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GEOSPATIAL APPLICATION FOR WATER SUPPLY

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6. Current GeoSpatial Related Applications
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INTRODUCTION

The image features a dark blue background with a subtle pattern of small white dots. Overlaid on this are several technical diagrams in a lighter blue color. These include circular gauges with numerical scales (e.g., 160, 170, 180, 190, 200, 210) and arrows, as well as concentric circles and dashed lines. A prominent white-outlined rectangular box is tilted and positioned in the center, containing the word 'INTRODUCTION' in a bold, white, sans-serif font.

WHAT IS GEOSPATIAL TECHNOLOGIES?

- Is the range of modern tools contributing to the geographic mapping and analysis of the Earth and human societies.
- Airborne photo/satellite imagery allowed image capturing of the Earth's surface and human activities with certain limitations.
- Computers allowed storage and transfer of imagery together with the development of associated digital software, maps, and data sets on socioeconomic and environmental phenomena, collectively called geographic information systems (GIS).

WHAT IS GEOSPATIAL TECHNOLOGIES?

- GIS assemble the range of geospatial data into a layered set of maps which allow complex themes to be analyzed and then communicated to wider audiences. This 'layering' is enabled by the fact that all such data includes information on its precise location on the surface of the Earth, hence the term 'geospatial'.
- In the last decade, satellite technologies have evolved into a network of national security, scientific, and commercially operated satellites complemented by powerful desktop GIS. High quality hardware and data is now available to new audiences such as universities, corporations, and non-governmental organizations.
- The fields and sectors deploying these technologies are currently growing at a rapid pace, informing decision makers on topics such as industrial engineering, biodiversity conservation, forest fire suppression, agricultural monitoring, humanitarian relief, and much more.

TYPE OF GEOSPATIAL TECHNOLOGY

- **Remote Sensing:** imagery and data collected from space- or airborne camera and sensor platforms. Some commercial satellite image providers now offer images showing details of one-meter or smaller, making these images appropriate for monitoring humanitarian needs and human rights abuses.
- **Geographic Information Systems (GIS):** a suite of software tools for mapping and analyzing data which is georeferenced (assigned a specific location on the surface of the Earth, otherwise known as geospatial data). GIS can be used to detect geographic patterns in other data, such as disease clusters resulting from toxins, sub-optimal water access, etc.

TYPE OF GEOSPATIAL TECHNOLOGY

- **Global Positioning System (GPS):** a network of U.S. Department of Defense satellites which can give precise coordinate locations to civilian and military users with proper receiving equipment (note: a similar European system called Galileo will be operational within the next several years while a Russian system is functioning but restricted).
- **Internet Mapping Technologies:** software programs like Google Earth and web features like Microsoft Virtual Earth are changing the way geospatial data is viewed and shared. The developments in user interface are also making such technologies available to a wider audience whereas traditional GIS has been reserved for specialists and those who invest time in learning complex software programs.



**GEOSPATIAL
APPLICATIONS IN WATER
SUPPLY**

GIS can be applied in the various sub-fields of the following areas:

- Water Resource Planning, Monitoring and Forecasting
- River Basin Planning and Management
- Monitoring of River Basin for Pollution
- Dam Safety Monitoring
- Planning, Management & Operation of the Water Supply System
- Asset Management
- Non-Revenue Water Programme
- Water Quality Monitoring of Distribution System

ADVANTAGE OF USING GIS

- Lowering operation and maintenance cost by adopting preventive maintenance practices.
- Increasing revenue
- Improving services to customer in terms of quality, achieving public participation and customer satisfaction.
- Development of hydraulics models fulfilling the various requirement such as variations in nodal demands, adding new pipelines to serve newly developing areas etc;
- Searching other alternatives of water that can be turned into useful resources of water in adverse condition.

The background features a blue gradient with technical diagrams. On the right side, there are several circular gauges or dials with numerical scales (e.g., 160, 170, 180, 190, 200, 210) and arrows. There are also dashed lines and other circular patterns scattered across the background.

HISTORY OF APPLICATIONS IN WATER SUPPLY

HISTORY OF APPLICATIONS IN WATER SUPPLY

- Early 1980's, Selangor Water Supply Dept. implement Telemetry System for Monitoring Service Reservoir Water Level
- 1990's Lembaga Air Perak Automated Pipeline Mapping System using AutoCad, later on MapInfo
- JICA-JKR Study 1996 Study to map W.P Labuan pipeline using ArcInfo/ArcView
- JKR Study 2005, using ArcView to carryout Distribution System Study
- 2007, JBA implement WP Labuan NRW Control Programme using GIS technology

The background is a dark blue gradient with various technical and data-related graphics. On the right side, there are several circular gauges or progress indicators with numerical scales (e.g., 0, 80, 100, 110, 120, 130, 140, 150, 180, 190, 200, 210) and arrows. There are also dashed lines and other circular patterns scattered across the background.

FINANCIAL ALLOCATIONS FOR GIS RELATED PROJECTS

FINANCIAL ALLOCATIONS : GIS & NRW CONTROL PROGRAMME

9th MP	10th MP	11th MP (estimate)
RM1.08 Billion	RM844 Million	RM500 Million

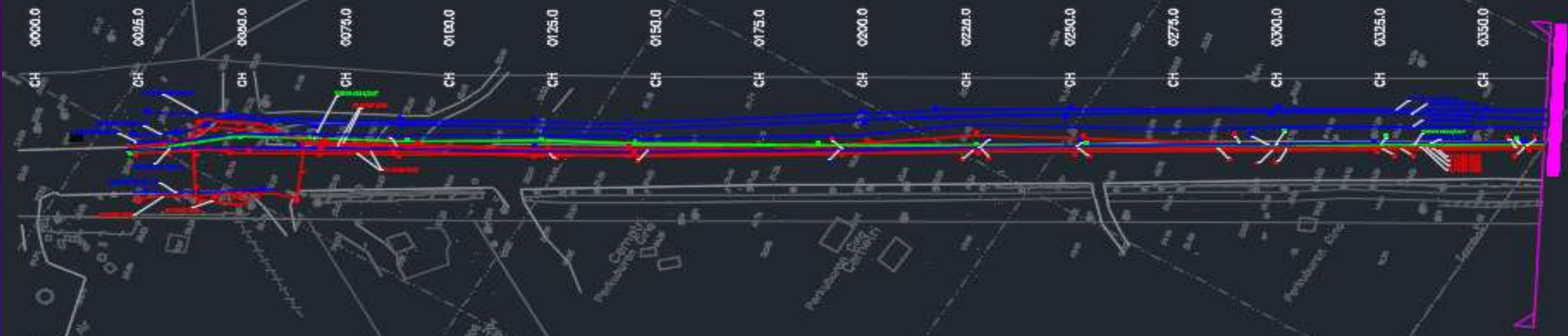
EXAMPLE OF PROJECTS USING GIS SYSTEM

Project Title: Projek Penggantian Paip AC Dari Tangki SGI Ke Kawasan Industri Ranche-ranche Sepanjang 6km Menggunakan Paip MSCL Berukuran 600mm Di WP Labuan.
Method Of Survey: Utilities and Ground Mapping

CURRENT GEOSPATIAL RELATED APPLICATIONS



Skala 1 : 500



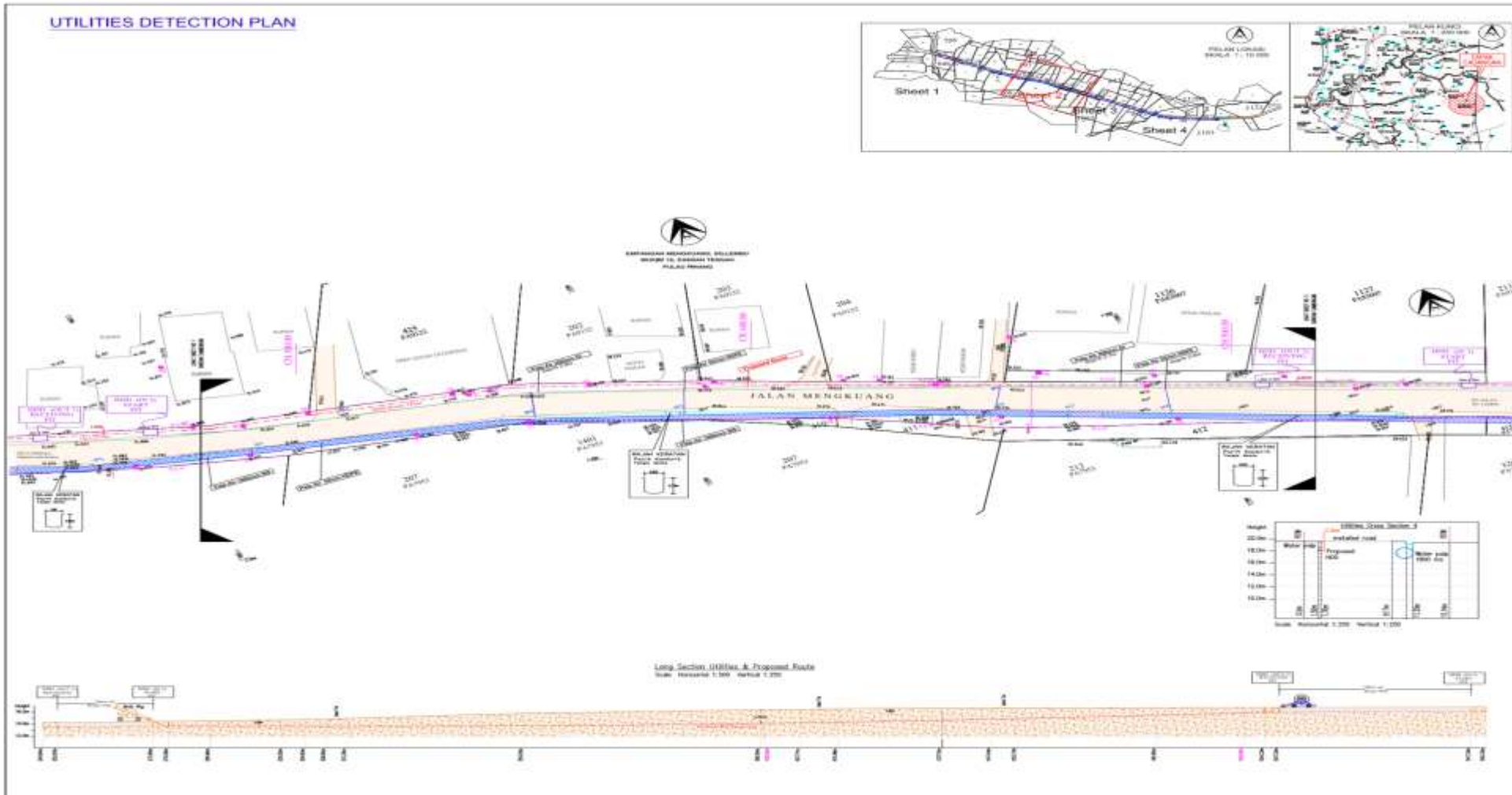
UTILITY DETECTION & MAPPING AT CH 0.00 – CH 350.0

UNDERGROUND UTILITY LEVEL	
	POWER CABLE
	WATER PIPE
	TELECOM CABLE/DUCT

EXAMPLE OF PROJECTS USING GIS SYSTEM

Project Title: Cadangan Pembesaran Empangan Mengkuang, Pulau Pinang.

Method Of Survey: Underground Utilities Detection and Mapping



RESULT

RMK-9 PROJECT

Project Title: GIS, SCADA dan SISTEM TELEMETRI NEGERI KELANTAN'
Cadangan Merekabentuk dan Menyiapkan Projek GIS Untuk Sistem
Bekalan Air Negeri Kelantan Dalam RMK-9'

Project Scope :

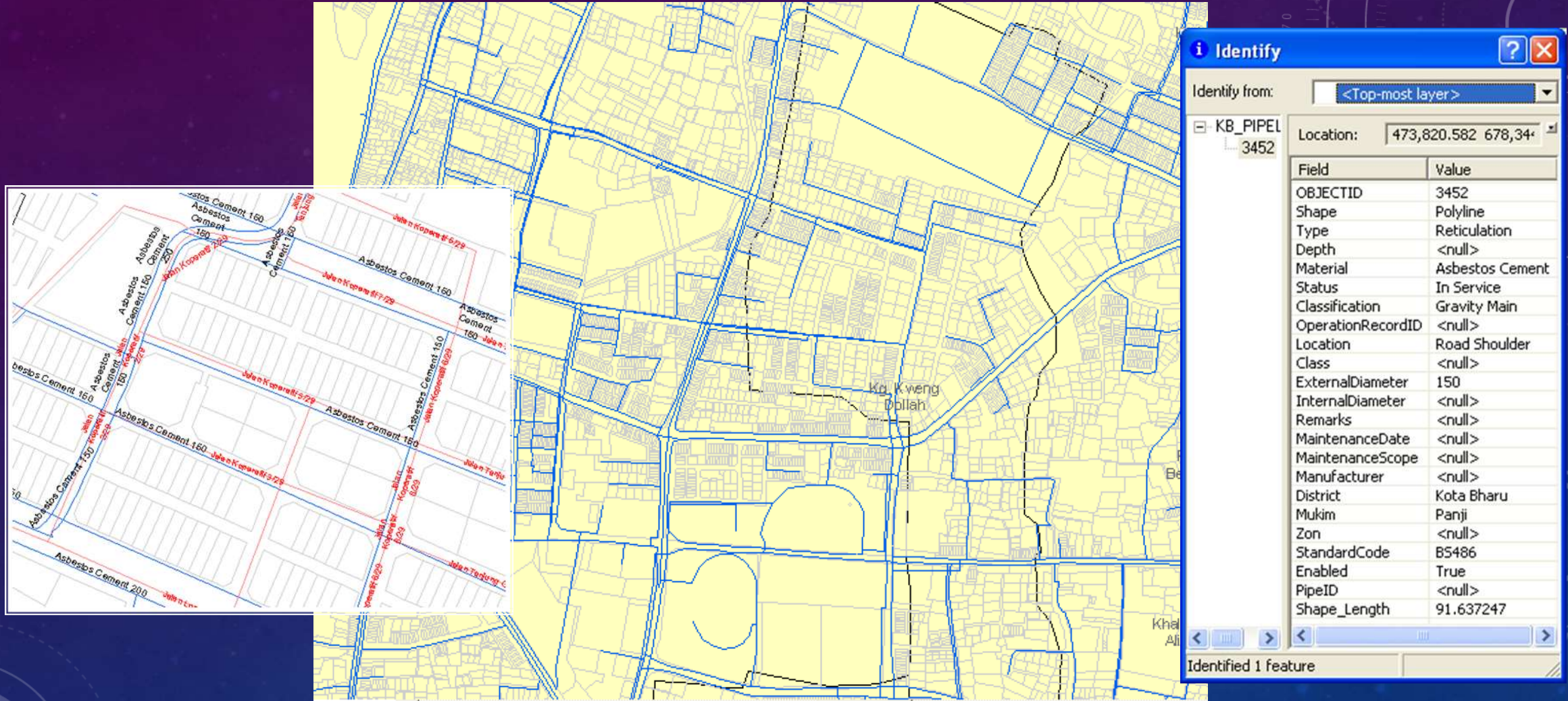
- GIS hardware & software
- Software development
- Integration with other softwares
- Digitization of the entire pipe network in Kelantan
- Preparation of data remote sensing and landbase

Contract Cost : RM 5,550,793.52

Site Possession Date : 4 Mei 2008

Completion Date: 31 Disember 2010

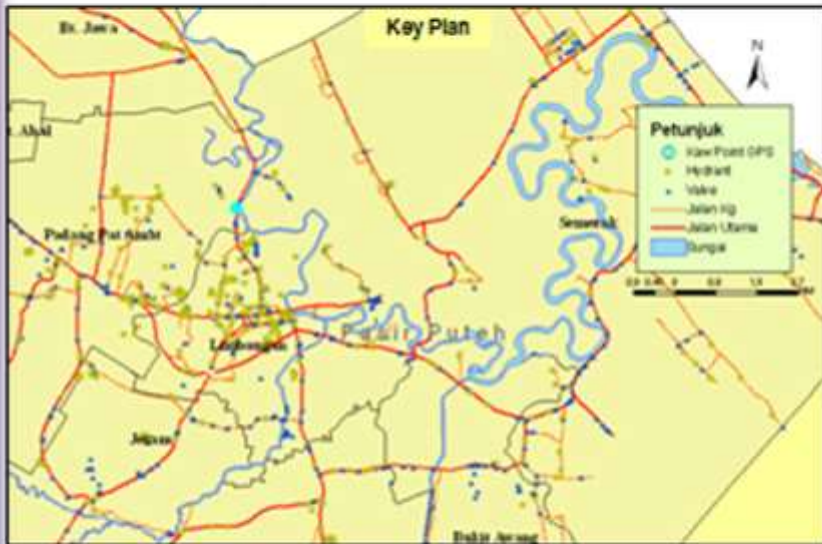
DIGITIZATION OF THE ENTIRE PIPE NETWORK



PIPE UTILITY VERIFICATION VALVE

ARSB WATER FACILITIES FIELD VERIFICATION USING GPS

Observed by: <u>Mohamad Saifuluddin bin Din</u>		Date: 01 <u>June</u> , 2009			
District: <u>Bangkubuk</u>					
ID	Cassini Kelantan (m)		MRSO (m)		Altitude Ht. (m)
	Easting	Northing (m)	Easting	Northing	
3	24775.22	-4044.36	489937.230	647746.765	
Location Description		Jalan D13, Kg. Gong Tesik			
Remarks		<u>6666666666666666</u>			



Detail Location Plan



Photographs



ARSB WATER FACILITIES FIELD VERIFICATION USING GPS

Observed by: <u>Mohamad Saifuluddin bin Din</u>		Date: 23 Jun 2009			
District: <u>Bangkubuk</u>					
ID	Cassini Kelantan (m)		MRSO (m)		Altitude Ht. (m)
	Easting	Northing (m)	Easting	Northing	
1	18166.9560966	27804.5862927	483382.149955	679609.753256	
Location Description		Jalan Kg. Kubur, Kg. Kubur			
Remarks		<u>6666666666666666</u>			



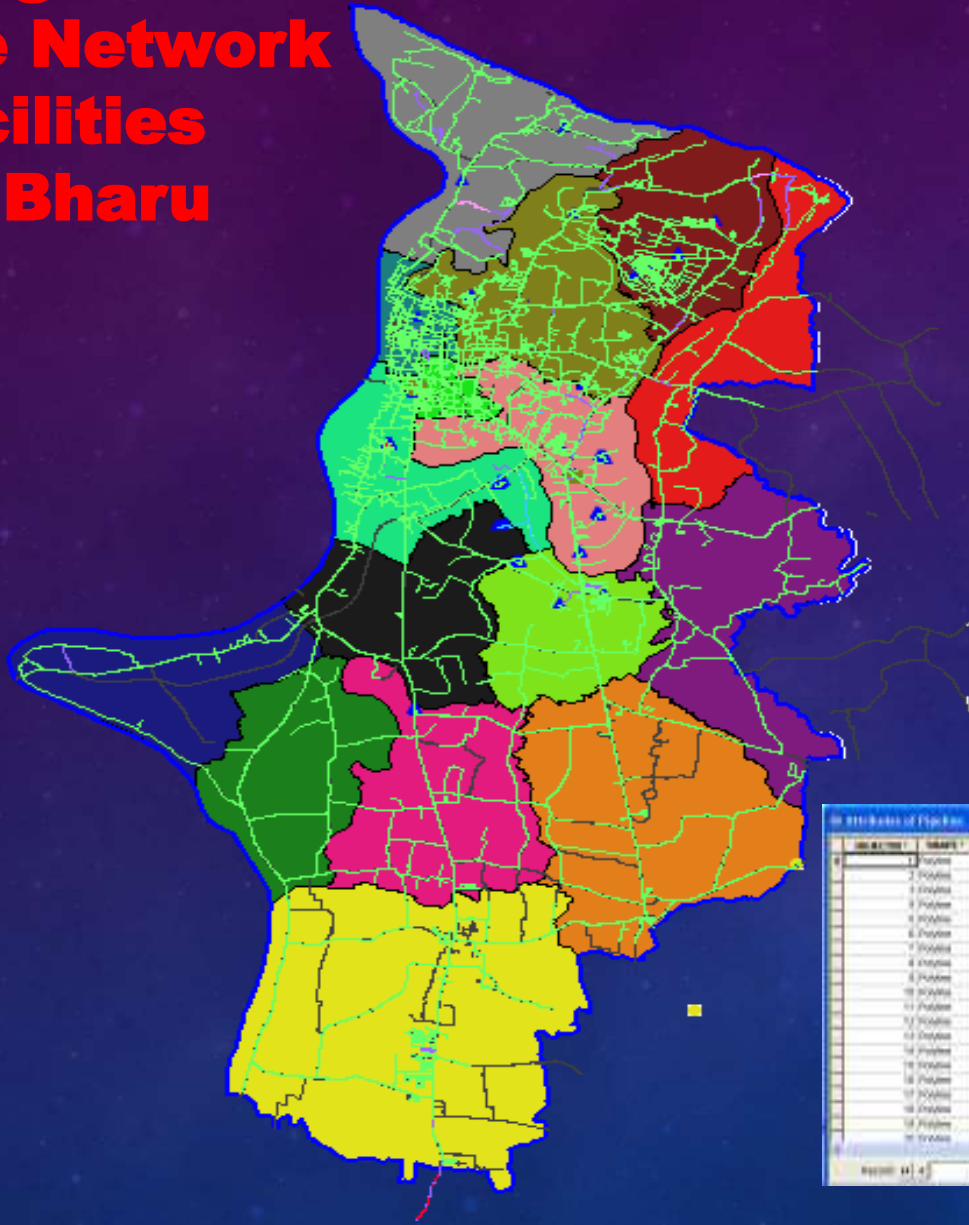
Detail Location Plan



Photographs



Digitizing Pipeline Network And Facilities In Kota Bharu



- Plant = 5**
- Reservoir = 45**
- Pipeline = 1363.976 km**
- Hydrant = 2044**
- Valve = 3576**
- Intake = 82**

NO. LINE	NAME	Type	Depth	Material	Status	Classification	Quantification	Location	Year	Investment	Notes
1	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
2	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
3	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
4	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
5	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
6	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
7	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
8	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
9	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
10	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
11	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
12	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
13	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
14	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
15	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
16	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
17	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
18	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
19	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	
20	Pipeline	Water	1.0	Steel	In Service	City Main	1000	Street	20	100	

PREPARATION OF DATA REMOTE SENSING & DATABASE



Quickbird Images



SPOT Images

DEM



Rivers and water body



Cadastral lot and Building Foot Print



District Boundary

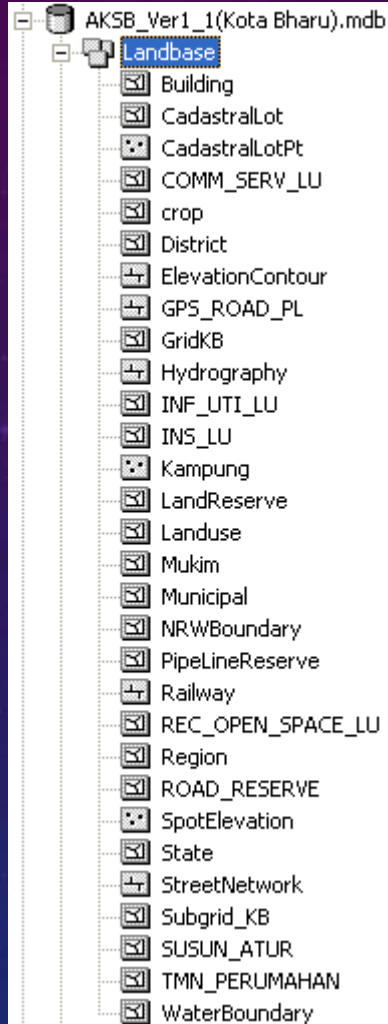


Road and Railways



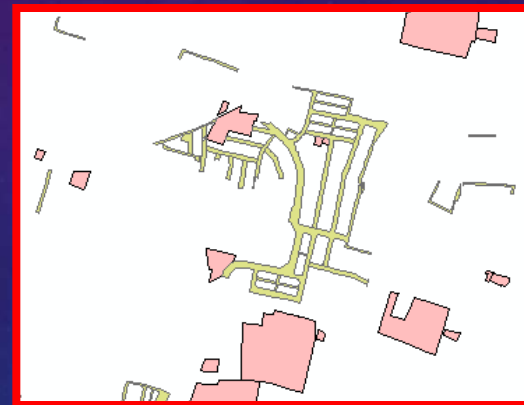
The use of satellite images and data in GIS landbase is to ensure that the digitization of the network and facilities is exactly the actual site conditions.

LANDBASE DATA



OBJECTID	SHAPE	MukimName	DistrictName	NoLot	NoPA	SHAPE_Length	SHAPE_Area
163915	Polygon	Panchor	Kota Bharu	3587	PA67489	47.558176	100.305728
163916	Polygon	Panchor	Kota Bharu	3588	PA67489	47.571311	100.537985
163917	Polygon	Panchor	Kota Bharu	3589	PA67489	47.530149	100.212355
163918	Polygon	Panchor	Kota Bharu	3590	PA67489	47.530239	100.212392
163919	Polygon	Panchor	Kota Bharu	3591	PA67489	47.529604	100.213133
163920	Polygon	Panchor	Kota Bharu	3592	PA67489	47.540419	100.256738
163921	Polygon	Baung	Kota Bharu	2600	PA15905	72.694423	291.485648
163922	Polygon	Panchor	Kota Bharu	3241	PA55995	59.011473	142.504226

Record: 1 Show: All Selected Records (0 out of *2000 Selected) Options



<input checked="" type="checkbox"/> Landuse
<input type="checkbox"/> <all other values>
Type
<input type="checkbox"/> Badan Air
<input type="checkbox"/> Hutan
<input type="checkbox"/> Infrastruktur_Utiliti
<input type="checkbox"/> Institusi_KemudahanAwam
<input type="checkbox"/> Kediaman
<input type="checkbox"/> Pengangkutan
<input type="checkbox"/> Perindustrian
<input type="checkbox"/> Perniagaan
<input type="checkbox"/> Pertanian
<input type="checkbox"/> TanahLapang_Rekreasi

OBJECTID	SHAPE	LanduseCode	Type	Status	Activity	YearOfData	SHAPE_Length	SHAPE_Area
2711	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	113.080418	727.659321
2679	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	84.334591	450.835321
2703	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	66.265022	263.884475
2704	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	56.83212	207.043592
2705	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	55.696948	187.814986
2706	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	55.983807	195.809249
2707	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	75.557918	327.817234
2708	Polygon	DA1320	Infrastruktur	<Null>	<Null>	<Null>	133.109916	1003.030052

Record: 0 Show: All Selected Records (0 out of 8668 Selected) Options

PROJECT TITLE : KAJIAN DAN PENGAMBILAN TANAH BAGI SKIM BEKALAN AIR LEMBANGAN LINGGI (BUNDED STORAGE), NEGERI SEMBILAN

METHOD OF SURVEY: BATHYMETRIC SURVEY

- Bathymetric profiling at 50m x 50m grid line (Figure 1) of the watered portion was carried out over the 7 ponds (Pond 1, 2, 3, 4, 5, 7, and 9). Remaining 3 ponds (Pond 6, 8 and 10) was carried out by method of manual sounding and topographic profiling.
- Continuous echo soundings were carried out and depths were logged into the online navigation system at intervals of not more than 5 metres interval along the profiles. A single high frequency echo sounder (~210 kHz) was used for the bathymetric survey with the transducer mounted over the side of the survey vessel.
- The echo sounder was calibrated at the start and end of each day's work when sounding was required using the calibration method known as "Bar Check". The "Bar Check" calibration was taken into account for the daily variation in acoustic velocity propagation through the water column and also used to check the echo sounder's transducer draft.
- The survey was extended as far as possible without endangering the safety of the vessel, equipment and survey team. Soundings were reduced to datum from observed water level at the vicinity of survey area. The bathymetric survey was carried out from 10th August 2016 to 17th August 2016 in order to complete the bathymetric survey process.

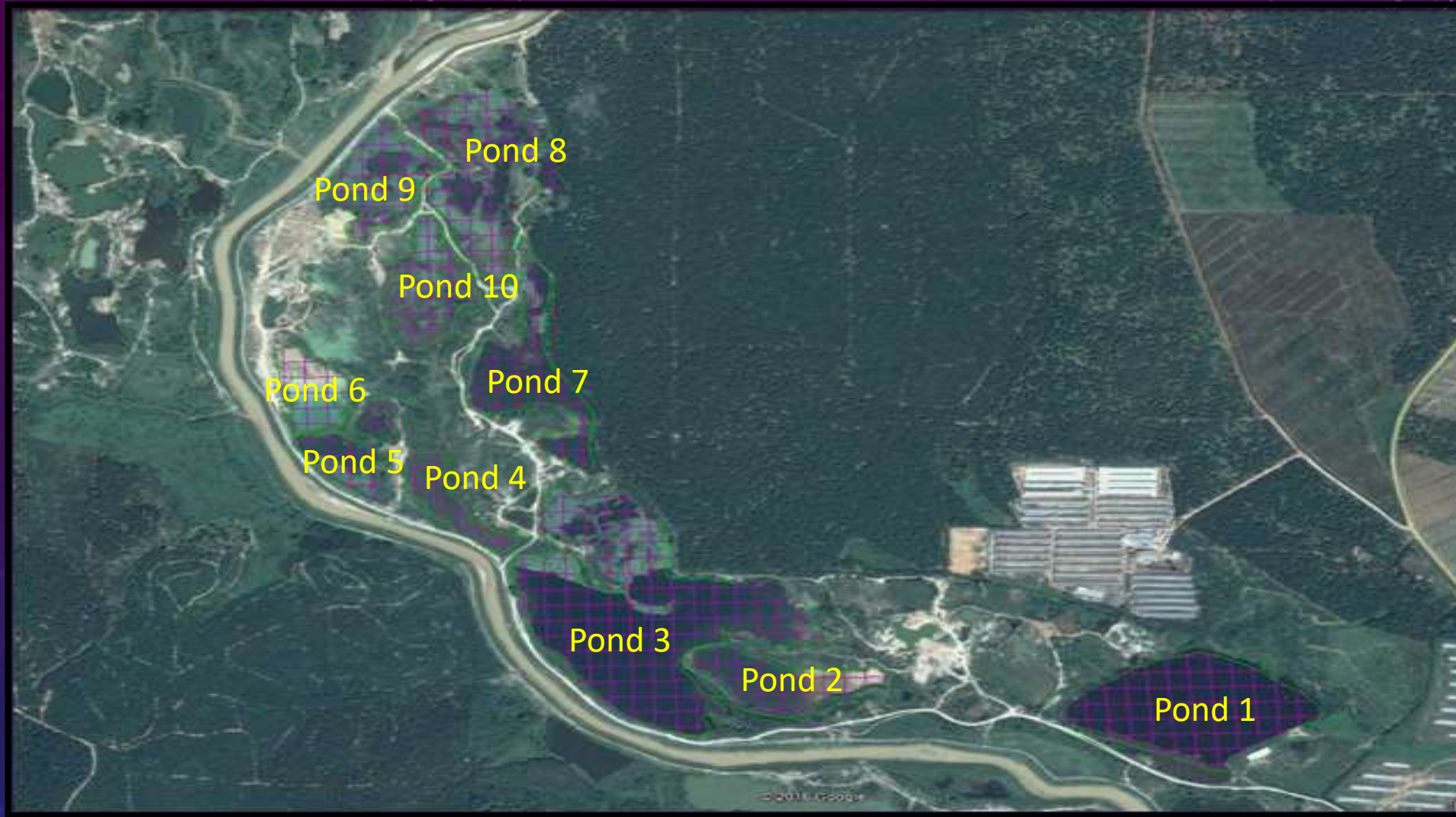


Figure 1: Topographic and Bathymetric Survey Areas

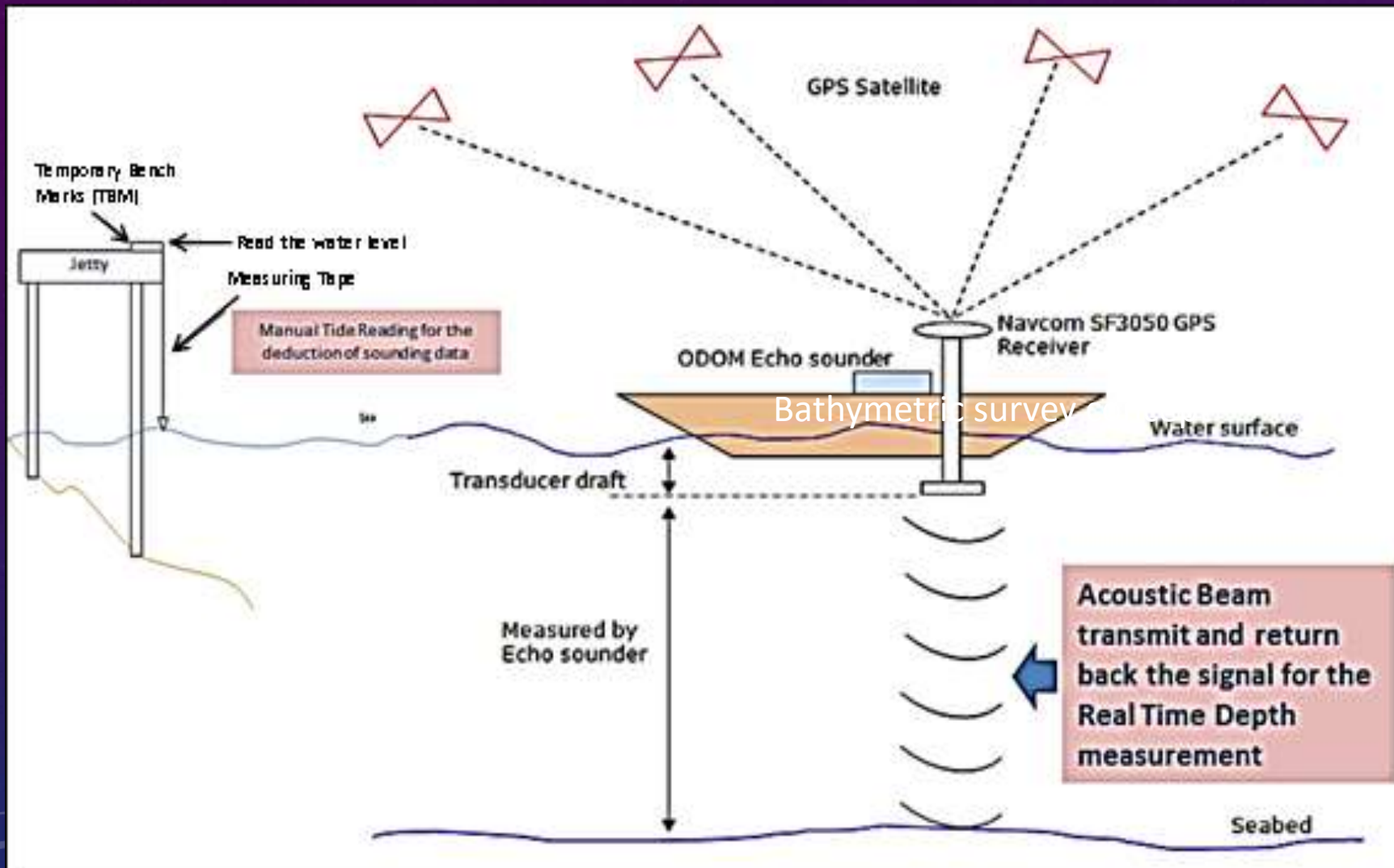


Figure 2: Bathymetric Survey Concept

RESULT



Contour

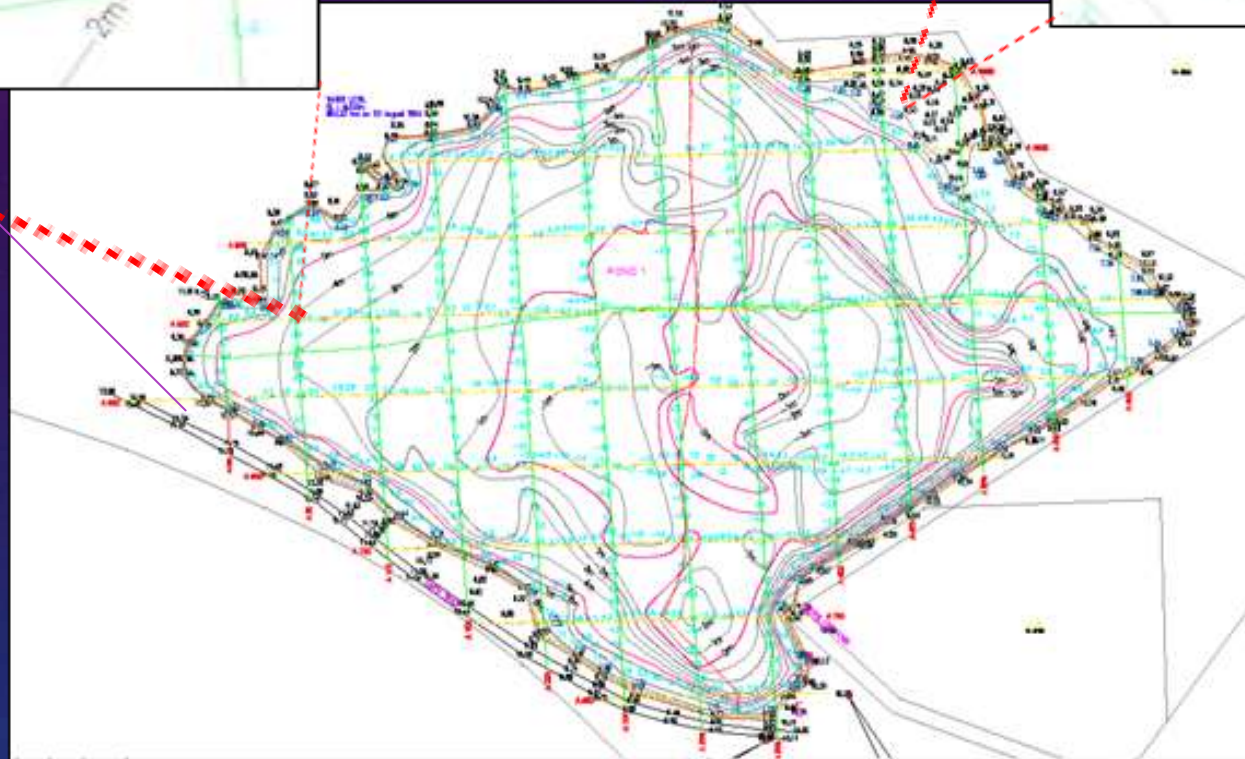
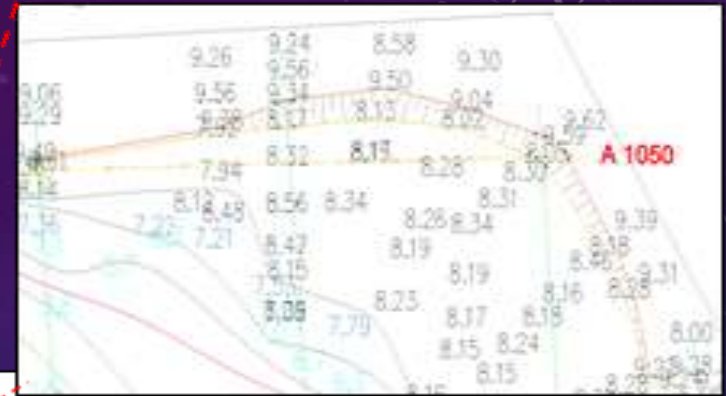
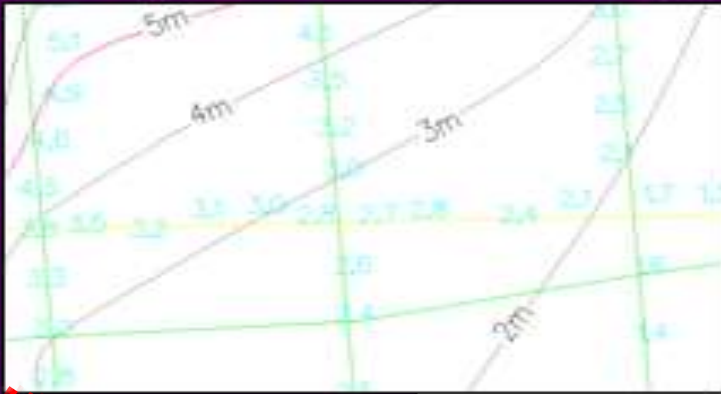


Figure 3: Example of Bathymetric Survey Plan For Pond 1

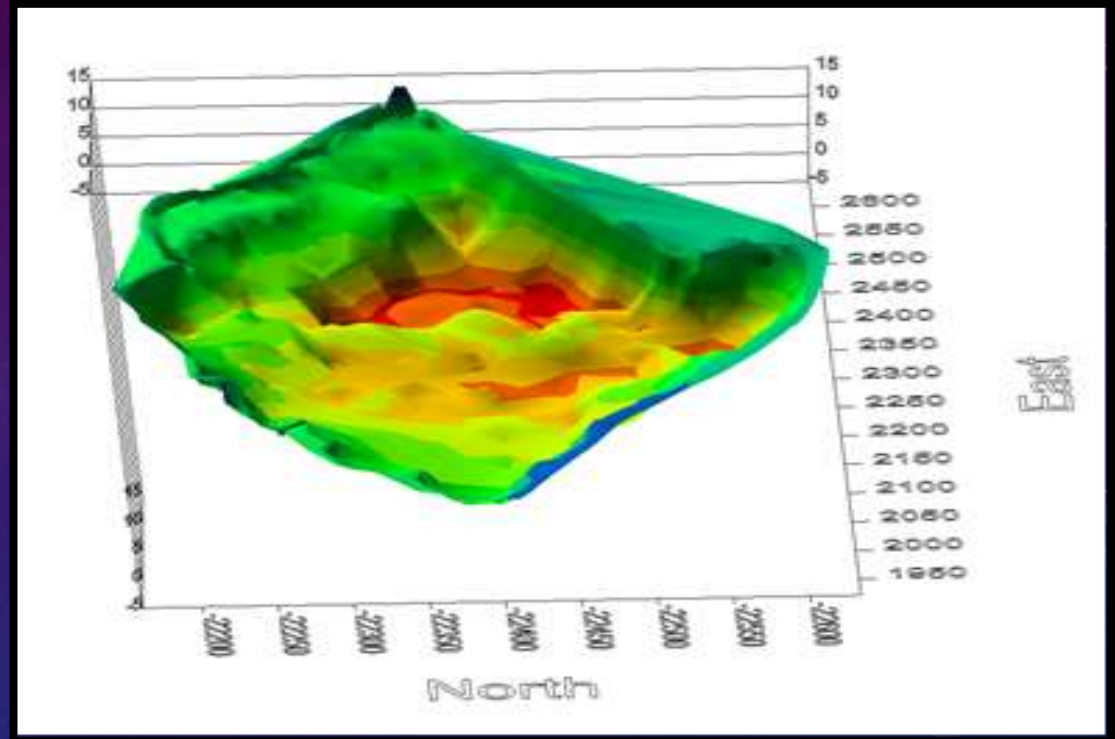
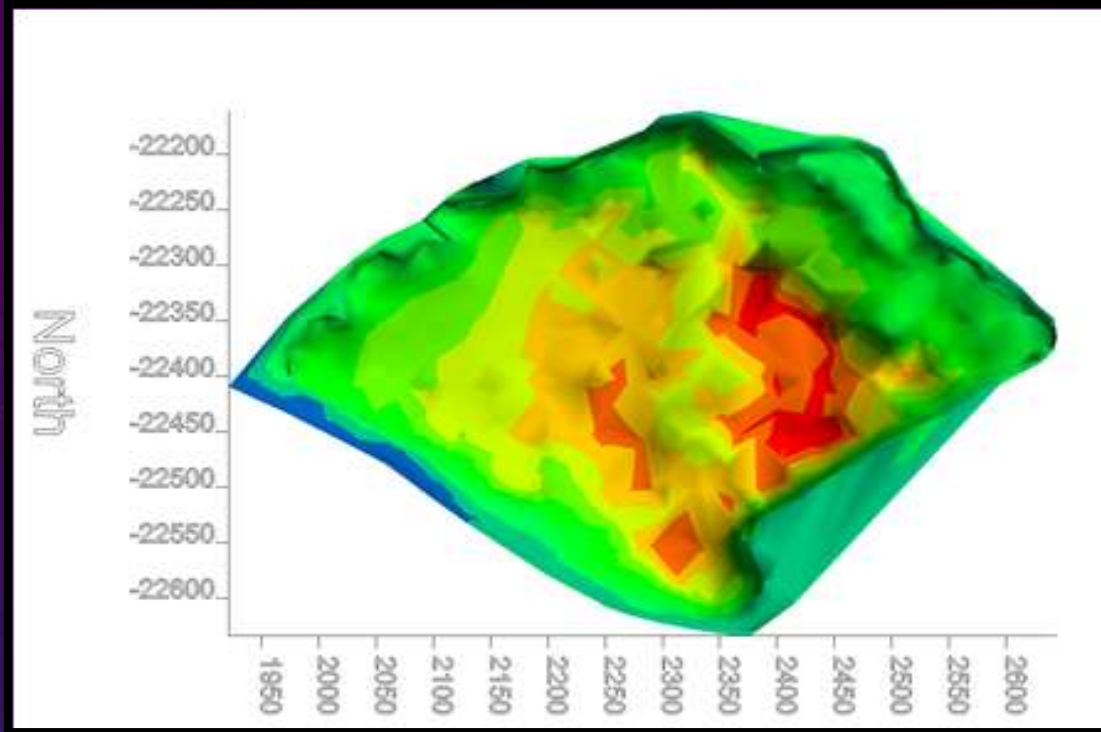


Figure 4 :3D view of Bathymetric Survey Plan for Pond 1

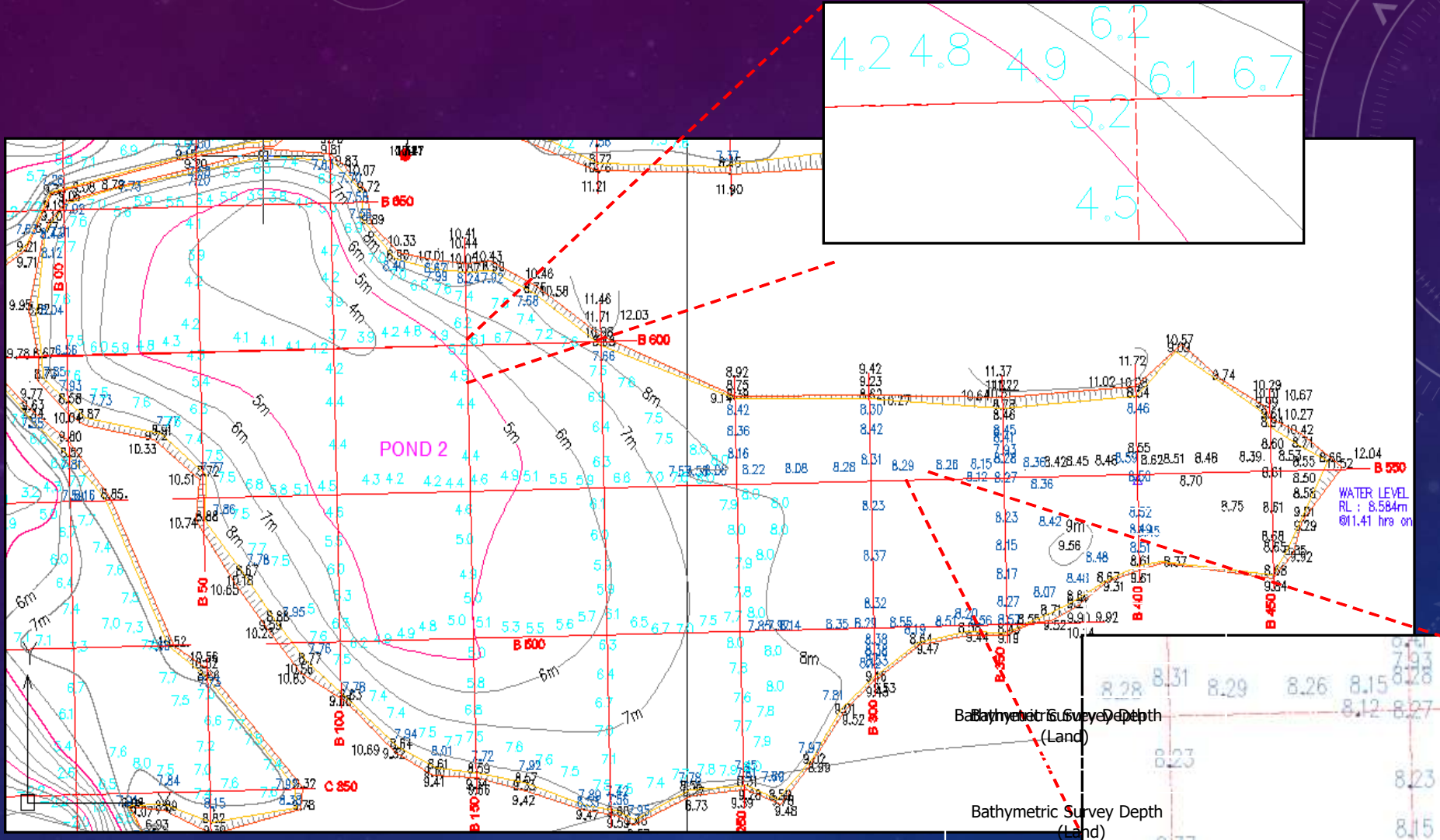


Figure 5: Example of Bathymetric Survey Plan For Pond 2

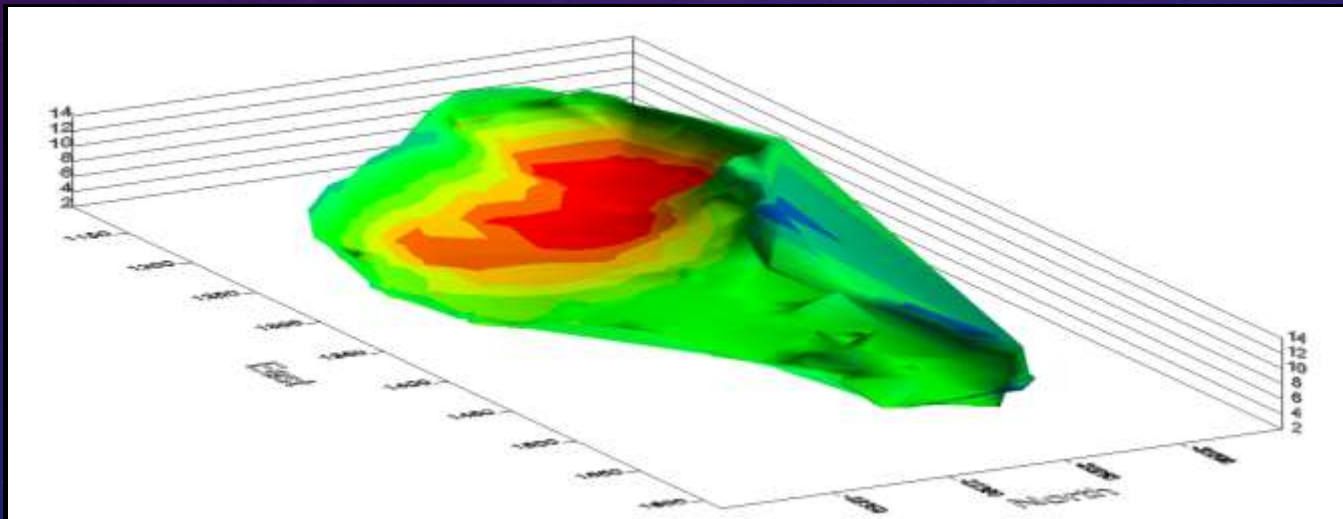
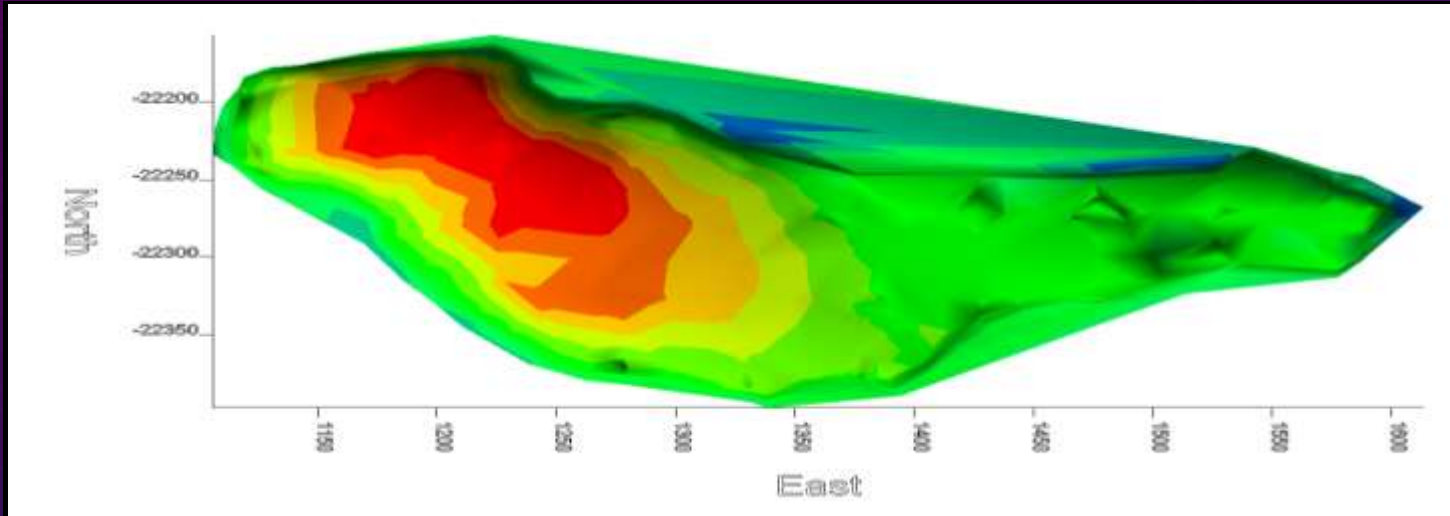
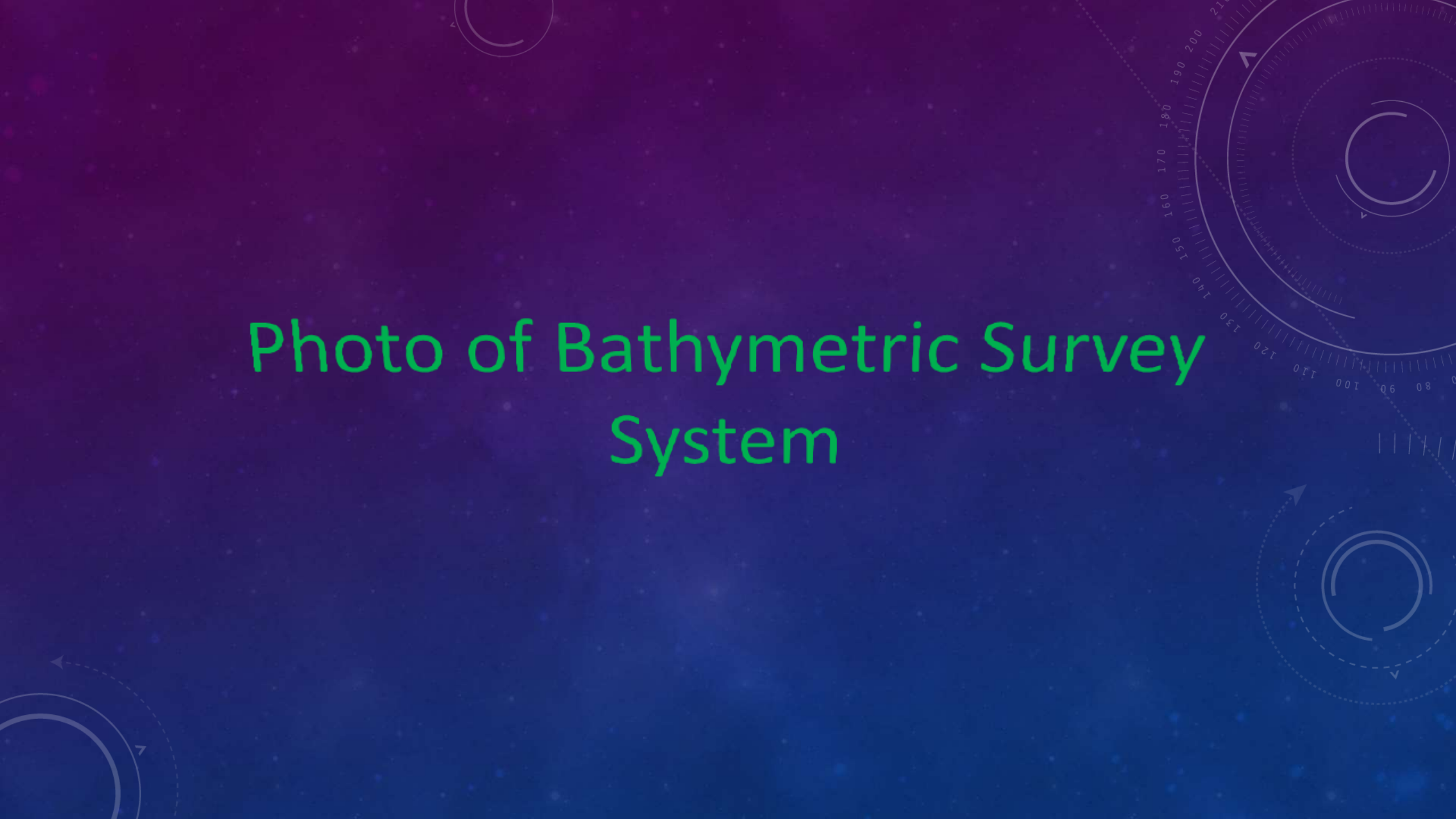


Figure 6: 3D view of Bathymetric Survey Plan for Pond 2

Photo of Bathymetric Survey System





Survey Boat

Bathymetric survey system on board



Hypack Navigation/positioning and Data Acquisition



D-GPS StarFire Integrity Check On Station L8A

SIBU WATER BOARD: GIS APPLICATION IN WATER SUPPLY

Sibu Water Board using GIS application in water supply for: -

- Planned Shutdown
- Assets Management Reporter

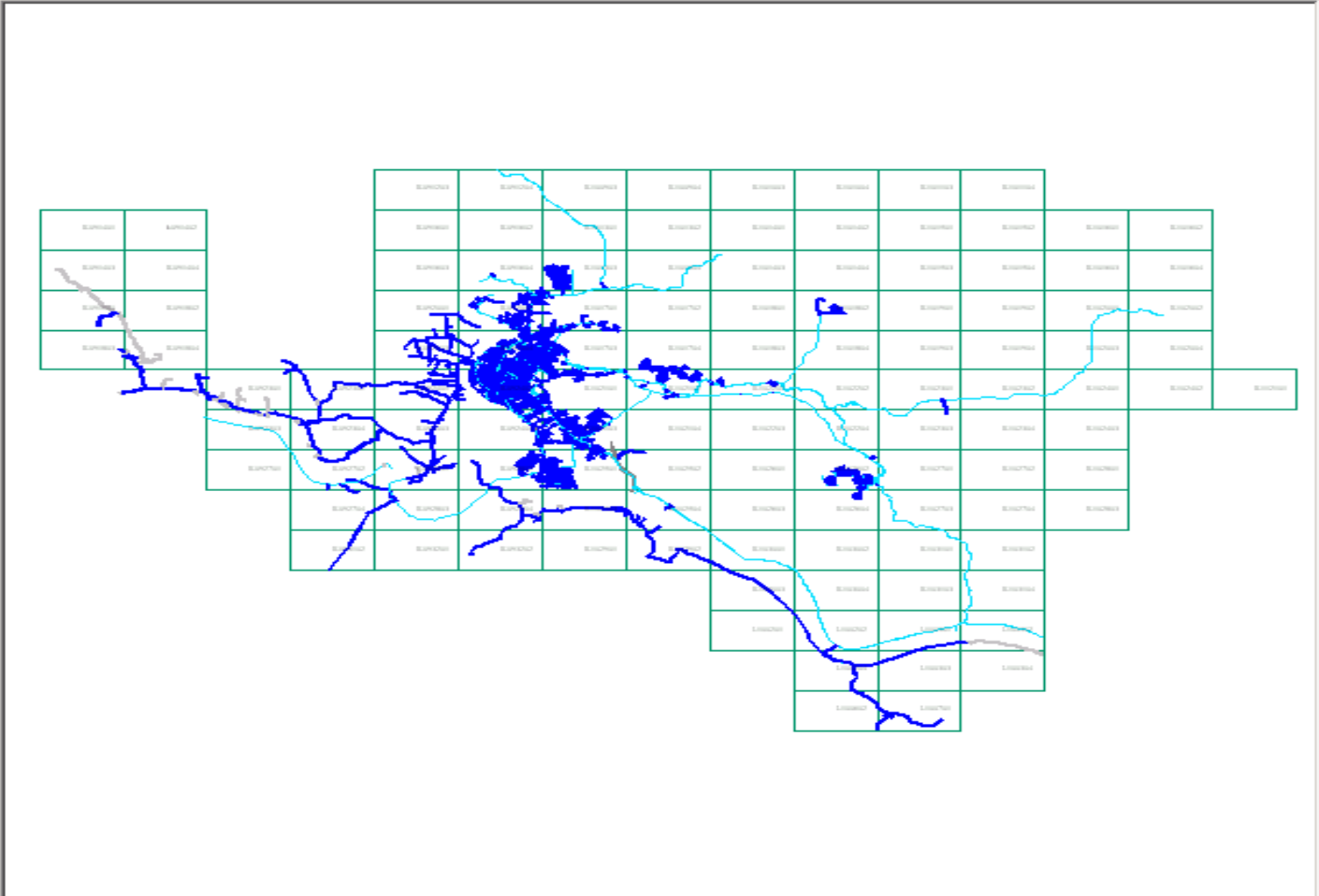
SWB GIS SWAF Application

File Edit View Trail Tools Window Help swbgis_swaf_application Translators

Search Text Mains

1:370880 1:250000 Timbalai 48 Noshift

Main MAP



Object Control Editor

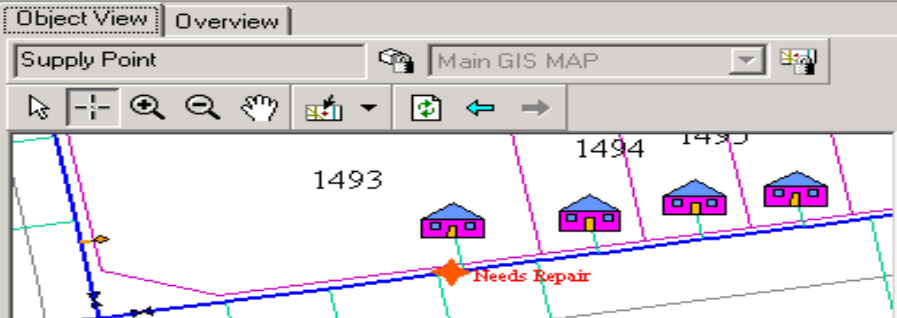
1:250000

- Gis (Smallworld Dastore)
 - Basemap Objects
 - Water Objects
 - WRS Objects
 - Drafting Objects
 - Tin (Smallworld Dastore)

Datasets Themes

Object View Overview

Supply Point Main GIS MAP



1493 1494 1495

Needs Repair

Sibu Area

 SWB Plan Shutdown Application v4.0 ✕

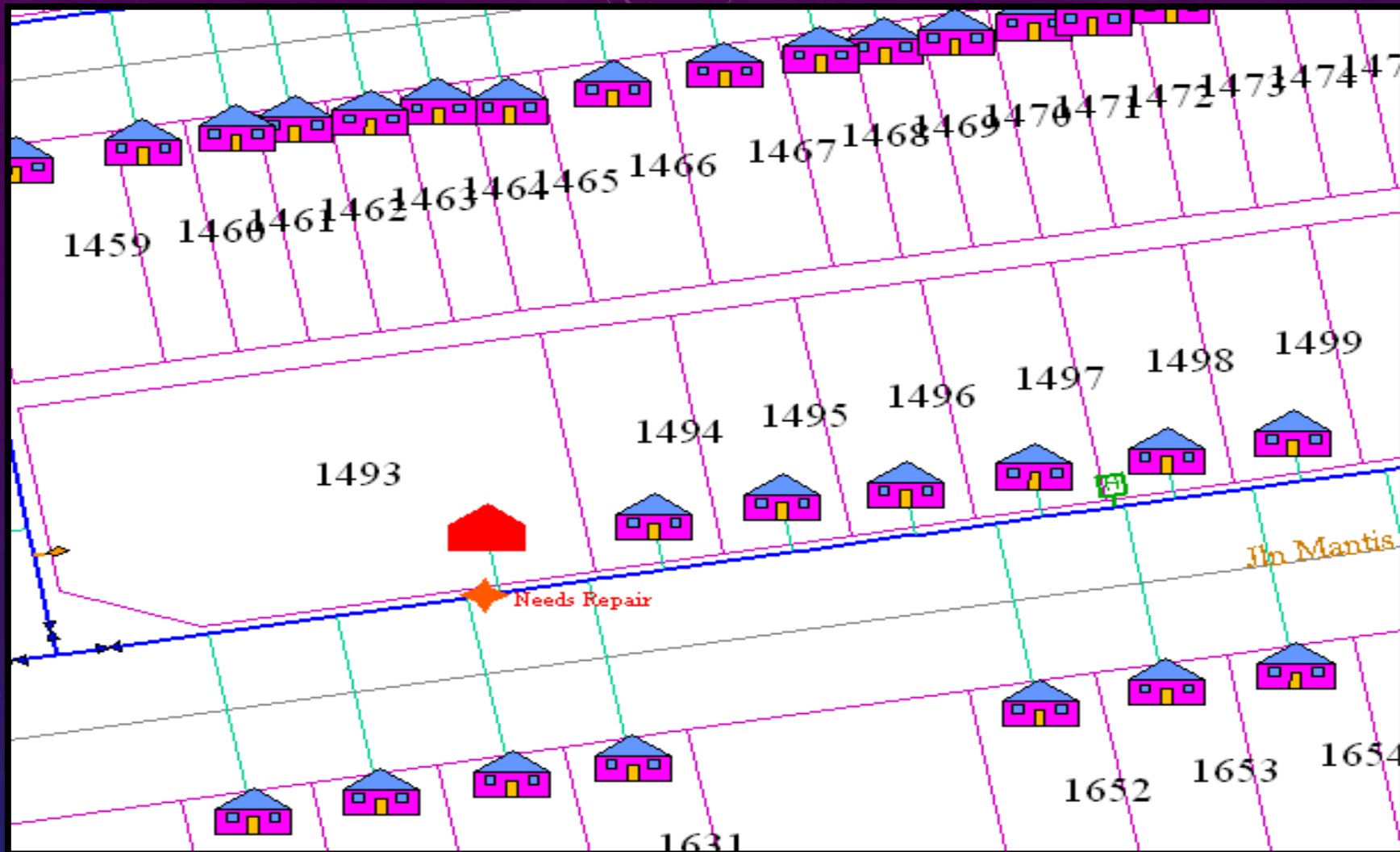
Select the Start Flag and place it at the start node of pipe network trace.
Click Next after placing the start node.



Title	Value	▲
Coord X		□
Coord Y		
Mains ID		



Select Area/Location To Plan Shutdown

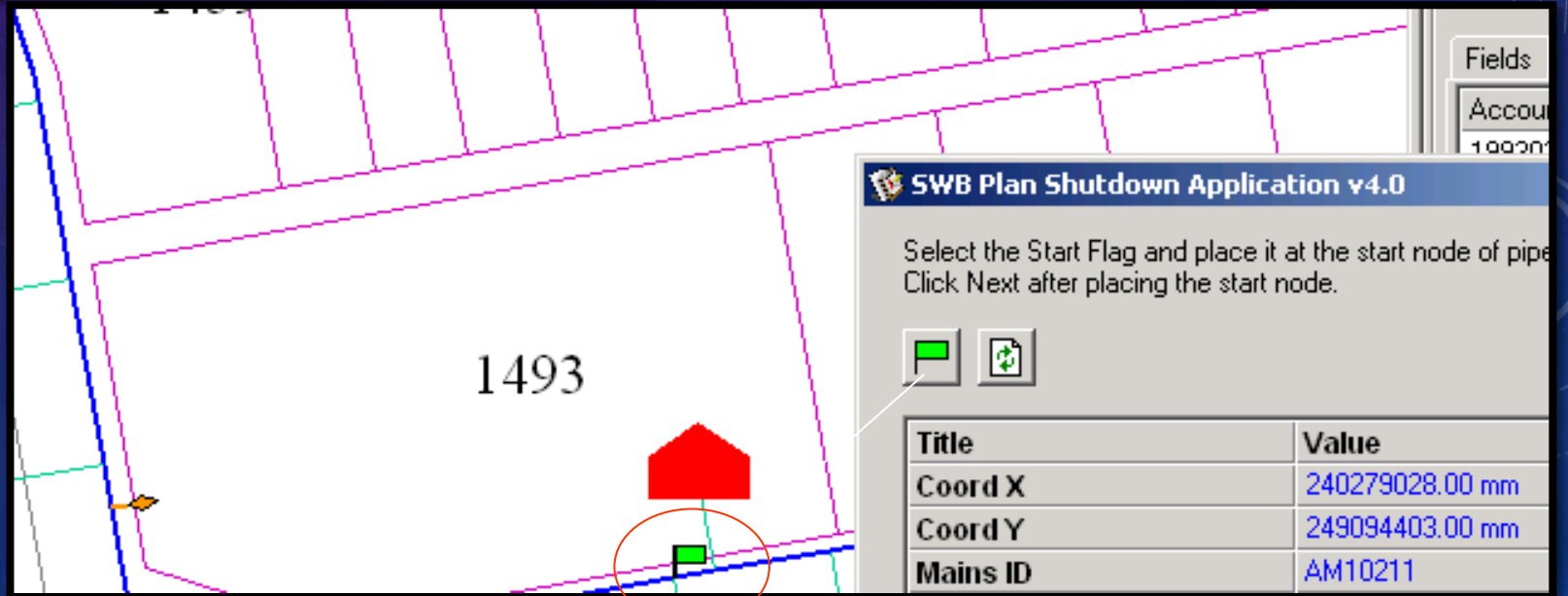
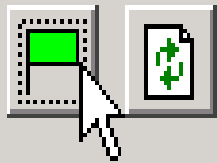


Zoom To Location Of
Consumer

Create Pipe Burst Location

SWB Plan Shutdown Application v4.0

Select the Start Flag and place it at the start node of pipe network trace.
Click Next after placing the start node.

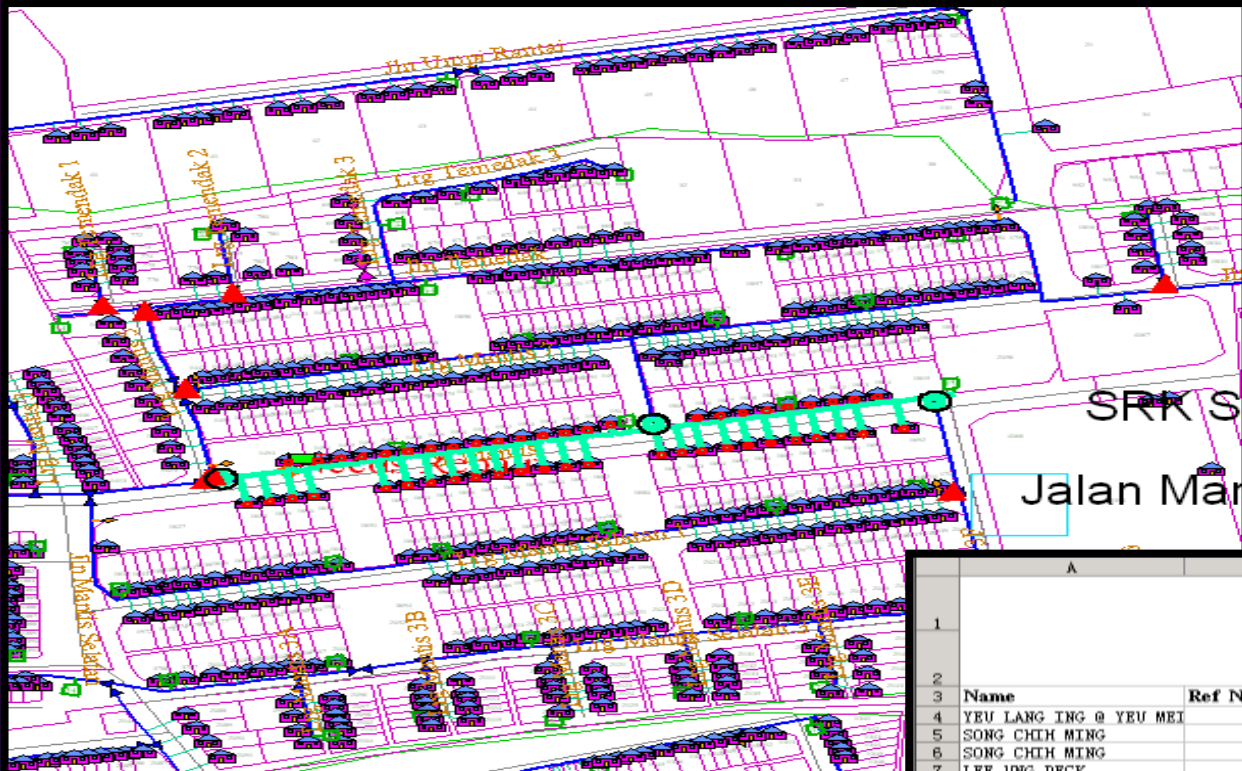


1493

SWB Plan Shutdown Application v4.0

Select the Start Flag and place it at the start node of pipe network trace.
Click Next after placing the start node.

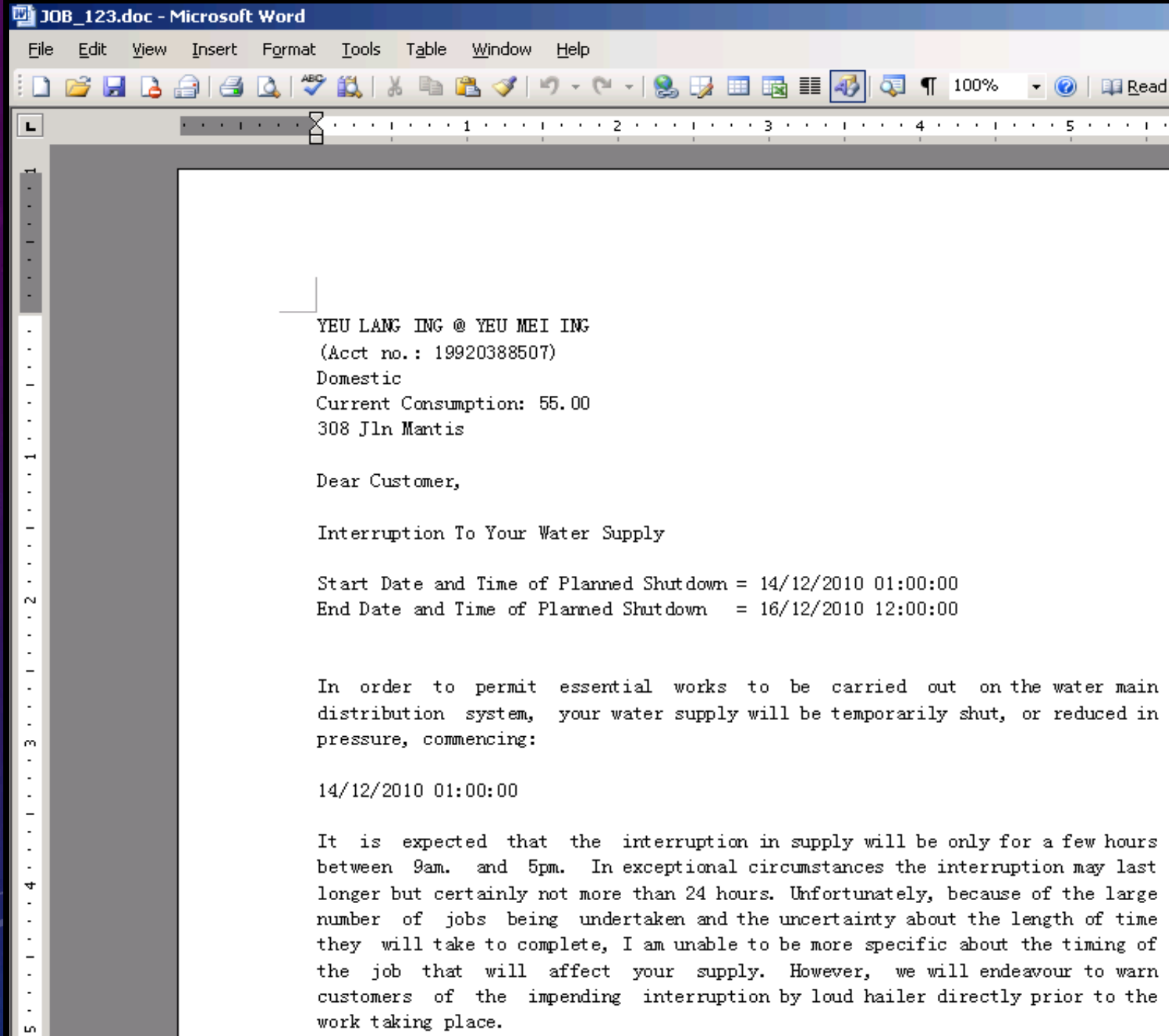
Title	Value
Coord X	240279028.00 mm
Coord Y	249094403.00 mm
Mains ID	AM10211



Map And List Customers Of Affected Area

Full Report on Customers Affected By Planned Shutdown

Name	Ref Number	Cust Type	Special Need	Location 0	Location 1	Location 2
4 YEU LANG ING @ YEU MEI	19920388507	Domestic	unset	28-A	TMN GRAND HEIGHTS	96000 SIBU
5 SONG CHIH MING	19910422704	Domestic	unset	13-B SL/114	JLN MANTIS	96000 SIBU
6 SONG CHIH MING	19910422803	Domestic	unset	13-A SL/115	JLN MANTIS	96000 SIBU
7 LEE UNG DECK	19910424403	Domestic	unset	22-B	TMN GRAND HEIGHTS	96000 SIBU
8 WONG SOON LIONG	19920388210	Domestic	unset	14-B	TMN GRAND HEIGHTS	96000 SIBU
9 YEU LANG ING @ YEU MEI	19920388903	Domestic	unset	34A	TMN GRAND HEIGHTS	96000 SIBU
10 SONG CHIH MING	19910424205	Commercial	unset	20-B	TMN GRAND HEIGHTS	96000 SIBU
11 SONG CHIH MING	19920389109	Domestic	unset	36-B	TMN GRAND HEIGHTS	96000 SIBU
12 HU SING KHO	19910424711	Domestic	unset	26-A	TMN GRAND HEIGHTS	96000 SIBU
13 SONG CHEE BENG	19930275701	Domestic	unset	25-B	JLN MANTIS	96000 SIBU
14 HUI GING CHOONG	19910424502	Domestic	unset	24-A	TMN GRAND HEIGHTS	96000 SIBU
15 WONG SOON SENG	19920388309	Domestic	unset	16-A	TMN GRAND HEIGHTS	96000 SIBU
16 YEU GING ING	19920388804	Domestic	unset	30B	TMN GRAND HEIGHTS	96000 SIBU
17 WONG ENG CHUONG	19910423702	Domestic	unset	3-B	TMN GRAND HEIGHTS	96000 SIBU
18 KIU TUONG KONG	19910423603	Domestic	unset	5-A	TMN GRAND HEIGHTS	96000 SIBU
19 YEU GING ING	19920388705	Domestic	unset	30A	TMN GRAND HEIGHTS	96000 SIBU
20 KAW FOH HUNG	19910424801	Domestic	unset	24-B	TMN GRAND HEIGHTS	96000 SIBU
21 YOU SIEW KUONG	19910424909	Domestic	unset	32-A	TMN GRAND HEIGHTS	96000 SIBU
22 LAU NAI LIOK	19930278105	Domestic	unset	21-B	JLN MANTIS	96000 SIBU
23 KONG LUNG FUI	19930275910	Domestic	unset	23-B	JLN MANTIS	96000 SIBU
24 WONG ENG CHUONG	19920388111	Domestic	unset	14-A	TMN GRAND HEIGHTS	96000 SIBU
25 CHUNG CHING LIEN	19910423801	Domestic	unset	3-A	TMN GRAND HEIGHTS	96000 SIBU
26 SONG CHIH MING	19910424007	Domestic	unset	18-B	TMN GRAND HEIGHTS	96000 SIBU
27 TING CHUI PING	19910425104	Domestic	unset	34-B	TMN GRAND HEIGHTS	96000 SIBU
28 WONG SOON HIEK	19930276006	Domestic	unset	23-A	JLN MANTIS	96000 SIBU
29 SONG CHEE BENG	19930275811	Domestic	unset	25-A	JLN MANTIS	96000 SIBU
30 TING PIEK LING	19930278611	Domestic	unset	17-A	JLN MANTIS	96000 SIBU
31 SONG CHIH MING	19910423911	Domestic	unset	18-A	TMN GRAND HEIGHTS	96000 SIBU
32 LEE FOK YAN	19910422506	Domestic	unset	SL/112 15-B	JLN MANTIS	96000 SIBU
33 KIU TUONG KONG	19910423306	Domestic	unset	7-B	TMN GRAND HEIGHTS	96000 SIBU
34 TEO ENG LIAN	19920389208	Domestic	unset		JLN MANTIS	96000 SIBU
35 LEE FOK YAN	19910422605	Domestic	unset	SL/113 15-A	JLN MANTIS	96000 SIBU
36 YOU SIEW KUONG	19910425005	Domestic	unset	32-B	TMN GRAND HEIGHTS	96000 SIBU
37 KIU TUONG CHEU	19910423108	Domestic	unset	9-B	TMN GRAND HEIGHTS	96000 SIBU
38 CHUNG CHOON YAN	19910424810	Domestic	unset	26-B	TMN GRAND HEIGHTS	96000 SIBU
39 KIU TUONG KONG	19910423405	Domestic	unset	7-A	TMN GRAND HEIGHTS	96000 SIBU
40 CHUNG CHING LIEN	19920388408	Domestic	unset	16-B	TMN GRAND HEIGHTS	96000 SIBU
41 TING HOY HUI	19910423009	Domestic	unset		TMN GRAND HEIGHTS	96000 SIBU



YEU LANG ING @ YEU MEI ING
(Acct no.: 19920388507)
Domestic
Current Consumption: 55.00
308 Jln Mantis

Dear Customer,

Interruption To Your Water Supply

Start Date and Time of Planned Shutdown = 14/12/2010 01:00:00
End Date and Time of Planned Shutdown = 16/12/2010 12:00:00

In order to permit essential works to be carried out on the water main distribution system, your water supply will be temporarily shut, or reduced in pressure, commencing:

14/12/2010 01:00:00

It is expected that the interruption in supply will be only for a few hours between 9am. and 5pm. In exceptional circumstances the interruption may last longer but certainly not more than 24 hours. Unfortunately, because of the large number of jobs being undertaken and the uncertainty about the length of time they will take to complete, I am unable to be more specific about the timing of the job that will affect your supply. However, we will endeavour to warn customers of the impending interruption by loud hailer directly prior to the work taking place.

Message To Customer
Informed Date Of
Interruption

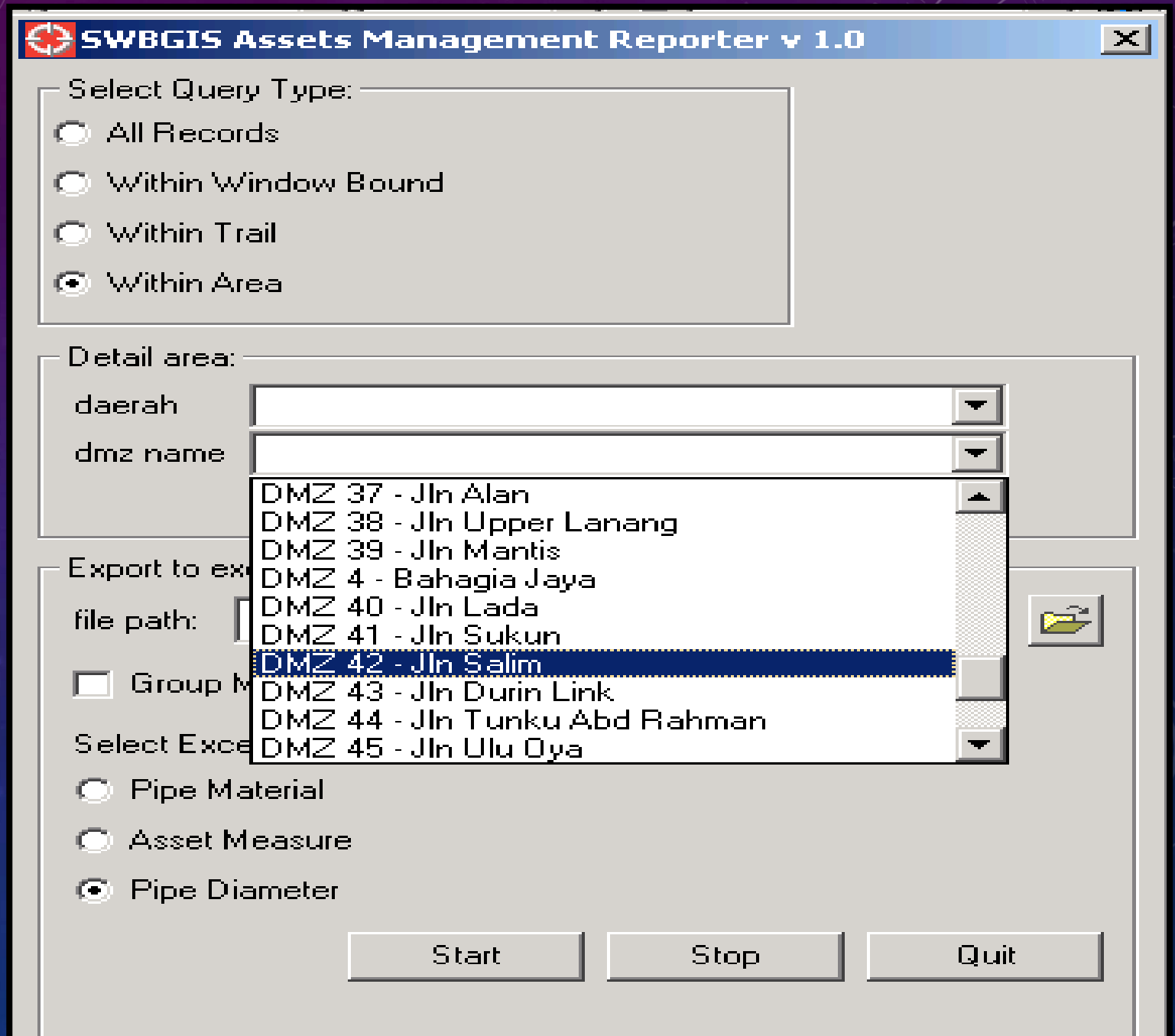
ASSETS MANAGEMENT REPORTER

Assets Management Reporter is using in Sibu Water Apply to determine:-

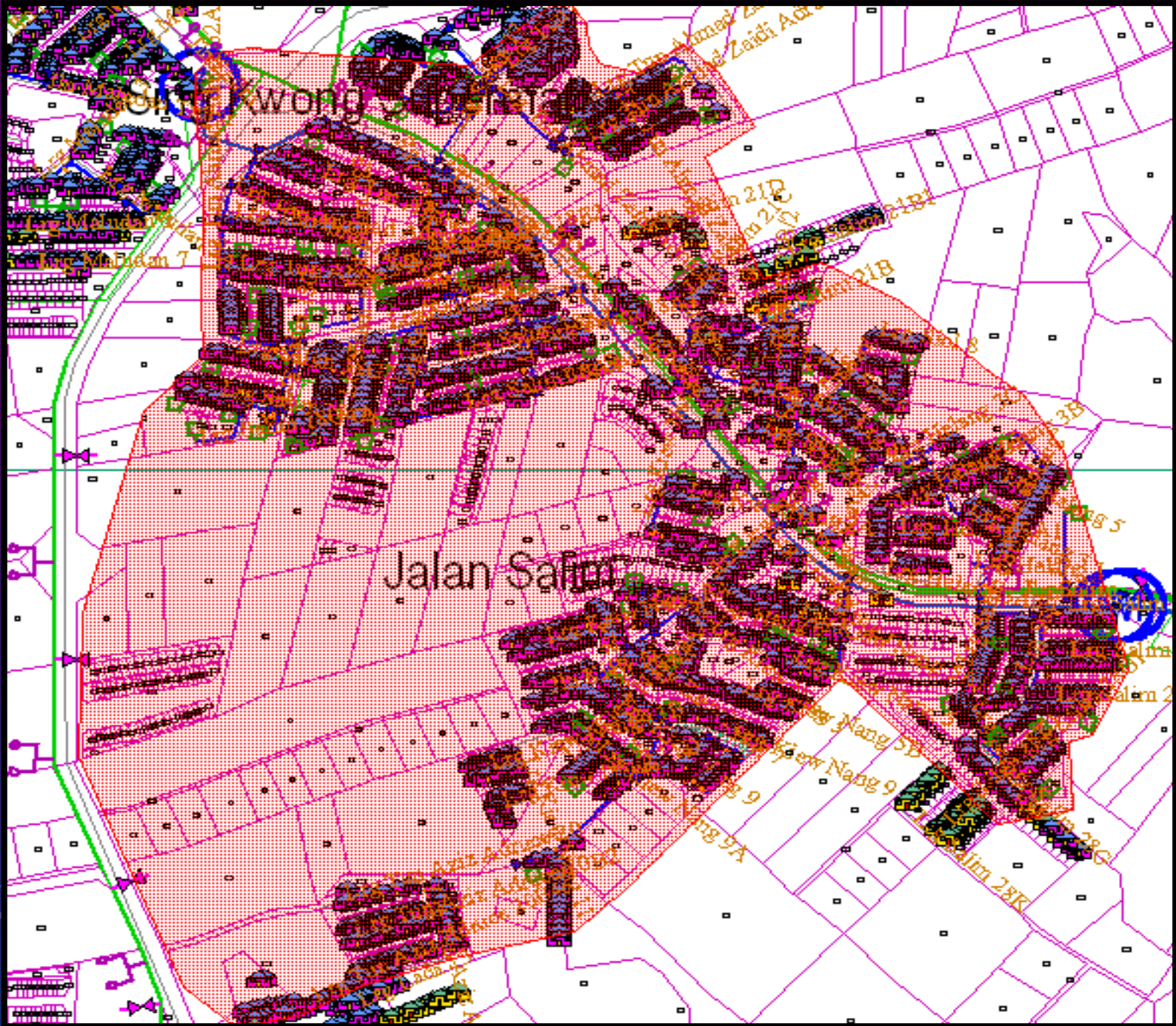
- Pipe material
- Asset measure
- Pipe diameter

The screenshot shows the SWBGIS Assets Management Reporter v 1.0 application window. It features a standard Windows-style title bar with a close button. The main interface is divided into several sections:

- Select Query Type:** A group box containing four radio button options: "All Records" (selected), "Within Window Bound", "Within Trail", and "Within Area".
- Detail area:** A group box containing two dropdown menus labeled "daerah" and "dmz name".
- Export to excel:** A group box containing a text field for "file path" with the value "\\sdec8\swbgis\AMaR Reports\All Records Pipe" and a folder icon button to the right. Below this is a checkbox labeled "Group Materials?".
- Select Excel Report Type To Export:** A group box containing three radio button options: "Pipe Material" (selected), "Asset Measure", and "Pipe Diameter".
- Buttons:** Three buttons labeled "Start", "Stop", and "Quit" are positioned at the bottom of the main content area.



To Determine DMZ



Area of DMZ

ASSETS MEASUREMENT REPORT

SWBGIS-Asset Measure - All records - 14 December 2010

Mode of Measurement	Unit	Length(m) District			Total(m)
		Sibu	Kanowit	Selangau	
Pipe Length		906402.646	0	0	906402.646
Distribution	m	223467.774			223467.774
Raw Water	m	3905.54			3905.54
Reticulation	m	592920.471			592920.471
Trunk	m	60385.929			60385.929
Unknown	m	25678.416			25678.416
Washout	m	44.517			44.517
Valve	Nos	3132			3132
Hydrant	Nos	3135			3135
Fitting		1499			1499
Air Valve	Nos	985			985
Double Air Valve	Nos	212			212
Endcap	Nos	2			2
Altitude Valve	Nos	8			8
PRV	Nos	14			14
Other Fitting	Nos	278			278
Water Treatment Plant	Nos	3			3
Intake (Water Site)	Nos	2			2
Reservoir	Nos	27			27

Map View Of DMA 39



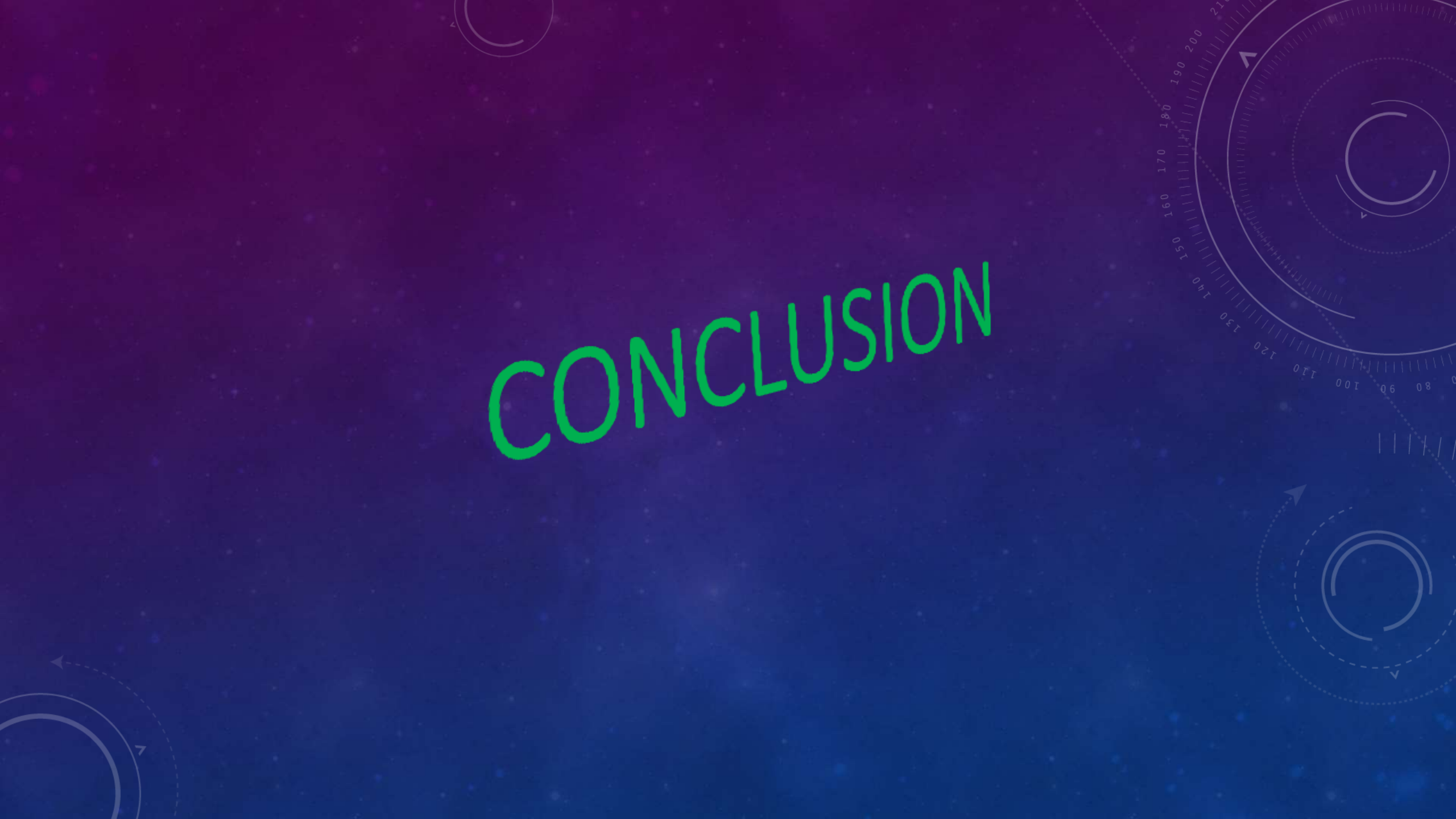
KeTTHA INTELLIGENT INFORMATION SYSTEM (KIIS)

- KIIS is also known as monitoring system that used to monitor all important data & information that involving all the sectors (Energy, Water, Green Technology) under KeTTHA.
- The system was built using IBM Intelligent Operation Center (IOC) Technology which is the the first one establish in Malaysia.

Features of KIIS

- able to manage the data structured and unstructured such as PDF, excel and so on
- provide analyse visually to get statistical and graphic information and generate reports through dashboards
- monitor and addressing critical issues of national utility based on business needs and system parameters specified in the stakeholders

CONCLUSION



GIS is a powerful tool in developing water supply system and can be applied in the followings:

1. Data collection and monitoring
2. Site selection for source of water
3. Water quality monitoring, assessment & enforcement
4. Network analysis and design of pipe line path.
5. Site selection for reservoirs and pumping stations
6. Site selection for surge tank and control valves
7. Routing optimization and visualization
8. Holistic NRW Control & Asset Management