WATCH LEAK
Water Management System

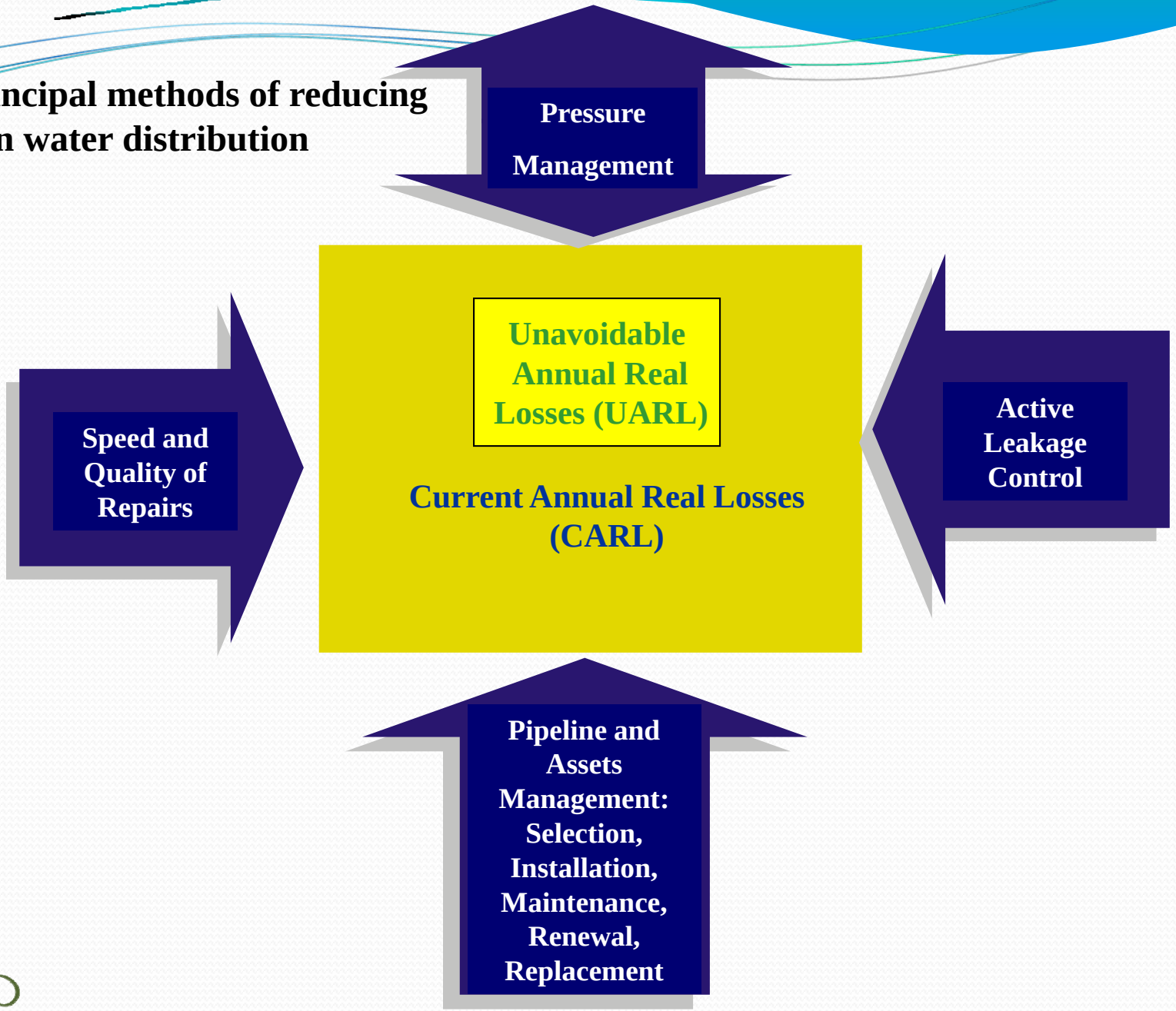
Integrated Water Management System
Leakage Control

WATER LOSS MANAGEMENT

IWA Standard Water Balance

<table>
<tr><td rowspan="8">System Input Volume</td><td rowspan="3">Authorized Consumption</td><td>Billed Authorized Consumption</td><td>Billed Metered Consumption</td><td rowspan="2">Revenue Water</td></tr>
<tr><td></td><td>Billed Unmetered Consumption</td></tr>
<tr><td>Unbilled Authorized Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="6">Non Revenue Water</td></tr>
<tr><td></td><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="4">Water Losses</td><td>Apparent (commercial) Losses</td><td>Unauthorized Consumption</td></tr>
<tr><td></td><td>Customer Meter Inaccuracies and Data Handling Errors</td></tr>
<tr><td rowspan="3">Real (physical) Losses</td><td>Leakage on Transmission and Distribution Mains</td></tr>
<tr><td></td><td>Leakage and Overflows at Storage Tanks</td></tr>
<tr><td></td><td>Leakage on Service Connections up to point of Customer Meter</td></tr>
</table>

The 4 principal methods of reducing leakage in water distribution



DMZ / DMA Approach

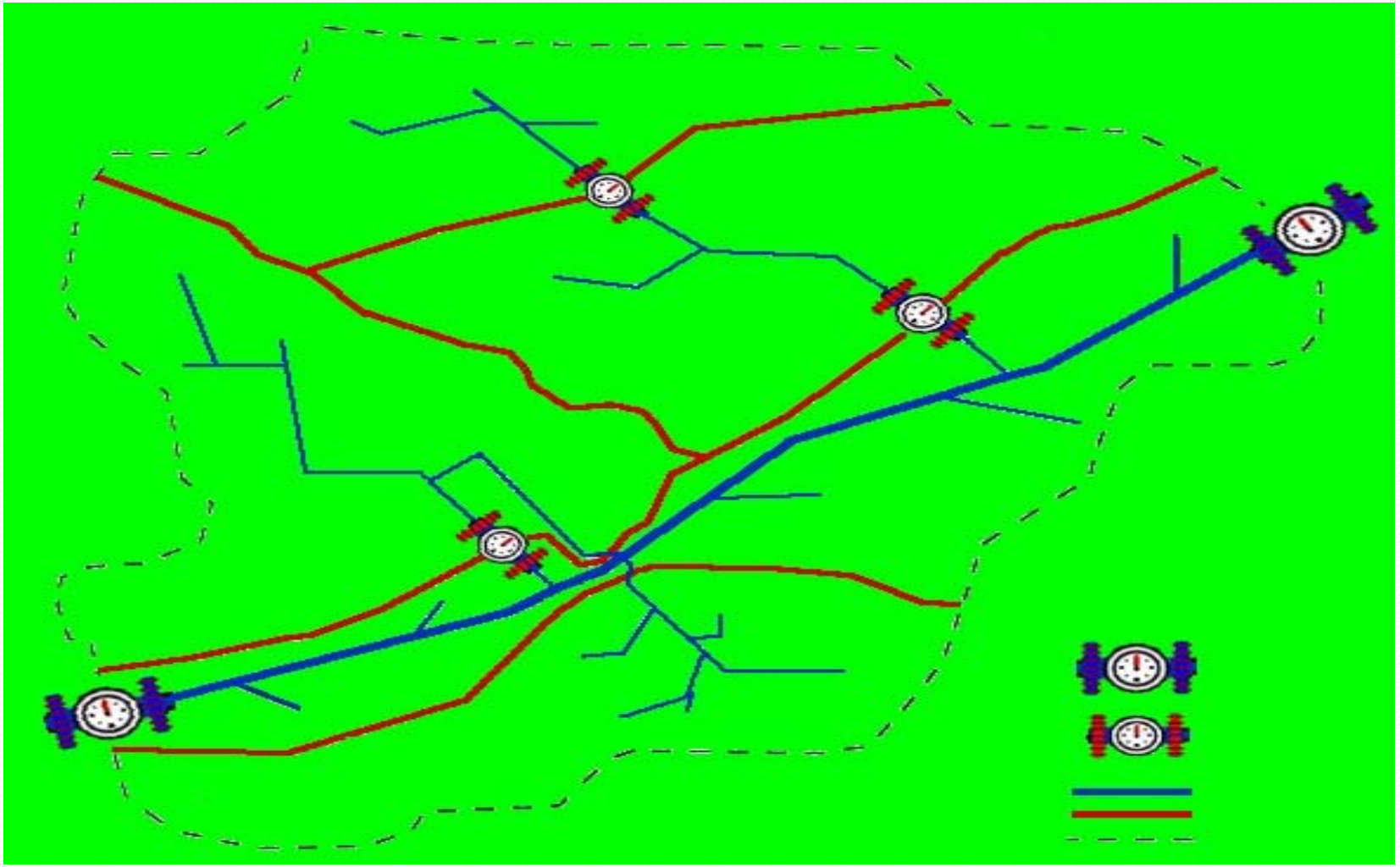
- **Water Auditing process is an effective tool available to utilities to quantify consumption and losses that occur in the distribution system.**

- **Sectoring the water distribution system by establishing pressure zones and DMAs become common and it has become a highly useful techniques for monitoring the occurrence of customer consumptions and leakages.**

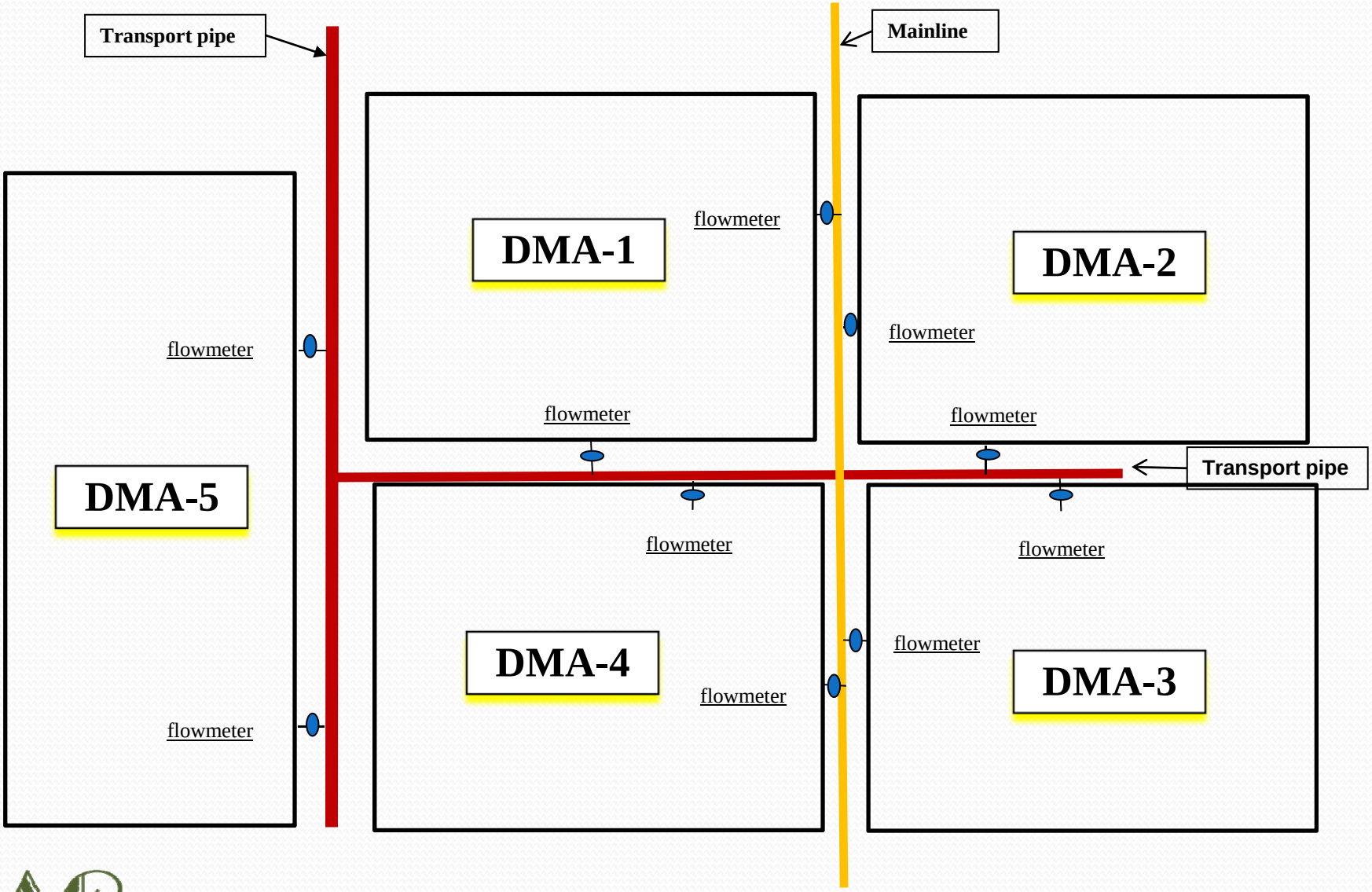
Zone (DMZ or DMA) Monitoring

- **Volume of water**
- **Cost of lost water**
- **Prioritizing system**
- **Allows the operator to focus leak location effort to give most benefit**

District Metered Area (DMA)



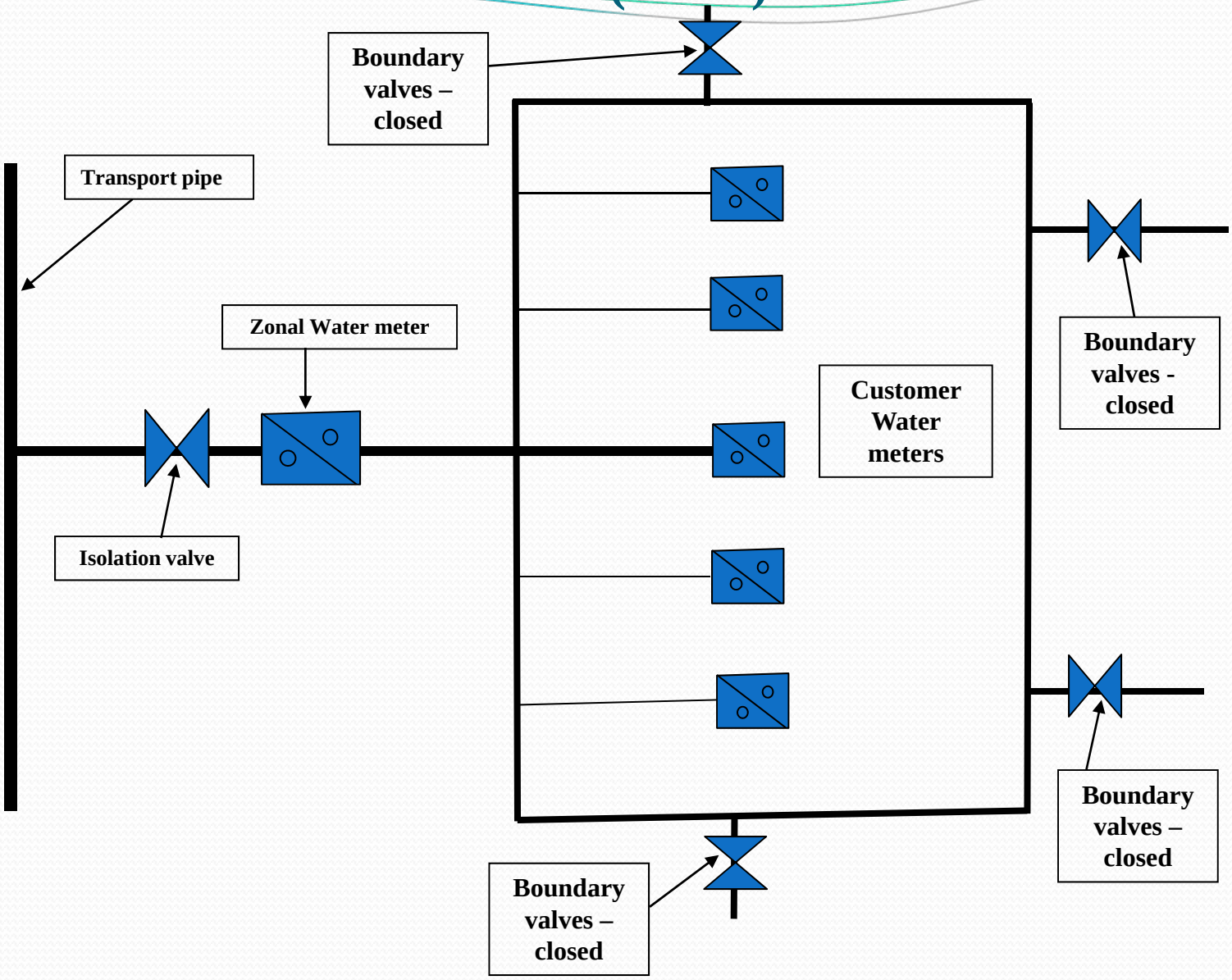
Typical District Metered Area (DMA) Design



Establishing a Standard Water Balance of DMA

- **Step 1 – Determining system input volume**
- **Step 2 – Determining authorized consumption**
- **Step 3 – Estimating apparent losses**
- **Step 4 – Calculating real losses**
- **Step 5 – Quantifying real loss components**

District Metered Area (DMA)



The Water Solution for Remote Readings

Electromagnetic Flowmeter Installation

Pressure Management

- **Pressure Management Area (PMA)**
- **(One-off) Reduction in Leakage**
- **Design within DMA**

Pressure Relief Valves

Active Leakage Control

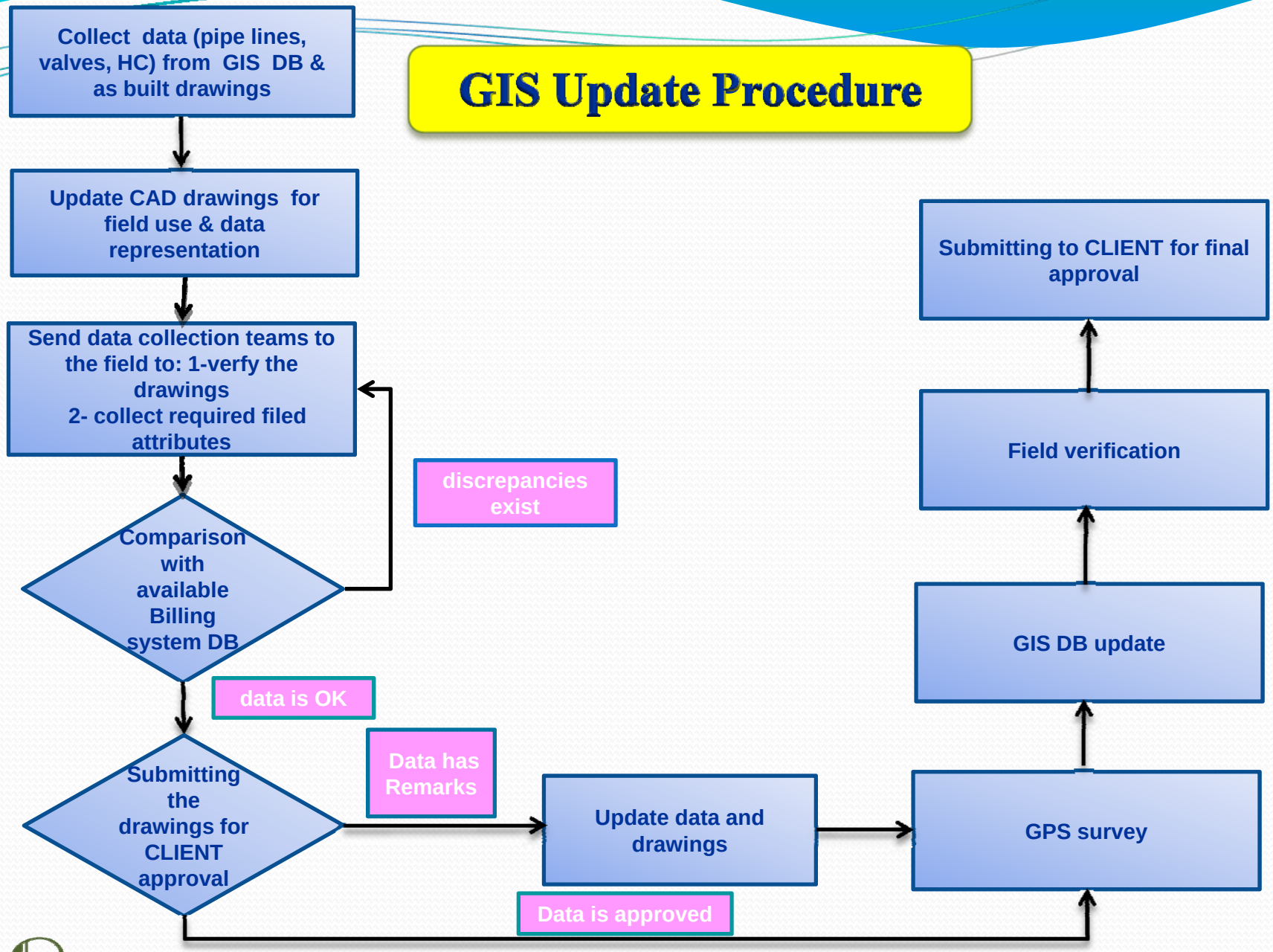
- Leakage monitoring (zones)
- Analysis of data
- Leak detection programs:

  - leak localizing (noise loggers)

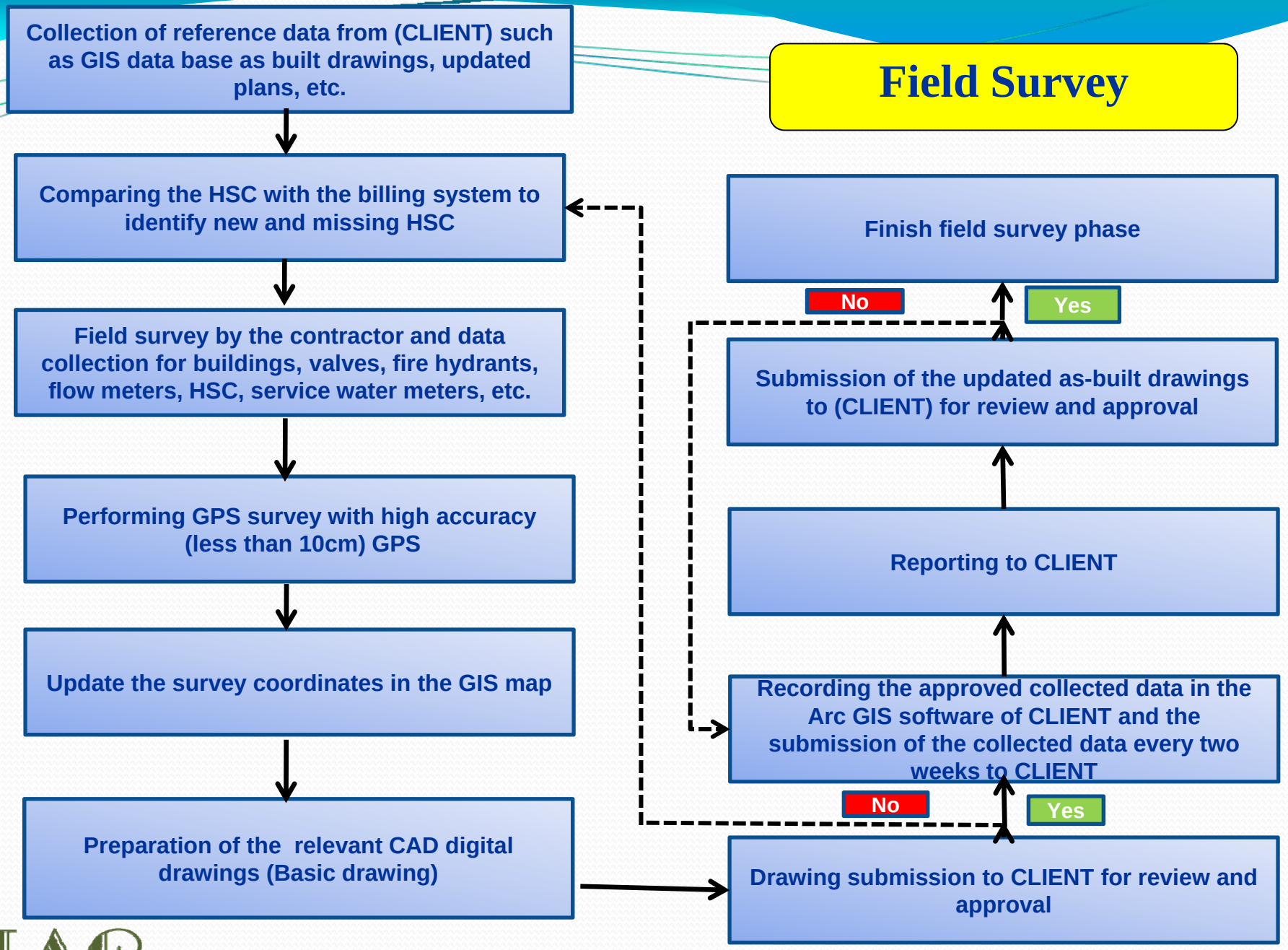
  - survey (correlator/sounding)

  - leak location

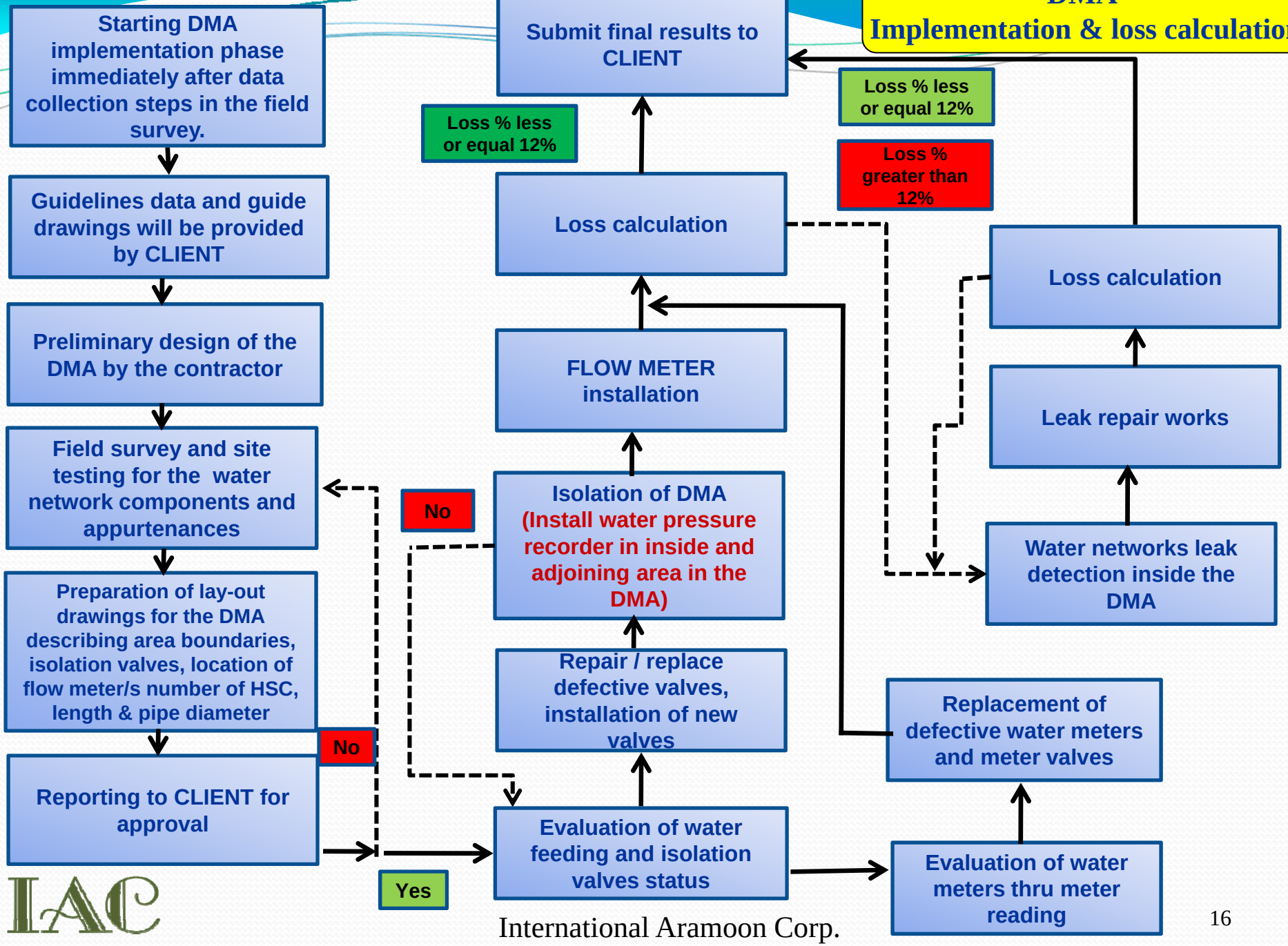
GIS Update Procedure



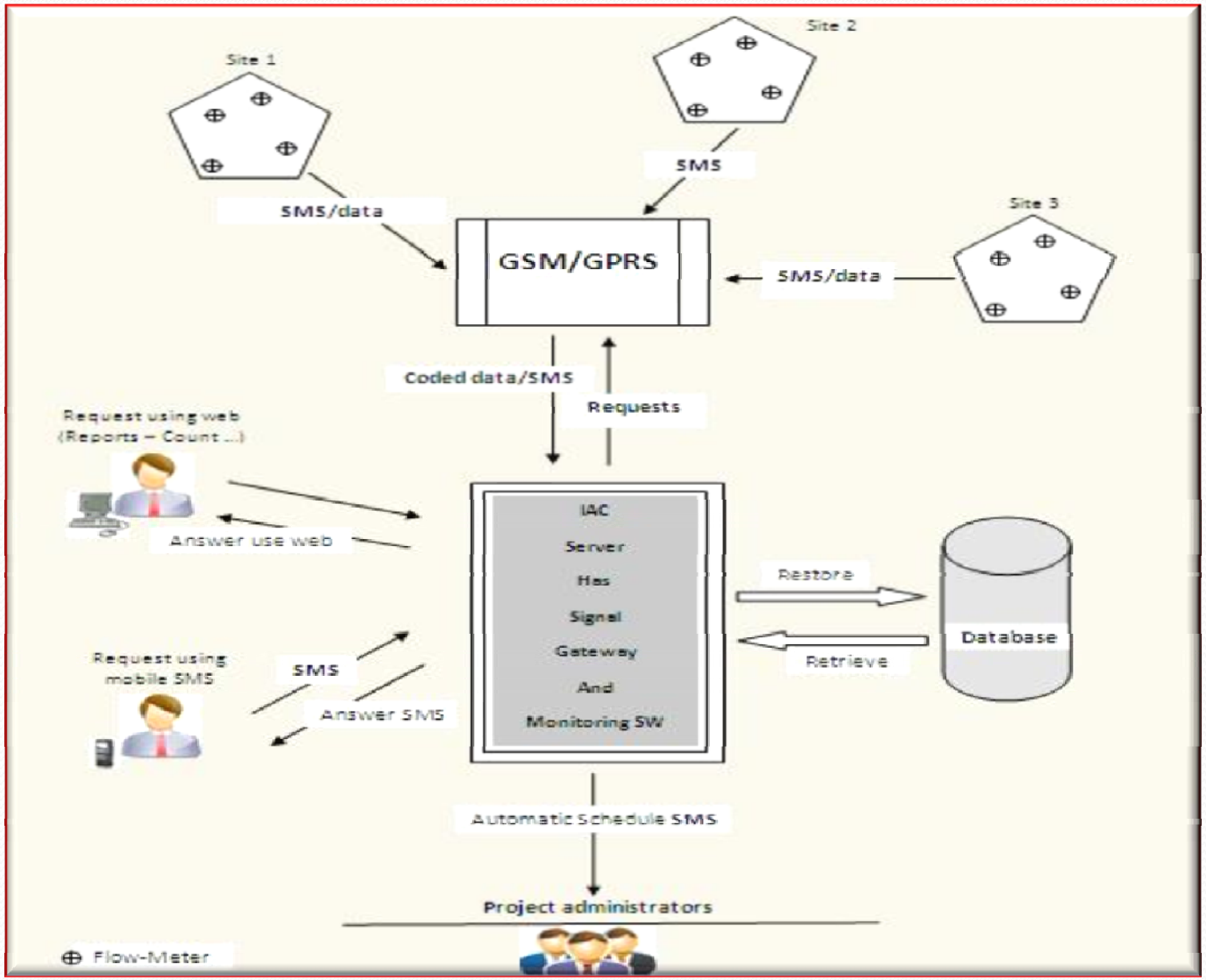
Field Survey



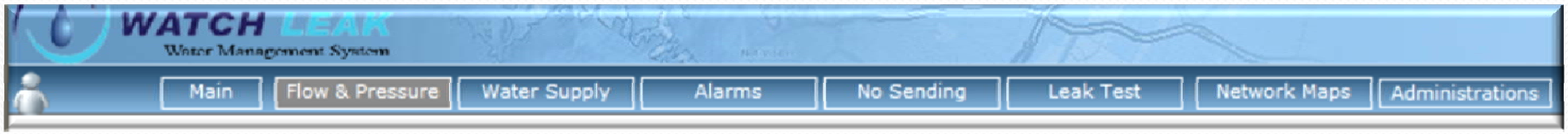
DMA
Implementation & loss calculation



System Overview



Advantages



Program to monitor all changes in the water network (flow and pressures, etc.) for selected points in the network. Analysis and recall data in the form of reports to help in decision making.

1. The program works as a web-based application, whether internal network or through the internet at the same time.
2. Details of the work of great powers to the users both in the pages or only certain zones.
3. Data to accommodate an infinite number of years and readings stored and retrieved at any time
4. Export all reports directed by the program to the office programs like Word, Excel and thus can make adjustments before printing

Watch Leak Operations

1 Network Map
Delivers advanced functionality for GIS

8 Remote Reading Status
Send reports for any defect (Data Logger)

2 Flow & Pressure
Continuous Monitoring for water distribution systems (Data & Graph)

7 Alarm
Warnings issued by the meter

3 Water Supply
DMZ & DMA (Data & Graph)

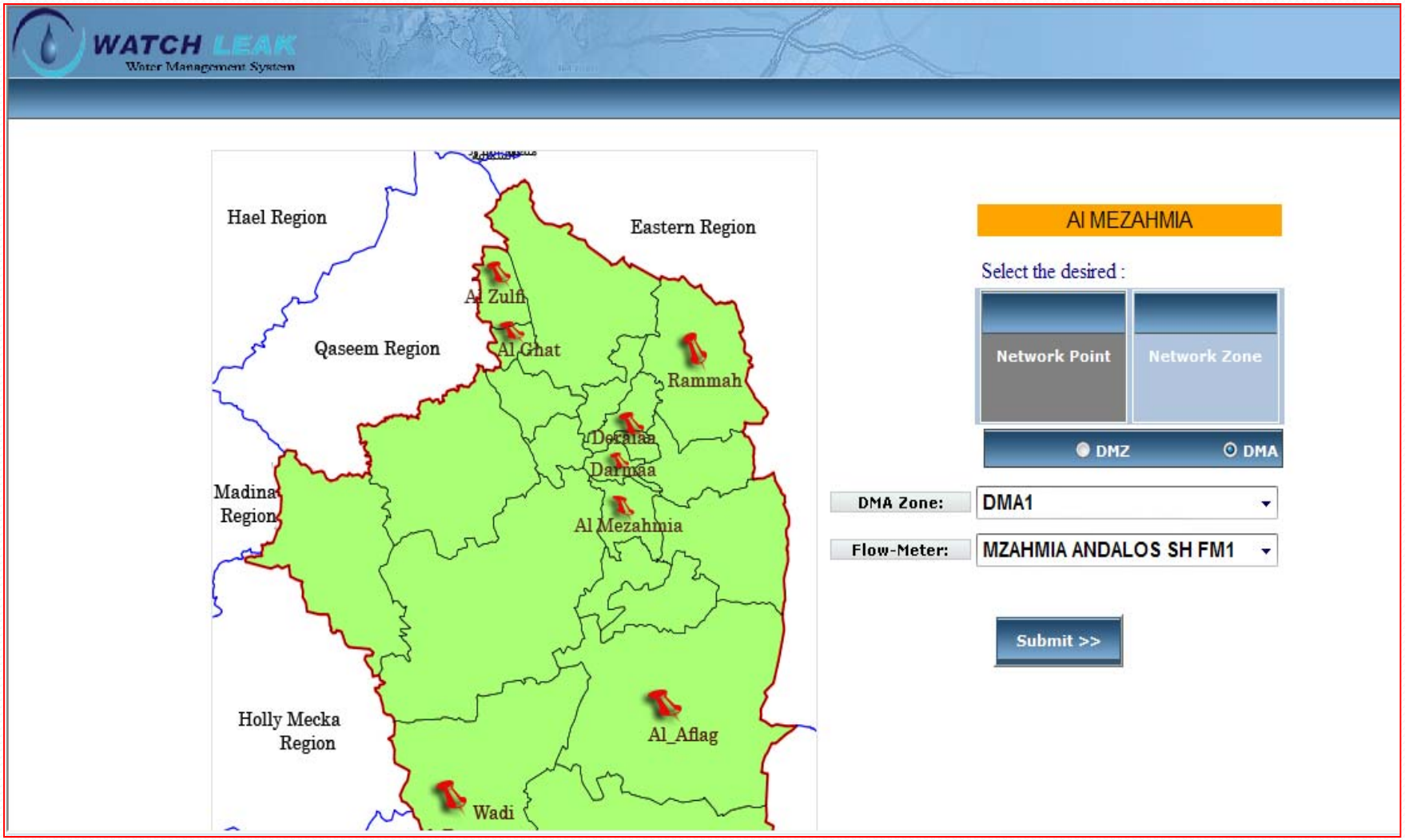
6 Continuous Losses Monitoring
Automatically for the DMA daily, Monthly, yearly

4 Losses Calculation
Automatically for the DMA stored in the system

5 Leak Test
Actual Leak Test for DMA including Step Test

Easy Access

DMZ & DMA Logging

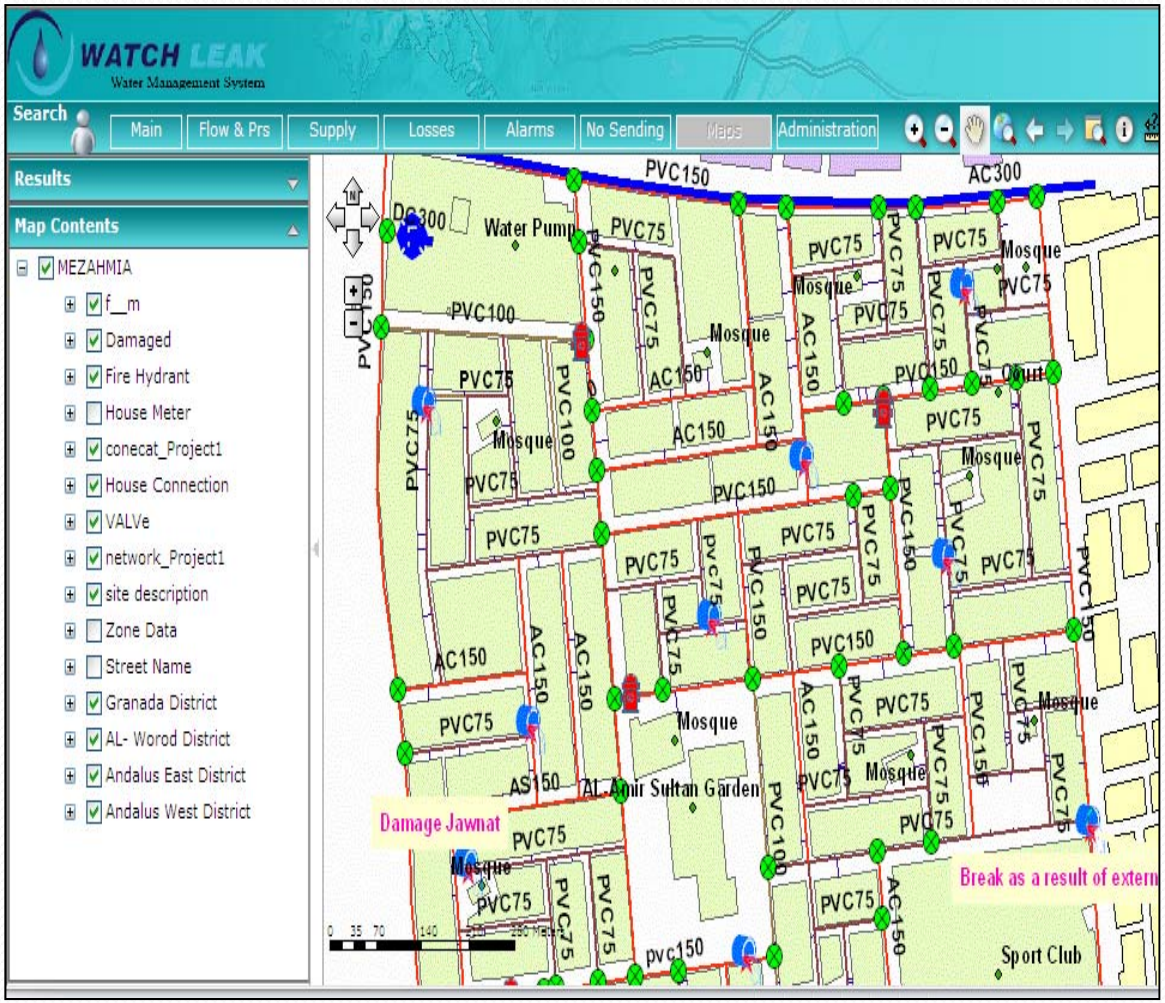


Network Map

GIS Integration

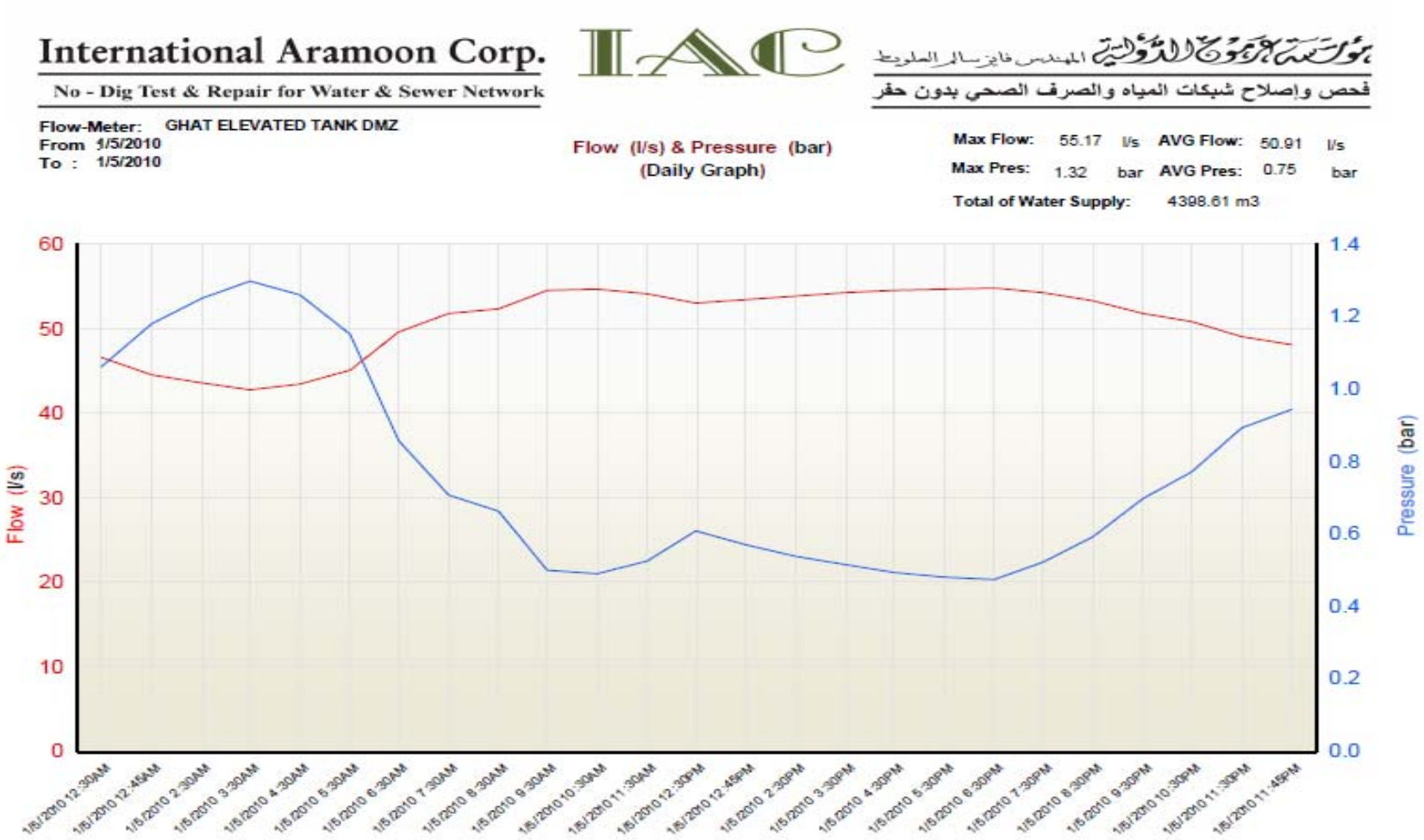
- ❑ Geographic information System (GIS) on the points and lengths of pipes and their actual locations and all components of the network up to date
- ❑ Compatible with (ARC GIS) and provided the full control of all the information about the network in the form of maps up to date
- ❑ Adding of variables on the grid in the area map designated as an example of knowledge of breaks and the dates of repair & reform of existing company, etc. through a constantly updated map of the area
- ❑ Networks Maintenance Schedule

GIS File



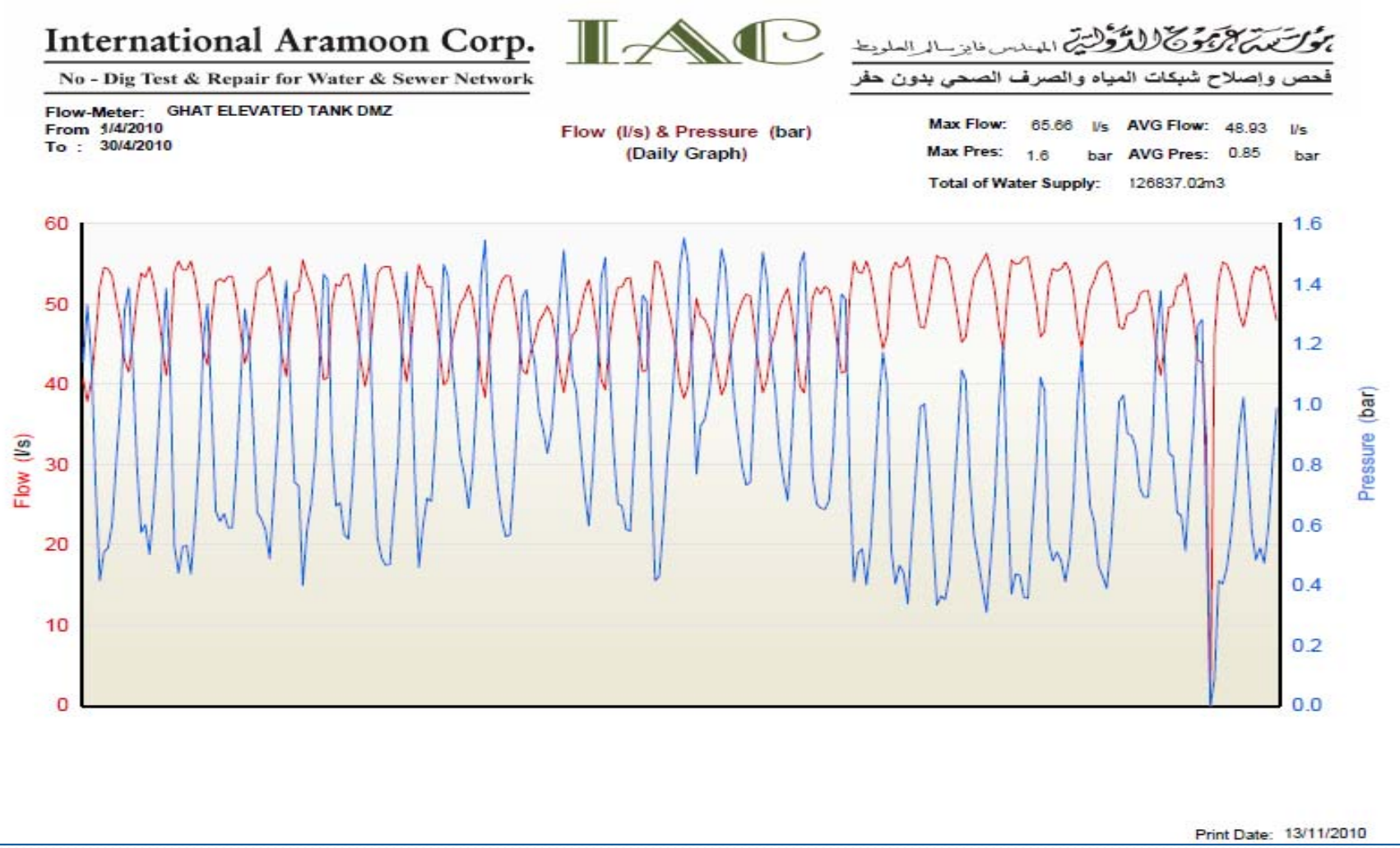
Flow & Pressure

Daily / Monthly / Period



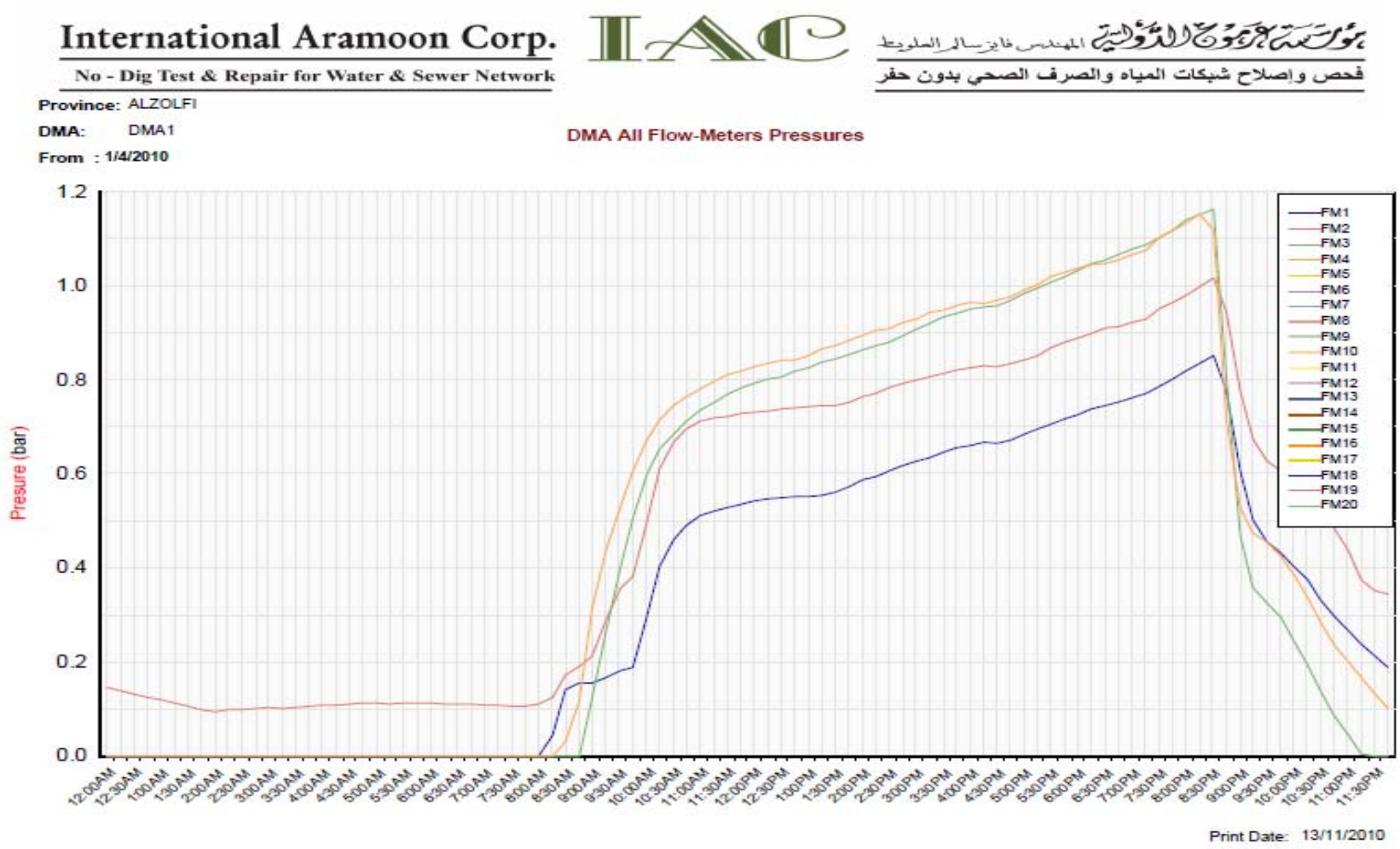
Cont./ Flow & Pressure

Daily / Monthly / Period



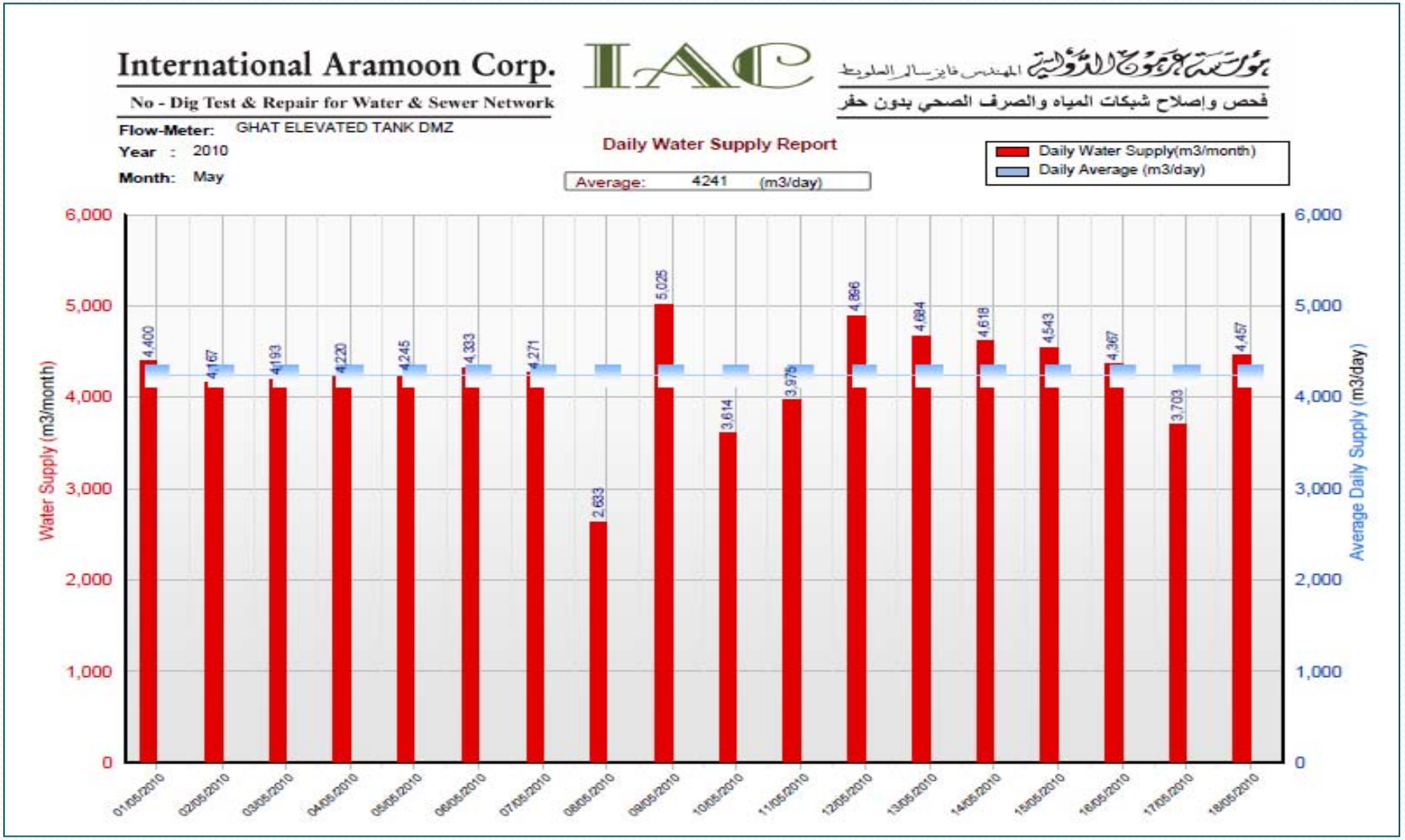
Cont./ Flow & Pressure

Pressure Distribution



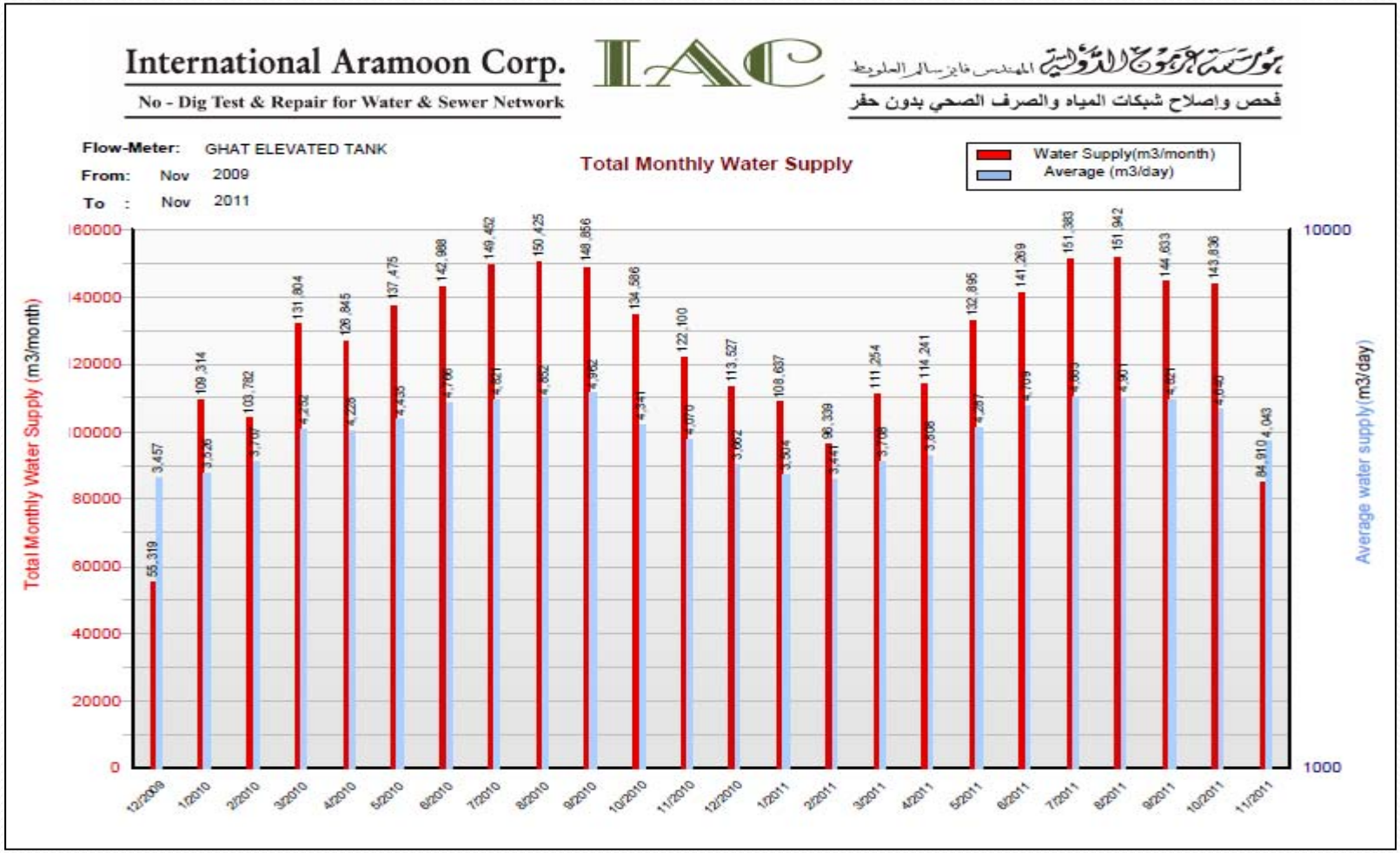
Water Supply

Daily / Monthly / Period



Water Supply

Daily / Monthly / Period



Cont/. Water Supply

Monthly / Average

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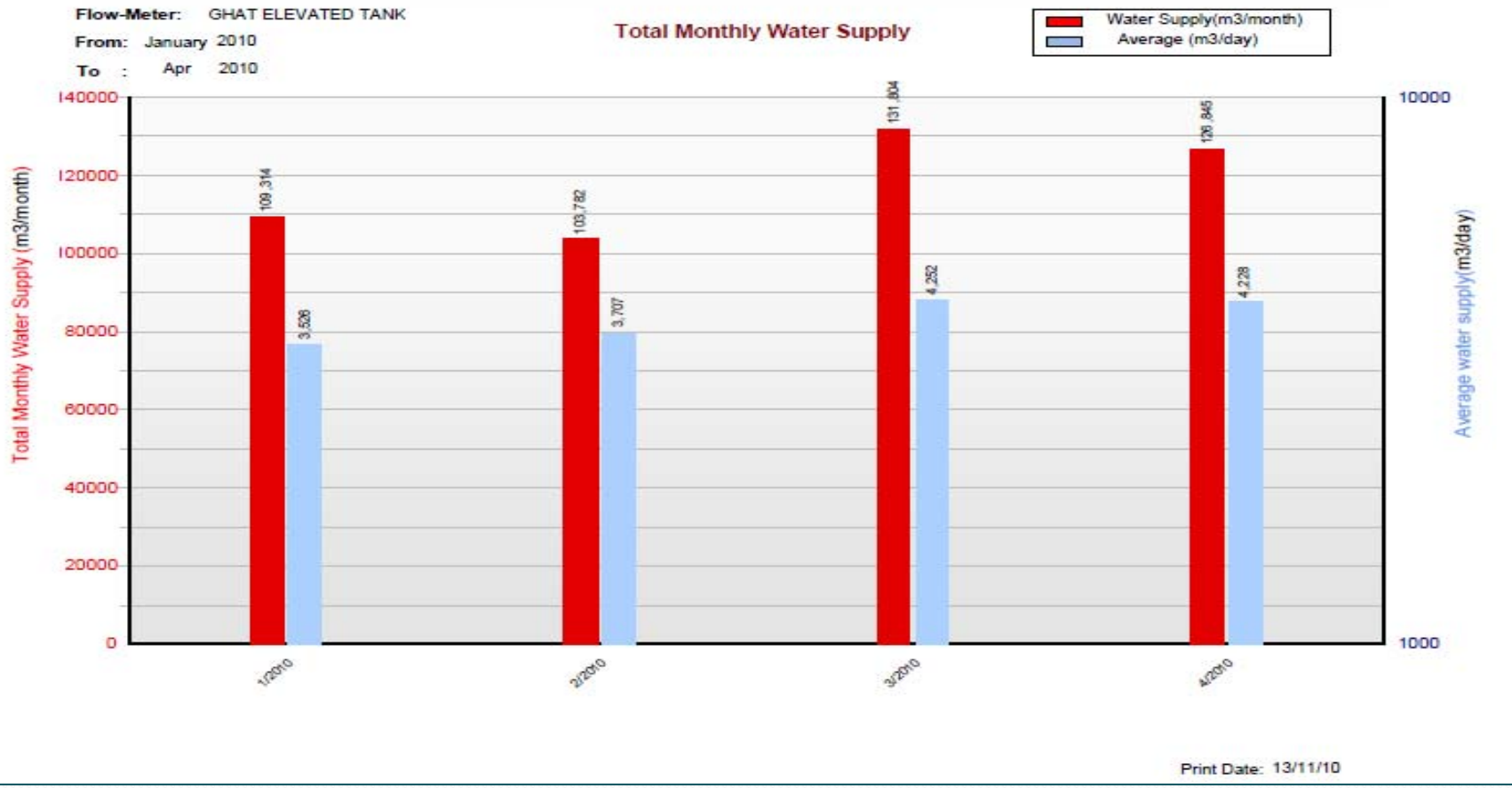
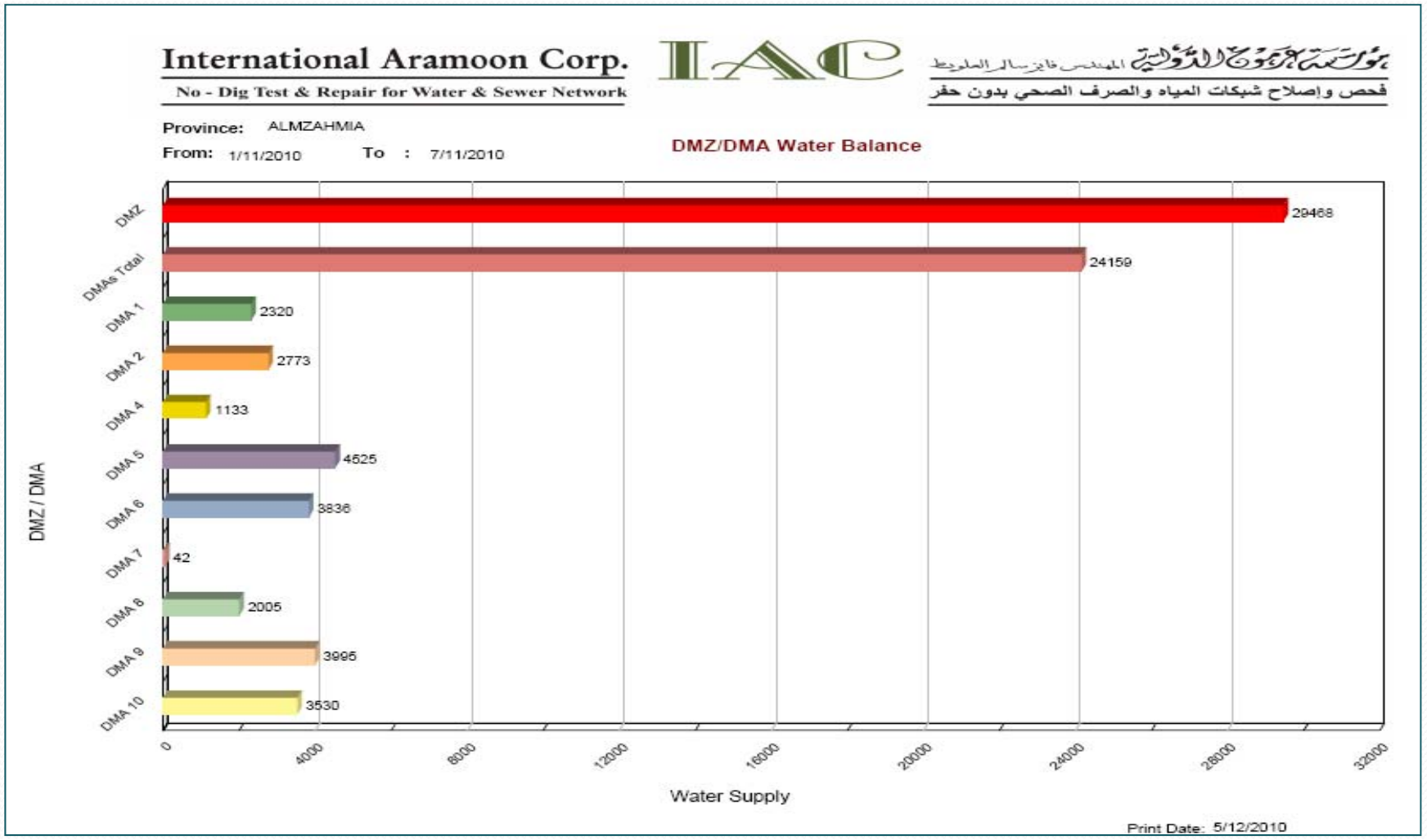
فحص وإصلاح شبكات المياه والصرف الصحي بدون حفر



Cont/. Water Supply

DMZ & DMA Water Balance



Live Data

Network Point Live Data

Alarms

International Aramoon Corp.

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فحص وإصلاح شبكات المياه والصرف الصحي بدون حفر

Flow-Meter: MZAHMIA TWEEK FM9

From : 1/11/2010

To : 30/11/2010

Flow-Meter Alarms

Time	Alarm Code	Alarm Description
2/11/2010 4:06:05 AM	264598	ALM- Call ABB, ALM- Sensor Bonding, INSTALLATION- Empty Pipe, INSTALLATION- S
2/11/2010 4:06:10 AM	264598	ALM- Call ABB, ALM- Sensor Bonding, INSTALLATION- Empty Pipe, INSTALLATION- S
3/11/2010 4:06:04 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
3/11/2010 4:06:10 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
4/11/2010 4:06:08 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
4/11/2010 4:06:16 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
5/11/2010 4:06:06 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
5/11/2010 4:06:13 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
6/11/2010 4:06:05 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
6/11/2010 4:06:09 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
7/11/2010 4:06:05 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
7/11/2010 4:06:08 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
8/11/2010 4:06:03 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
8/11/2010 4:06:10 AM	33174	ALM- Call ABB, INSTALLATION- Empty Pipe
9/11/2010 4:06:04 AM	264598	ALM- Call ABB, ALM- Sensor Bonding, INSTALLATION- Empty Pipe, INSTALLATION- S
9/11/2010 4:06:12 AM	264598	ALM- Call ABB, ALM- Sensor Bonding, INSTALLATION- Empty Pipe, INSTALLATION- S
11/11/2010 4:06:01 AM	33170	INSTALLATION- Empty Pipe
11/11/2010 4:06:04 AM	33170	INSTALLATION- Empty Pipe

Page 1 of 2

Print Date: 13/12/2010

Flow-Meter Sending Status

International Aramoon Corp.

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مؤسسة أرامون الدولية للمهندس خايز سالم المطيط

فحص وإصلاح شبكات المياه والصرف الصحي بدون حفر

Flow-Meter MZAHMIA DMZ
Sim: +966563855803
From: 1/12/2010
To: 31/12/2010

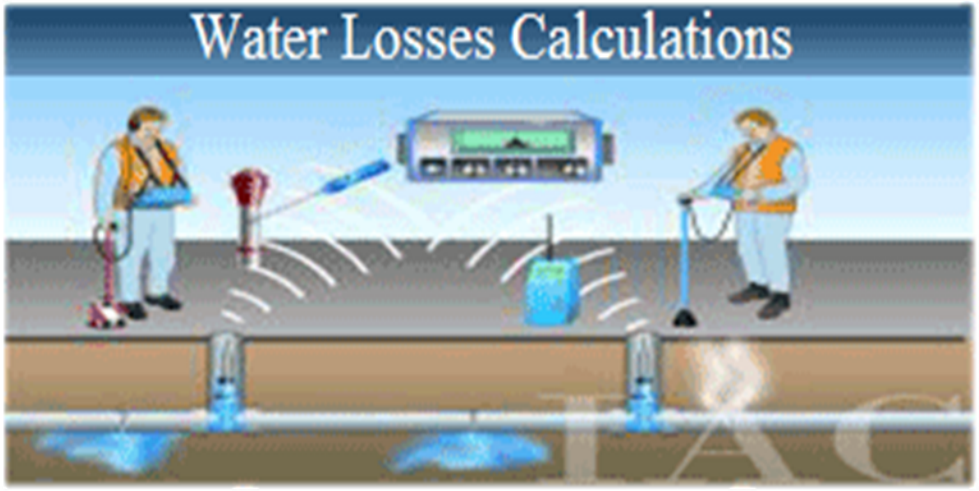
Flow-Meter Sending Status

S	Day	Flow	Pressure	Total
1	01/12/2010	OK	OK	OK
2	02/12/2010	OK	OK	-
3	03/12/2010	OK	OK	OK
4	04/12/2010	OK	OK	OK
5	05/12/2010	OK	OK	OK
6	06/12/2010	OK	OK	OK
7	07/12/2010	OK	OK	OK
8	08/12/2010	OK	OK	OK
9	09/12/2010	OK	OK	OK
10	10/12/2010	OK	OK	OK
11	11/12/2010	OK	OK	OK
12	12/12/2010	OK	OK	OK
13	13/12/2010	OK	OK	OK
14	14/12/2010	-	-	-
15	15/12/2010	-	-	-
16	16/12/2010	-	-	-
17	17/12/2010	-	-	-
18	18/12/2010	-	-	-
19	19/12/2010	-	-	-
20	20/12/2010	-	-	-
21	21/12/2010	-	-	-
22	22/12/2010	-	-	-
23	23/12/2010	-	-	-
24	24/12/2010	-	-	-
25	25/12/2010	-	-	-
26	26/12/2010	-	-	-
27	27/12/2010	-	-	-
28	28/12/2010	-	-	-
29	29/12/2010	-	-	-
30	30/12/2010	-	-	-
31	31/12/2010	-	-	-

Page 1 of 1

Print Date: 13/12/2010

Water Losses Calculation



Consumption	RLK	AVG Flow
using total water supply and customers' consumption	(Rate of Loss per Kilometer) using minimum flow	using the AVG flow for the zone and the minimum flow

Losses Calculation

New Study | Earlier Studies

Water Loss Report

From

November December 2010 January

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

To

November December 2010 January

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

< Analysis >

Total Water Supply: 2750 m3

Manual — Customers consumption

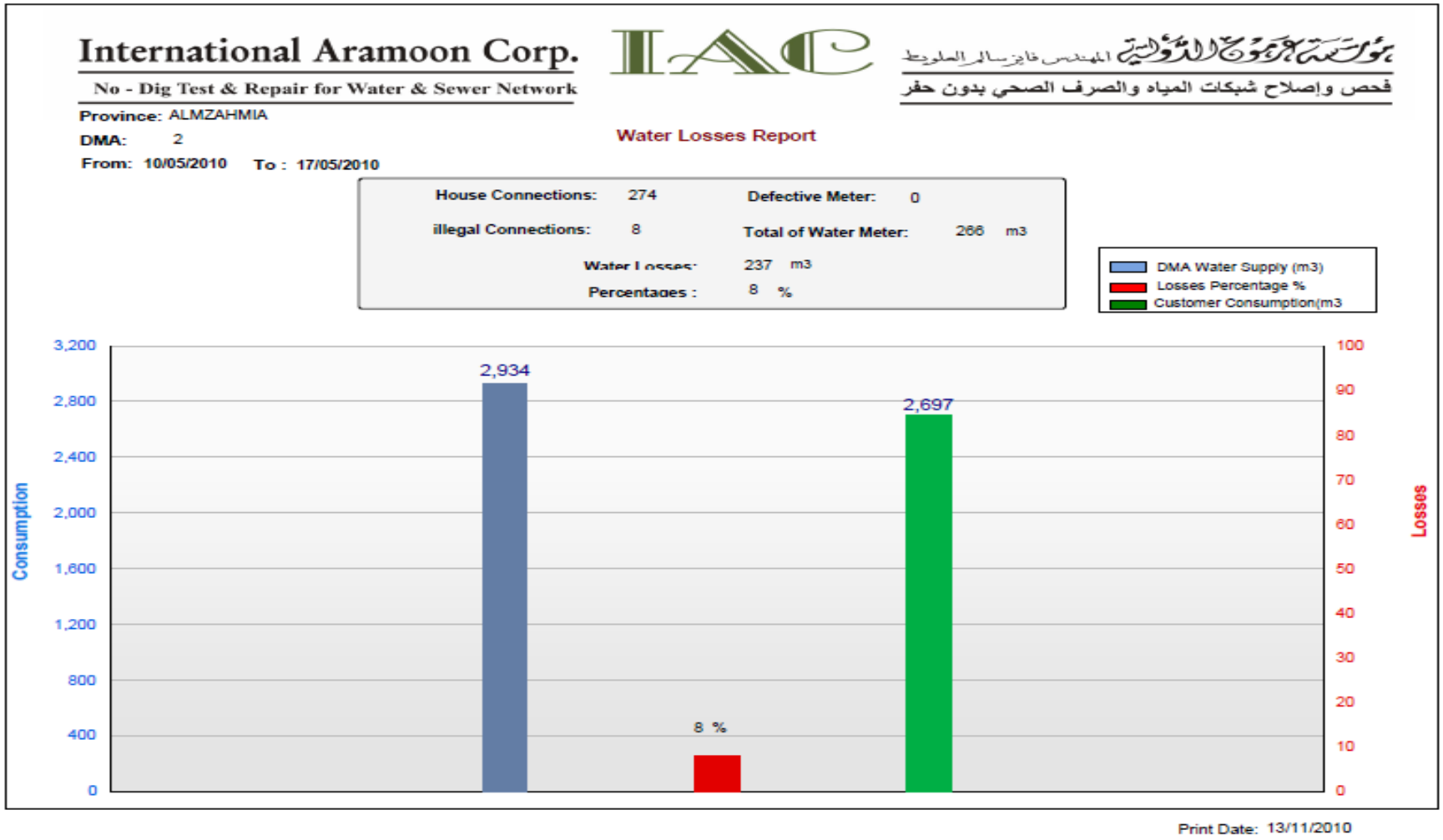
2120 m3

Automatic

Get Report

Cont/. Losses Calculation

Consumption Method



Cont/. Losses Calculation

WATCH LEAK
Water Management System

Main | Zone's Info | Flow & Pressure | Water Supply | Water Balance | Losses Study | Network Maps | Administrations

New Study | Earlier Studies

Earlier Water Losses Studies

Area:	Central Region	City:	Riyadh
Province:	ALMZAHMIA	DMA:	DMA2

Earlier Periods:

	From	To	Supply (m3)	Consumption (m3)	Loss Value (m3)	Loss (m3/day)	Percentage (%)
>>	26/04/2010	03/05/2010	2722	1674	1048	149.71	39 %
>>	03/05/2010	10/05/2010	2850	2007	843	120.43	30 %
>>	10/05/2010	17/05/2010	2934	2697	237	33.86	8 %
>>	17/05/2010	24/05/2010	2884	2820	64	9.14	2 %

Losses Progress Chart | Losses Progress Values

Cont/. Losses Calculation

RLK Method

Cont/. Losses Calculation

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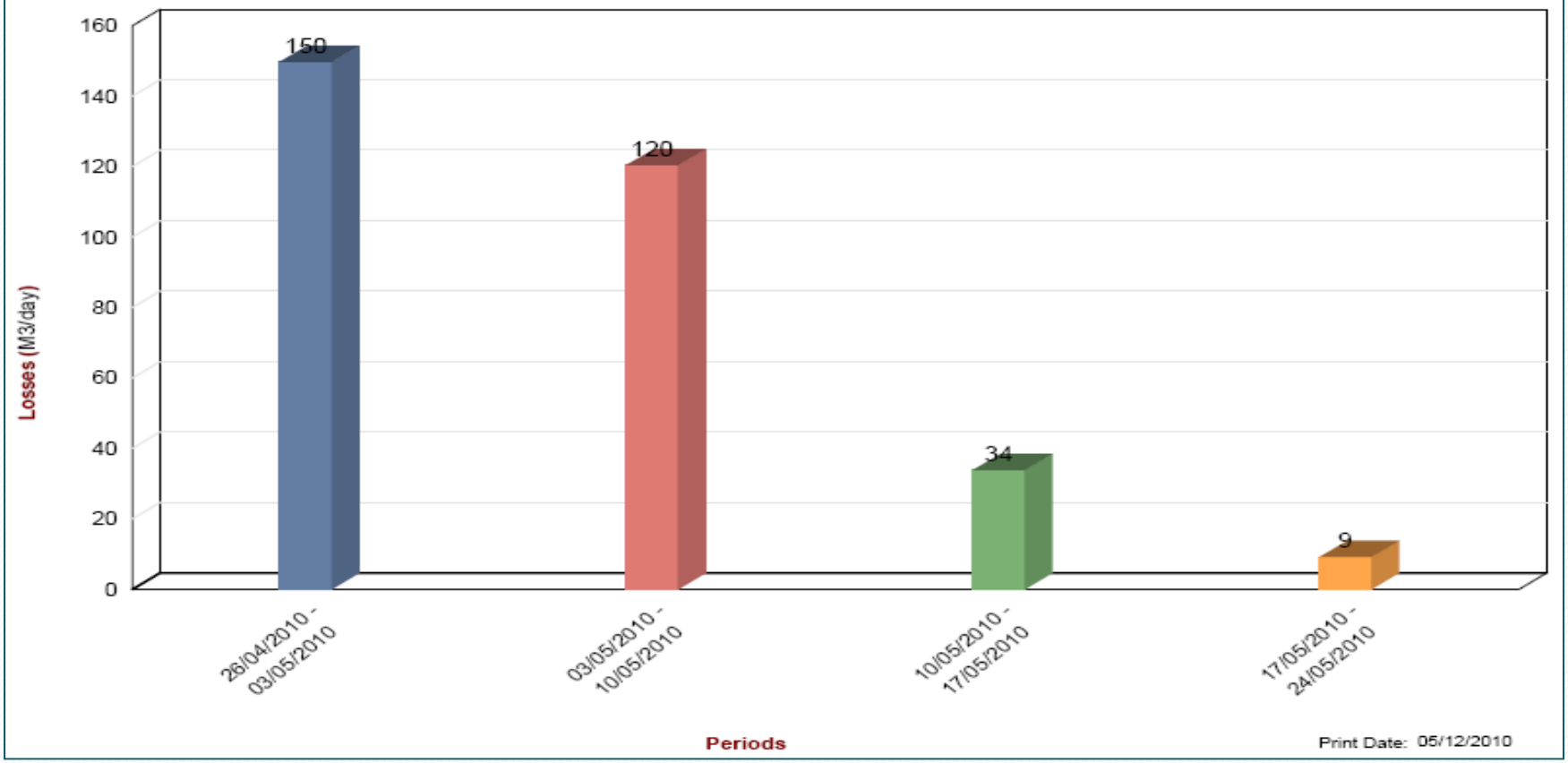
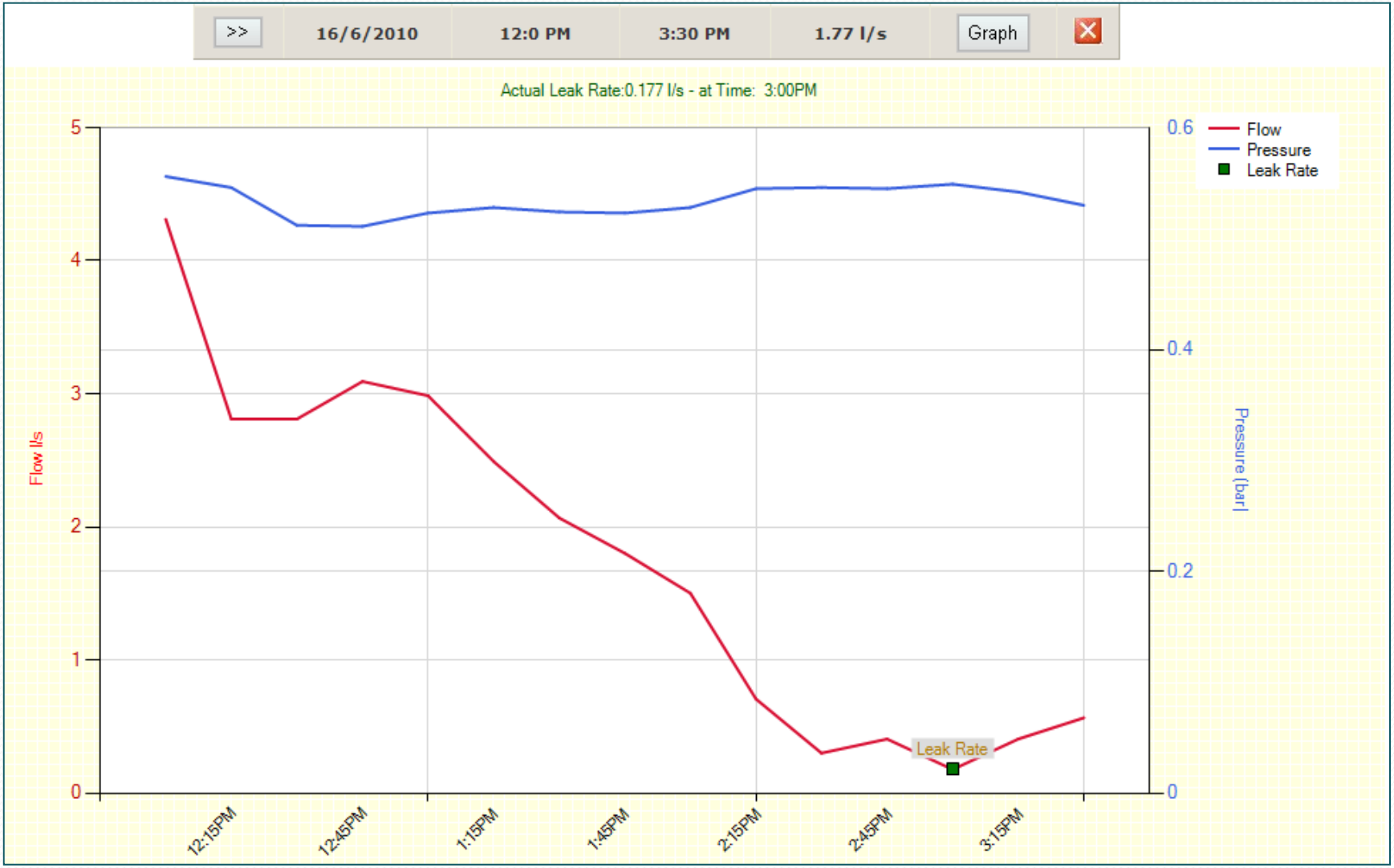
Province: ALMZAHMIA

DMA: DMA 2

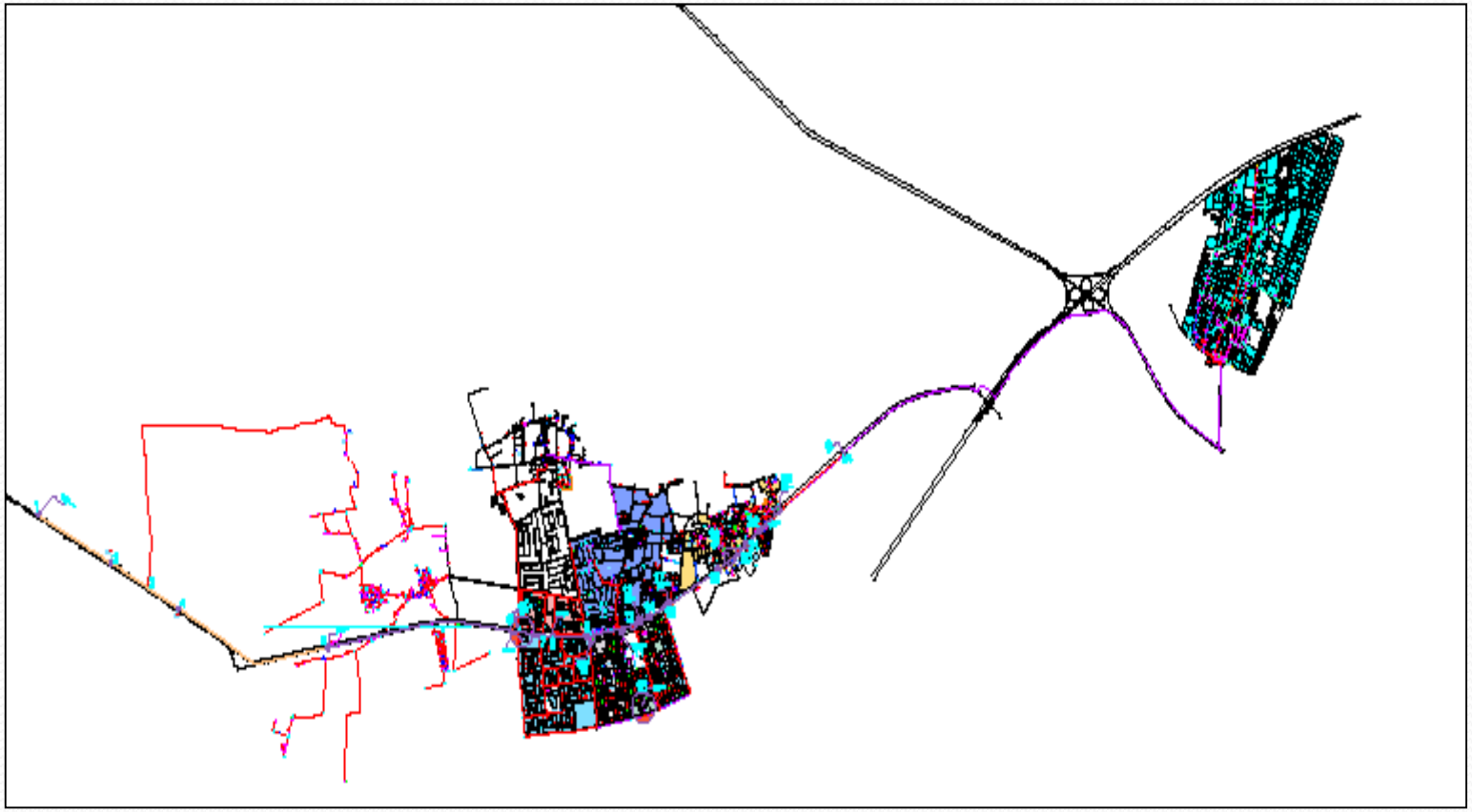


Actual Leak Test



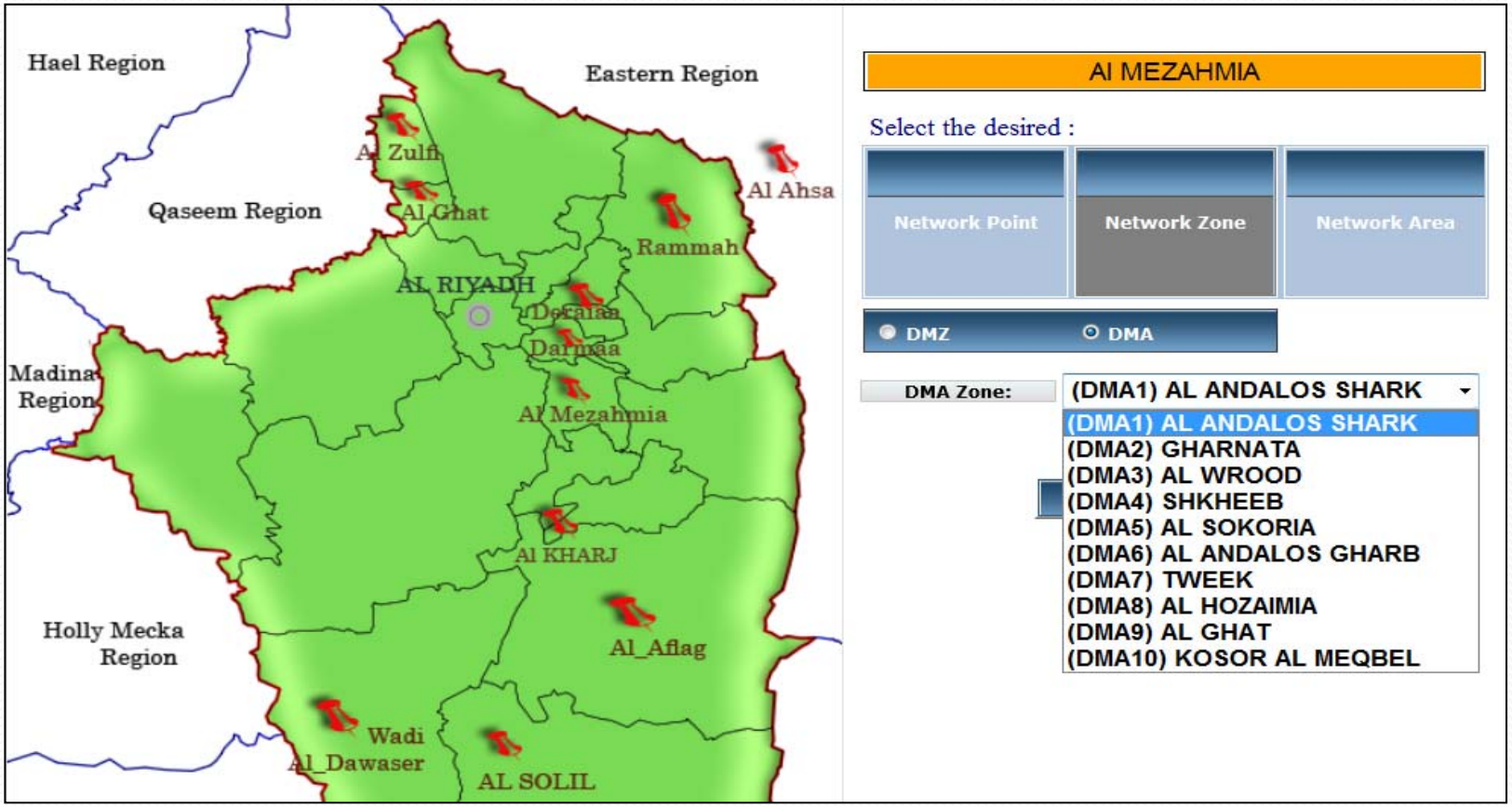
CASE STUDY

One (DMZ)
10 DMA



CASE STUDY

One (DMZ)
10 DMA



CASE STUDY

One (DMZ)
10 DMA **(DMZ)&(DMA) Water Balance**

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فحص واصلاح شبكات المياه والصرف الصحي بدون حفر

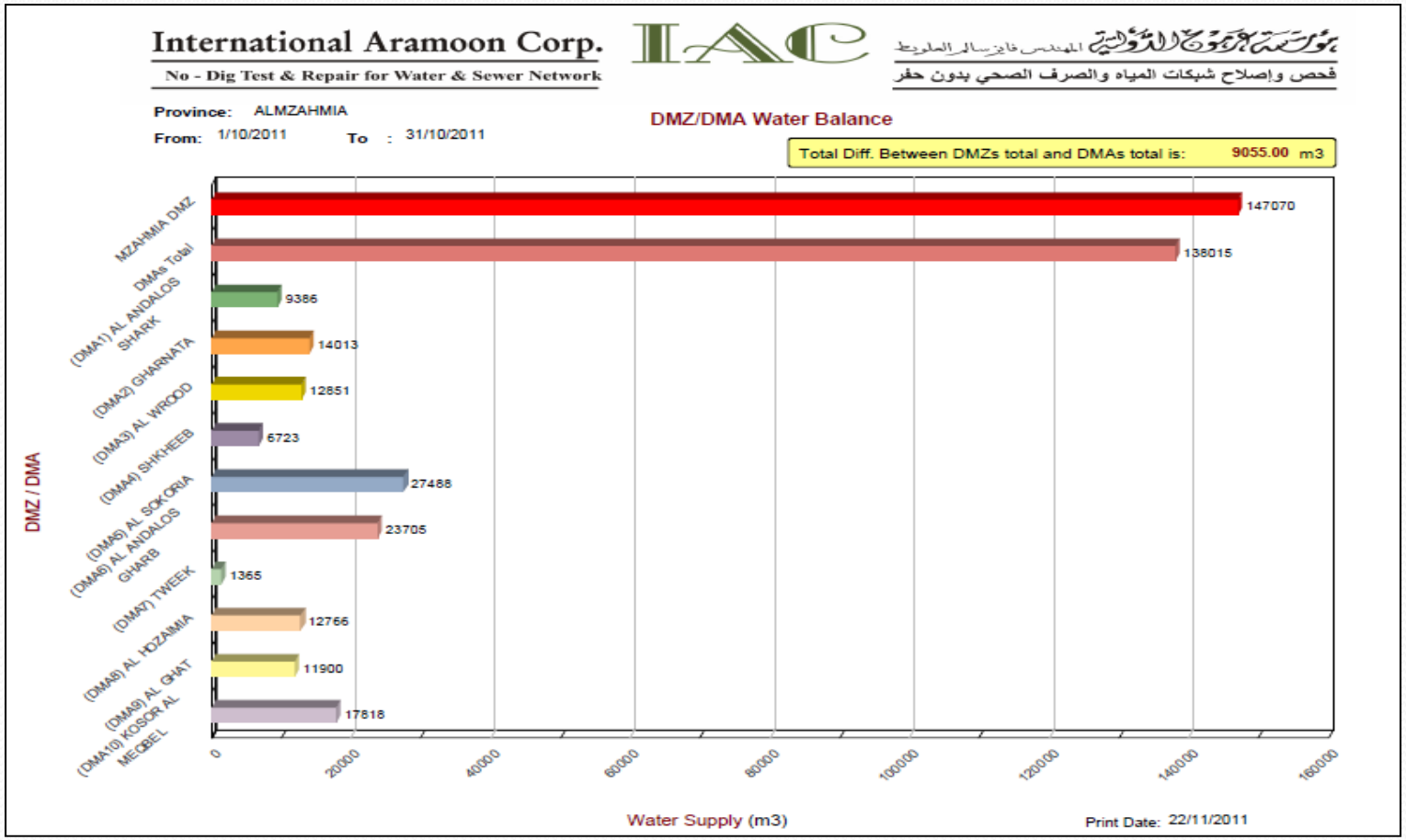
Province: ALMZAHMIA
From: 1/10/2011
To : 31/10/2011

DMZ/DMA Water Balance Data Sheet

Zone	Type	Total Water Supply (m3)	Daily Water Supply (m3)
MZAHMIA DMZ	DMZ	147070.00	4744.19
DMAs Total	DMAs Total	138015.00	4452.10
(DMA1) AL ANDALOS SHARK	DMA	9386.00	302.77
(DMA2) GHARNATA	DMA	14013.00	452.03
(DMA3) AL WROOD	DMA	12851.00	414.55
(DMA4) SHKHEEB	DMA	6723.00	216.87
(DMA5) AL SOKORIA	DMA	27488.00	886.71
(DMA6) AL ANDALOS GHARB	DMA	23705.00	764.68
(DMA7) TWEEK	DMA	1365.00	44.03
(DMA8) AL HOZAIMIA	DMA	12766.00	411.81
(DMA9) AL GHAT	DMA	11900.00	383.87
(DMA10) KOSOR AL MEQBEL	DMA	17818.00	574.77
Total Diff. Between DMZs total and DMAs total is:			9055.00 m3
Average Daily Water Supply is:			292.10 m3

CASE STUDY

One (DMZ)
10 DMA (DMZ)&(DMA) Water Balance



CASE STUDY

One (DMZ)
10 DMA (DMZ)&(DMA) Summary Report

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فحص وإصلاح شبكات المياه والصرف الصحي بدون حفر

Province: ALMZAHMIA
From: 01/10/2011
To : 31/10/2011

Area Summary Report

#	Zone ID	Zone Name	House Con.	House Meters	Direct Con.	Defec-tive	Populat-ions	Network Len(KM)	Water Supply(m3)	m3/day	m3/day /HSC	L/C/D	Last Test Date	Losses Percent	Losses Calc. Method
1	1	(DMA1) AL ANDALOS SHARK	301	272	29	0	2500	12.04	9,386	312.87	1.04	125.15	01-02-2011	2.00%	Consumption
2	2	(DMA2) GHARNATA	274	266	8	0	2200	21.87	14,013	467.10	1.70	212.32	24-05-2010	2.00%	Consumption
3	3	(DMA3) AL WROOD	170	165	5	0	1360	8.46	12,851	428.37	2.52	314.98	11-06-2011	9.00%	Consumption
4	4	(DMA4) SHKHEEB	135	133	2	0	1200	10.20	6,723	224.10	1.66	186.75	15-10-2011	12.00%	Consumption
5	5	(DMA5) AL SOKORIA	544	530	14	0	4000	32.46	27,488	916.27	1.68	229.07	05-06-2011	11.00%	Consumption
6	6	(DMA6) AL ANDALOS GHARB	413	364	49	0	3200	16.06	23,705	790.17	1.91	246.93	11-12-2010	4.00%	Consumption
7	7	(DMA7) TWEEK	51	49	2	1	400	1.92	1,365	45.50	0.89	113.75	27-02-2011	11.00%	Consumption
8	8	(DMA8) AL HOZAIMIA	391	379	12	0	3000	12.13	12,766	425.53	1.09	141.84	24-07-2011	3.00%	Consumption
9	9	(DMA9) AL GHAT	358	347	11	0	2500	25.00	11,900	396.67	1.11	158.67	17-11-2011	12.00%	Consumption
10	10	(DMA10) KOSOR AL MEQBEL	250	0	250	0	1500	25.00	17,818	593.93	2.38	395.96	-	0.00%	-
Total		10	2887	2505	382	1	21860	165	138015	4601	1.59	210.45			

WATCH LEAK
Water Management System

Thank You