Features

Transmission Main

Rgo selected

## Zoom

Transmission Main

Select a Feature

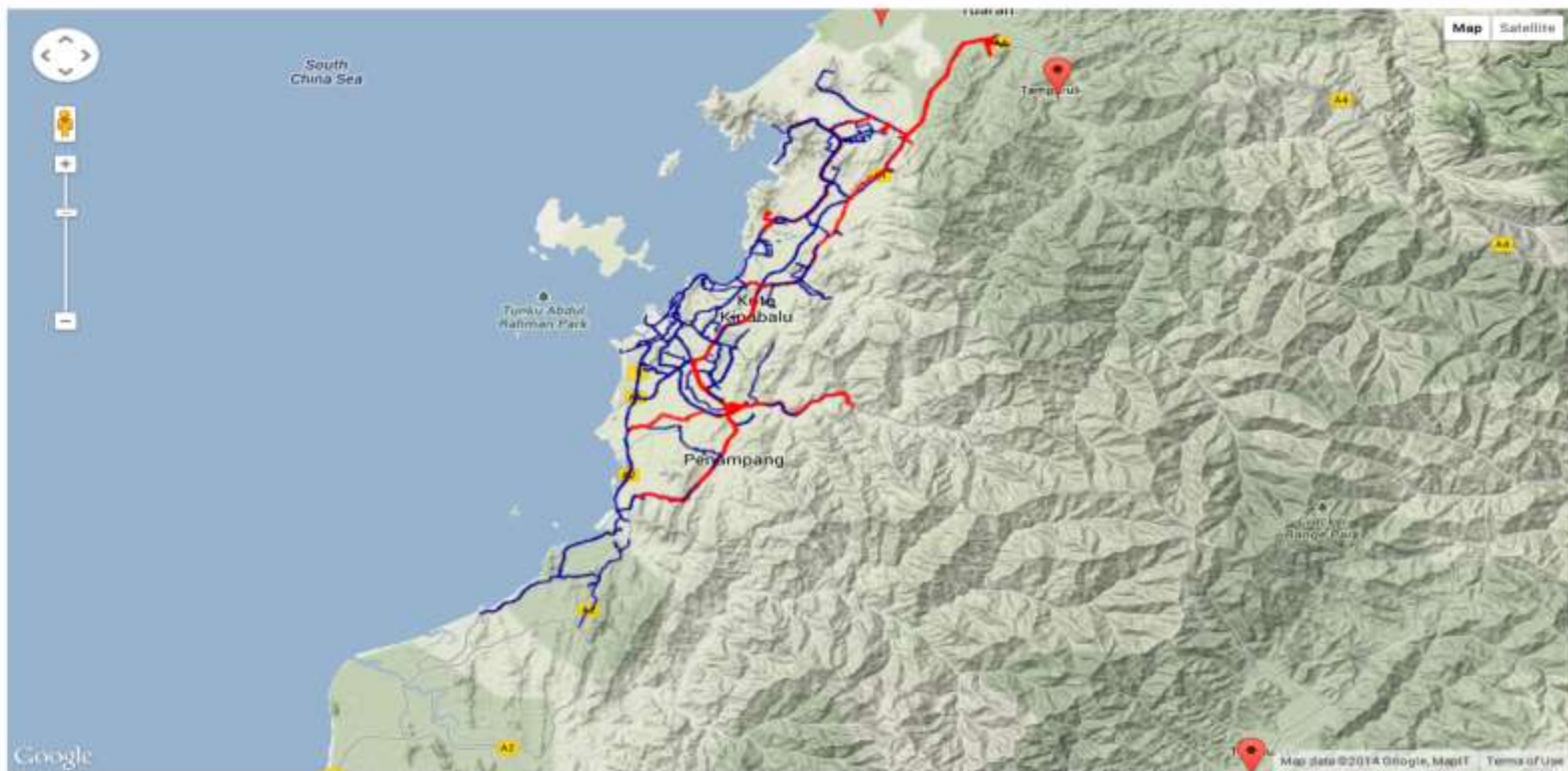
## Thematics

Select a Layer

Select a Layer Theme

Re-center map

Reset map



## Map Control

## Regions

Kota Kinabalu

## Layers

3 selected

## Features

Transmission Main

Rgo selected

## Zoom

Transmission Main

Select a Feature

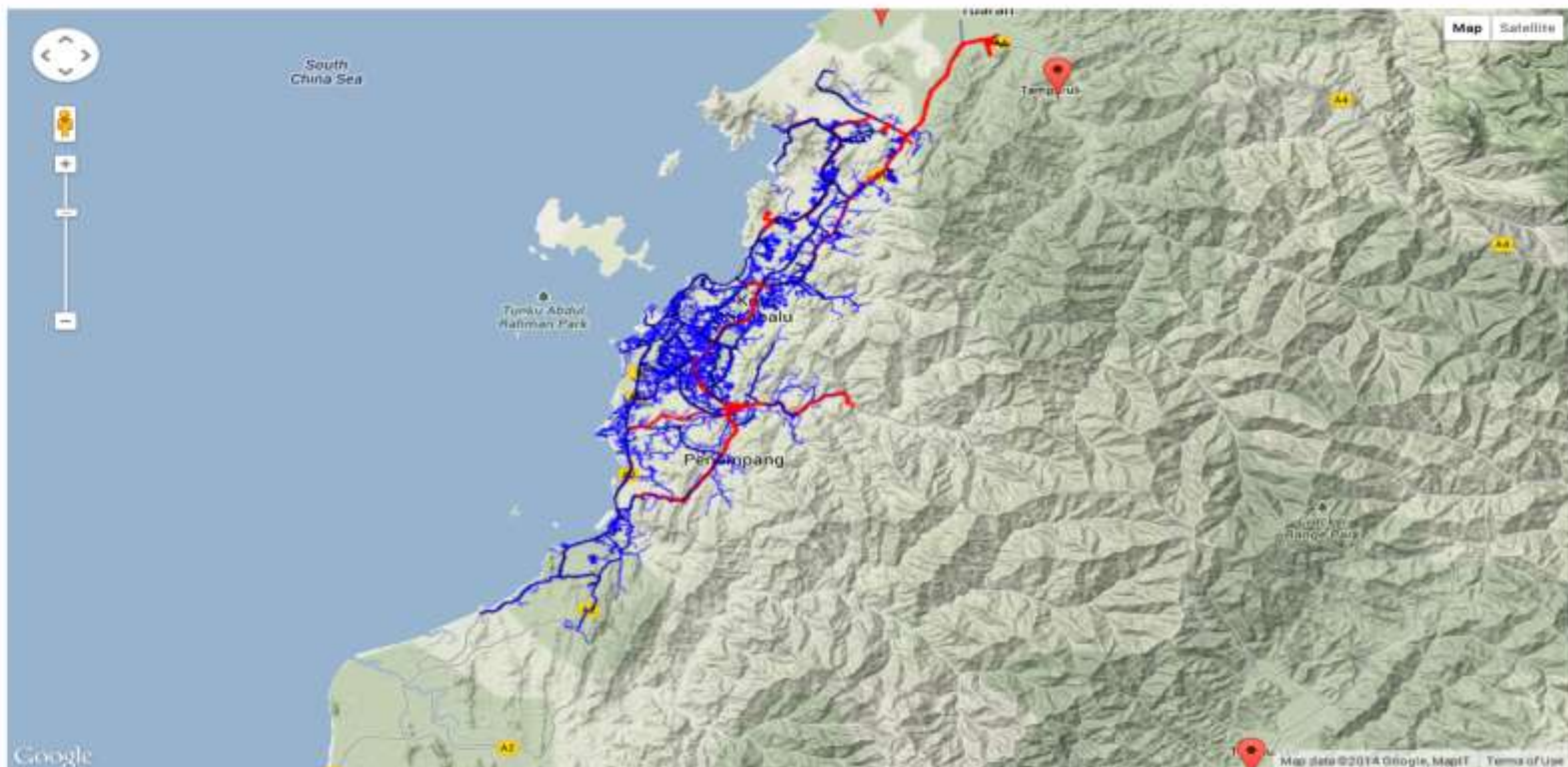
## Thematics

Select a Layer

Select a Layer Theme

Re-center map

Reset map





## Map Control

## Regions

Kota IGabalu

## Layers

4 selected

## Features

Select a Layer

Select a Feature

## Zoom

Select a Layer

Select a Feature

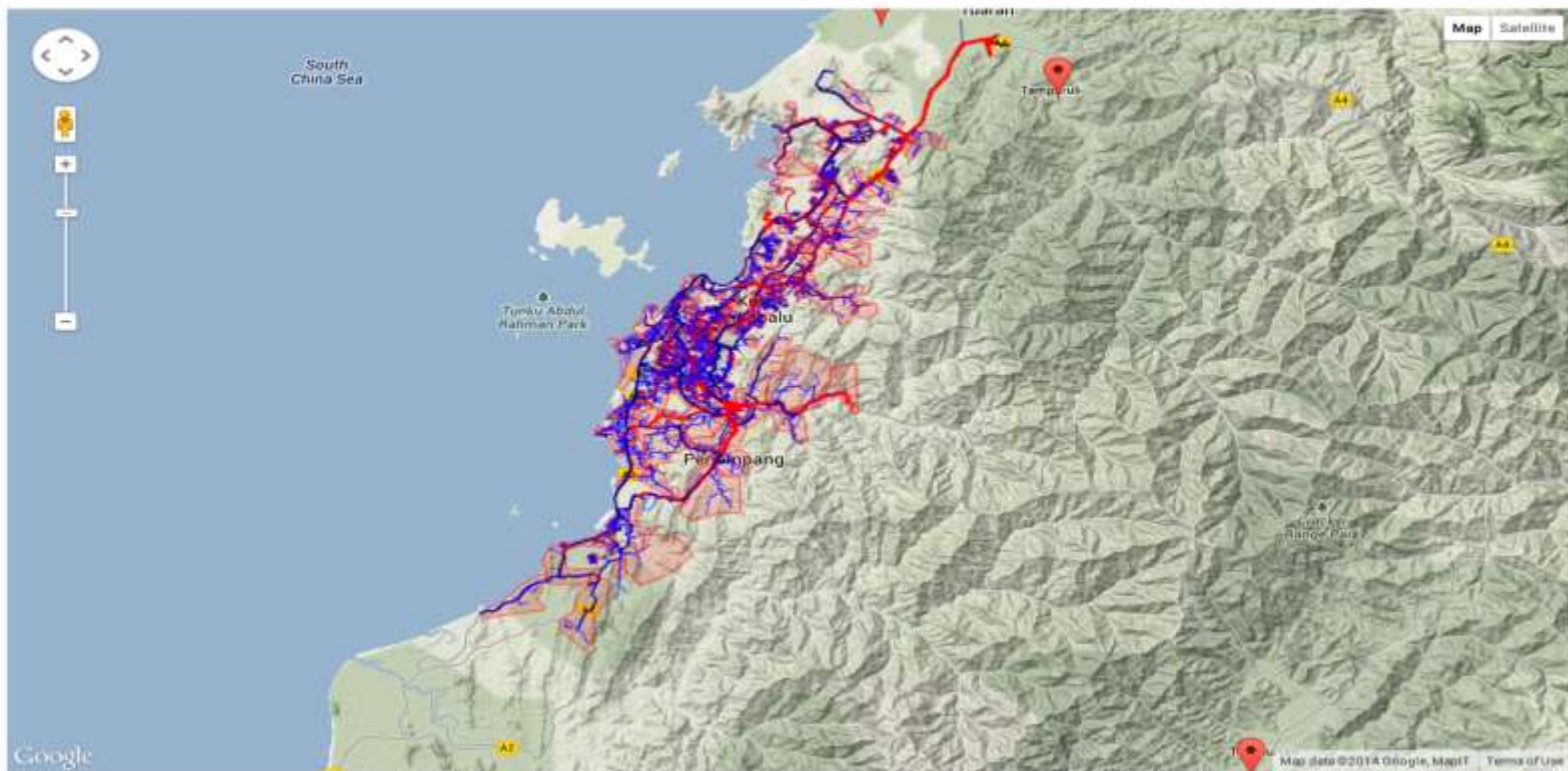
## Thematics

DMZ Boundaries

Select a Layer Theme

Re-center map

Reset map





## Map Control

## Regions

Kota Kinabalu +

## Layers

6 selected +

## Features

Select a Layer +

Select a Feature +

## Zoom

Select a Layer +

Select a Feature +

## Thematics

DMZ Boundaries +

Select a Layer Theme +

Re-center map

Reset map



## Map Control

## Regions

Kota Kinabalu

## Layers

6 selected

## Features

Select a Layer

Select a Feature

## Zoom

Select a Layer

Select a Feature

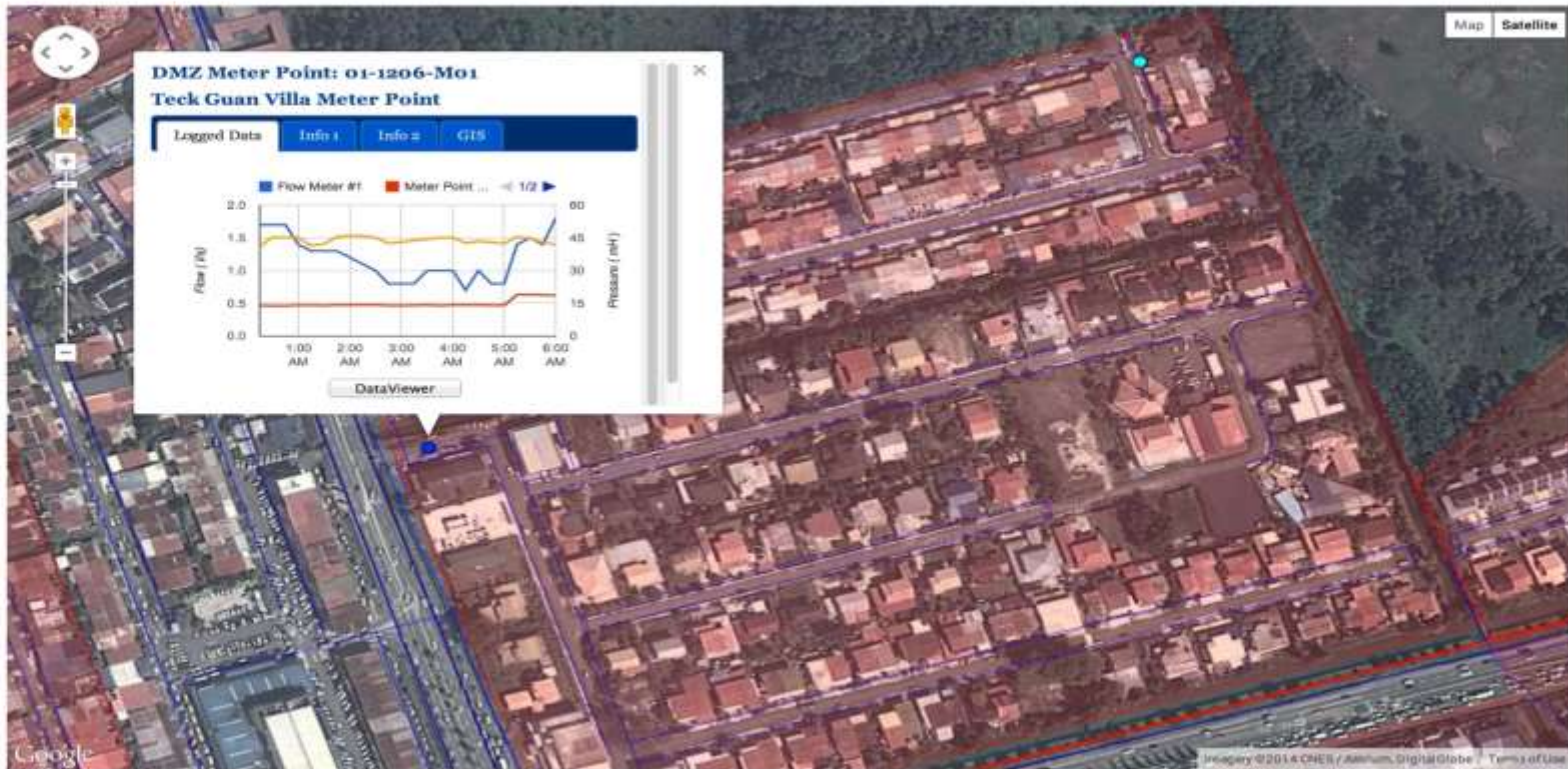
## Thematics

DMZ Boundaries

Select a Layer Theme

Re-center map

Reset map



## DataViewer

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

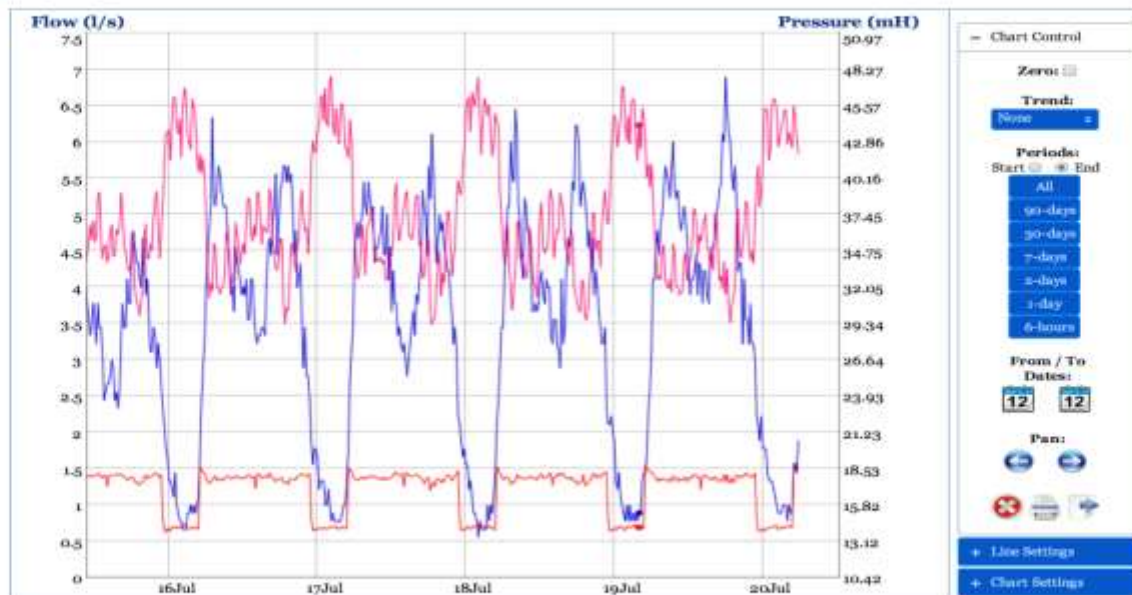
Datapoint(s)

3 selected

Period

30 days

Add to chart



Legend	Units	Min	Avg	Max	Volume (MLD)
1: Teck Guan Villa - Zone Inflow	l/s	0.56	3.41	6.89	0.294
21: Teck Guan Villa - Meter Point Downstream Pressure	mH	13.8	16.9	19	
22: Teck Guan Villa - Meter Point Upstream Pressure	mH	29.3	37.5	47.7	

19/07/2014 04:15:00 :  
 1: [l/s] 0.89  
 21: [mH] 14.16  
 22: [mH] 44.1

## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

Consumption  
HistoryConsumption  
Detail  
(Meters)Consumption  
Detail  
(Readings)Property  
& Account  
DetailsZone  
Property  
MapMeters  
to be  
AdjustedConsumption  
AdjustmentsNRW  
CalculationZone  
Property  
ListEdit  
Property  
Details

<b>Selected Region:</b>	<b>01 Kota Kinabalu</b>
<b>Selected Group:</b>	<b>DM3 Distribution Zones - Phase 3</b>
<b>Selected Zone:</b>	<b>01-1206 Teck Guan Villa</b>



## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

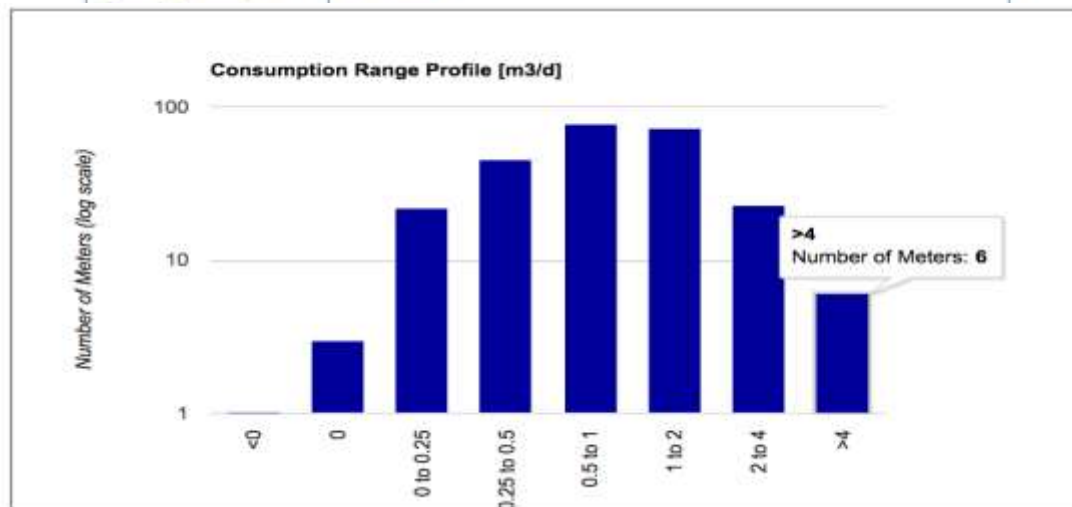
Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

Consumption  
HistoryConsumption  
Detail  
(Meters)Consumption  
Detail  
(Readings)Property  
& Account  
DetailsZone  
Property  
MapMeters  
to be  
AdjustedConsumption  
AdjustmentsNRW  
CalculationZone  
Property  
ListEdit  
Property  
Details

<b>Selected Region:</b>	<b>Kota Kinabalu</b>
<b>Selected Group:</b>	<b>DM3 Distribution Zones - Phase 3</b>
<b>Selected Zone:</b>	<b>01-1206 Teck Guan Villa</b>
<b>Selected Month:</b>	<b>2017-04</b>



## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

Consumption  
HistoryConsumption  
Detail  
(Meters)Consumption  
Detail  
(Readings)Property  
& Account  
DetailsZone  
Property  
MapMeters  
to be  
AdjustedConsumption  
AdjustmentsNRW  
CalculationZone  
Property  
ListEdit  
Property  
Details

Selected Region: Kota Kinabalu  
 Selected Group: DM3 Distribution Zones - Phase 3  
 Selected Zone: 01-1206 Teck Guan Villa  
 Selected Month: 2017-04

Selected Range:

greater than 4 m3/d

Select All

#	Meter Number	Premise Number	BMAC Monthly Total (cubic metres per month)	BMAC Daily Average (cubic meters per day)
1	JANH546063	0191232	380.0	12.667
2	JANH288477	0162371	301.9	10.062
3	JANH523765	2005877	186.8	6.227
4	JAN1011197	2727721	151.0	5.034
5	JANH629230	0176017	132.0	4.400
6	JAN1012535	2801918	120.4	4.012

Records: 6

Page:

&lt;&lt;

&lt;

1

&gt;

&gt;&gt;

Refresh

## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

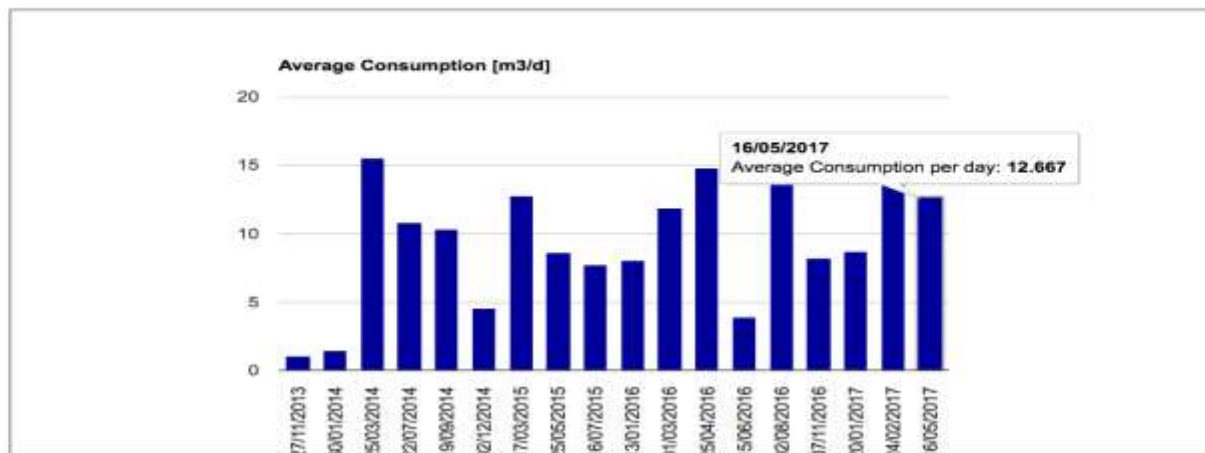
Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

Consumption History	Consumption Detail (Meters)	Consumption Detail (Readings)	Property & Account Details	Zone Property Map	Meters to be Adjusted	Consumption Adjustments	NRW Calculation	Zone Property List	Edit Property Details
---------------------	-----------------------------	-------------------------------	----------------------------	-------------------	-----------------------	-------------------------	-----------------	--------------------	-----------------------

**Selected Region:** Kota Kinabalu  
**Selected Group:** DM3 Distribution Zones - Phase 3  
**Selected Zone:** 01-1206 Teck Guan Villa  
**Selected Meter:** JANH546063  
**Selected Premise:** 0191232

[View Property & Account Details](#)



**1. Premise Number Information (tbinstallation)**

Premise Number	Account Number	Combined Meter Round Number	Customer Name	Address	Customer Status	Select Account
0191232	01023316580003	D1-70-C2	NG NYIT CHO	L-35,#2,Lrg Tupai, Teck Guan (LOT NO 2 TECK GUAN VILLA) Villa,Lido,KK,	01 - ACTIVE CONSUMER	<input type="radio"/>
0191232	01001912320001	D1-70-C2	MISS VERONICA WONG	L-35,#2,Lrg Tupai, Teck Guan (LOT NO 2 TECK GUAN VILLA) Villa,Lido,KK,	09 - TERMINATE SUPPLY	<input type="radio"/>

**2. Other Premise Numbers with same address (tbinstallation)**

There are no other Premise Numbers with the same address details

**3. Meter-Customer Account information (tbmeter)**

Account Number	Meter Number	Installation Date	Meter Sequence Number	Meter Status Number	Select Meter
01023316580003	JANH546063	08/11/2013	749469	0 - ACTIVE	<input type="radio"/>

## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-12-06 Tuck Guan Villa

Consumption History	Consumption Detail (Meters)	Consumption Detail (Readings)	Property & Account Details	Zone Property Map	Consumption Adjustments	Meters to be Adjusted	NRW Calculation	Zone Property List	Edit Property Details	Upload Property List
---------------------	-----------------------------	-------------------------------	----------------------------	-------------------	-------------------------	-----------------------	-----------------	--------------------	-----------------------	----------------------

DMZ Boundaries 

Thematics

Select a Theme

Go



## Billed Metered Authorised Consumption Data for NRW Zones

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-12-06 Tuck Guan Villa

Consumption History	Consumption Detail (Meters)	Consumption Detail (Readings)	Property & Account Details	Zone Property Map	Consumption Adjustments	Meters to be Adjusted	NRW Calculation	Zone Property List	Edit Property Details	Upload Property List
---------------------	-----------------------------	-------------------------------	----------------------------	-------------------	-------------------------	-----------------------	-----------------	--------------------	-----------------------	----------------------

DMZ Boundaries 

Thematics

Select a Theme

Go





Thematics

Select a Theme ▾

Go

- Select a Theme
- None
- Meter Status
- Account Status



DMZ Boundaries

Thematics

Account Status

Go

Legend





Account Status

- 00 New Consumer
- 01 Active Consumer
- 02 WO in progress
- 03 Billing in progress
- 04 Discon-request
- 05 Discon-payment
- 06 Discon-special
- 07 Discon-deposit
- 08 Discon-notice
- 09 Terminate supply
- 10 Rejected Consumer
- 11 Bad Debt
- 12 Closed Account
- 13 Transfer to State
- 20 Miscellaneous Account
- 21 Transferred District
- No Status



## Monthly Summary Report - Individual NRW Zone

Region

Kota Kinabalu

Group

Distribution Zones - Phase 3

Site

01-1206 Teck Guan Villa

NRW Report

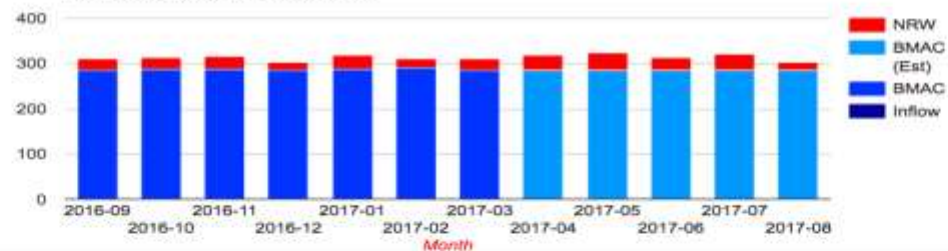
Zone Status Report

Region: 01 Kota Kinabalu

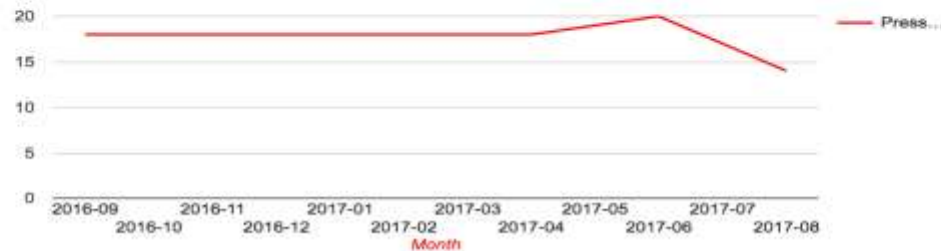
Group: DM3 Distribution Zones - Phase 3

Site: 01-1206 Teck Guan Villa

Average Monthly Zone Inflow [m3/d]



Average Monthly Zone Pressure [mH]





Summary Reports

Alarm &amp; Alert Reports

Infrastructure Reports

System Reports

An online data viewing and reporting system  
for Non-Revenue Water management.

Always-on NRW data, anytime, anywhere.



## Non-Revenue Water Management System

for

JABATAN AIR  
NEGERI SABAH

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## nrwmanager - online data viewing and reporting system

**nrwmanager** is an online data viewing and reporting system that gives you instant access to your latest water distribution flow and pressure data on any computer, anywhere you need it, at any time of night or day. No more waiting for engineers or technicians to process the data into reports. **nrwmanager** provides fully automated data reporting with a wide range of intelligent, standardised reports. The reports draw on our long experience of managing non-revenue water and provides a quick and easy way to see what is happening in your water distribution system. Data analysis tools are included with the data viewer as well so that sense can be made of the large amount of data that modern data logging generates.

See more information at [nrwmanager.com](http://nrwmanager.com)

An online data viewing and reporting system  
for Non-Revenue Water management.

Always-on NRW data, anytime, anywhere.



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Summary Reports

Alarm &amp; Alert Reports

Infrastructure Reports

System Reports

Data Not Received

Alarm Report

Logger Battery Alarms

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*The End*