



# Water Loss Management Program

FOR REGIONAL NSW WATER UTILITIES

---

Local Government  
Association of NSW



Shires Association  
of NSW



**Australian Government**

---

**Water for the Future**

# Water Loss Management Program

\$22 million joint initiative between :

- Local Government & Shires Associations
- Water Directorate
- Australian Government



**Australian Government**  
**Water for the Future**

Local Government  
Association of NSW



**Shires Association  
of NSW**



# Aims of WLMP

- Work with NSW Regional Water Utilities
- Water savings of 10,000 ML/Year
- Provide Equipment
- Improve System Knowledge
- Water Loss Management Education
- **Sustainable water savings**

# Two Phase Process

## Investigation



- Free Consultancy
- Equipment Provision
- Leakage Estimation
- Project Scoping
- Prepare Funding Submission

## Implementation



- Agree Funding
- Undertake Work
- Measure Savings
- Claim Funding Payment

# WLMP Water Loss Estimation

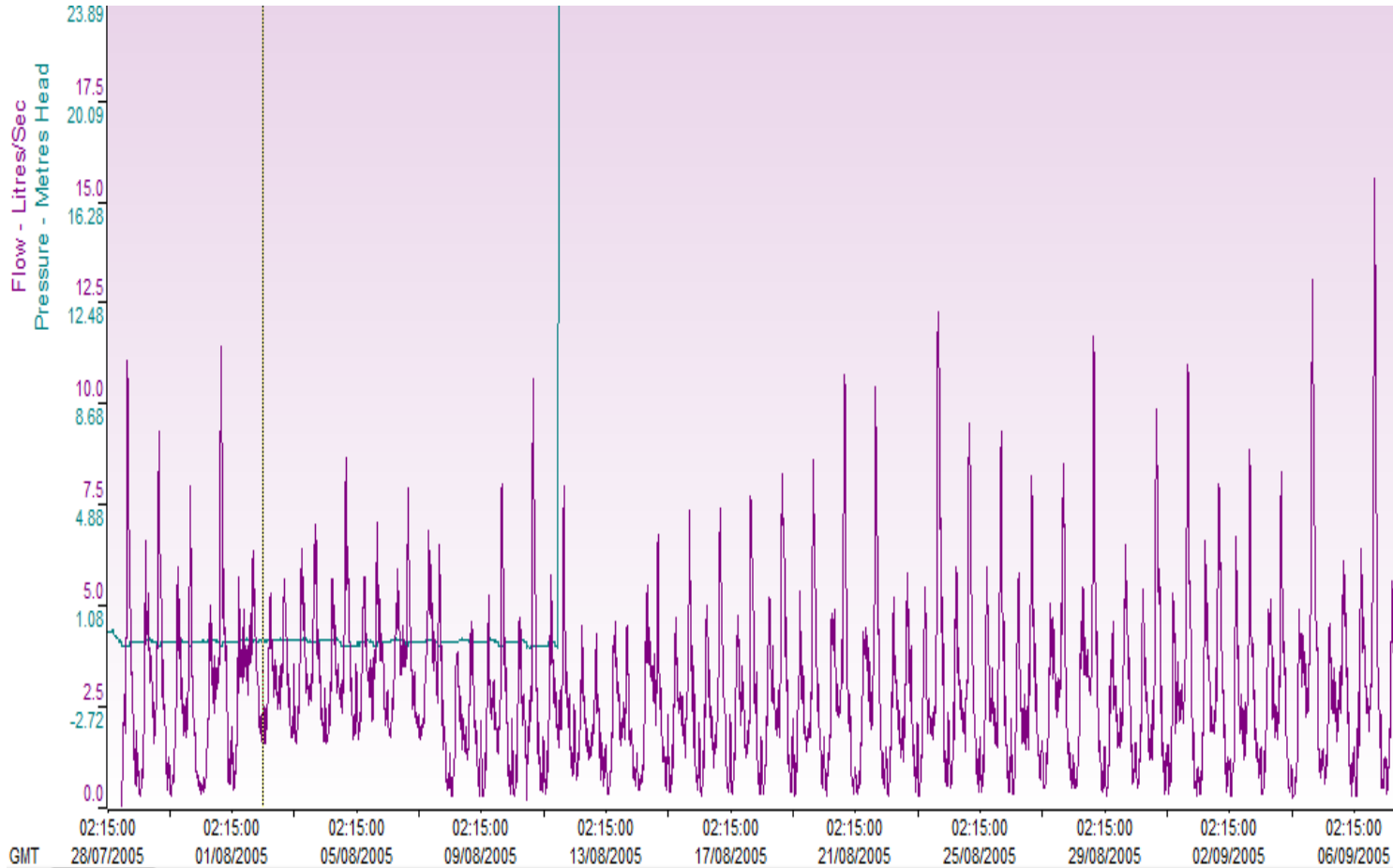
## Water Balance

- System Input
- Reporting / Benchmarking

## Minimum Night Flow

- DMA Analysis
- Operational

# Minimum Night Flow Monitoring



# DMA Analysis software

## DMA Analysis for Water Loss Management Program Data Entry Worksheet



Enter all required data below

Calculations carried out by	<b>Engineer</b>
Date of analysis	<b>1 January 2010</b>
Project Number	<b>IP??</b>
Council Name	<b>Shire</b>
Sector (DMA) to be analysed	<b>Sector 1</b>

Length of mains	Lm	<b>100</b>	<b>km</b>
Average Zone Night Pressure	AZNP	<b>60</b>	<b>metres</b>
Target Average Zone pressure	TAZNP	<b>25</b>	<b>metres</b>
No of residential Connections	RC	<b>1000</b>	<b>conn</b>
No of non residential connections	NRC	<b>100</b>	<b>conn</b>
Total Connections	TC	<b>1100</b>	<b>conn</b>
Average persons per connection	PpC	<b>2.5</b>	<b>person</b>
No of metered connections	MC	<b>1100</b>	<b>conn</b>
Average Minimum Night Flow	AMNF	<b>10.0</b>	<b>l/s</b>
Flowmeter Accuracy at this flow	Fmacc	<b>5%</b>	<b>percent</b>
Exceptional Night Use (see ExoNightUse Sheet)	ENU	<b>0.0</b>	<b>KL/h</b>
Water Cost	\$KL	<b>1.00</b>	<b>\$/KL</b>
Estimated Leak Detection Cost	\$Km	<b>220</b>	<b>\$/Km</b>
Estimated Repair Cost	\$Km	<b>440</b>	<b>\$/Km</b>
Estimated Metering Cost	Moost	<b>25000</b>	<b>\$</b>
Estimated Pressure Management Cost	Moost	<b>50000</b>	<b>\$</b>

Calculated Night Day Factor	NDF	<b>24</b>	Default = <b>24</b>
<i>Go to Night Day Factor Worksheet</i>			

*Note: Using the default may over estimate annual savings in a gravity fed system and under estimate savings in a pumped system.*

FAVAD NI Factor	FNI	<b>1.0</b>	Default = <b>1.0</b>
<i>To calculate use NI Calc Worksheet</i>			

*Note: An NI Factor of 1.0 shows a linear relationship between pressure and leakage.*

Defaults Used

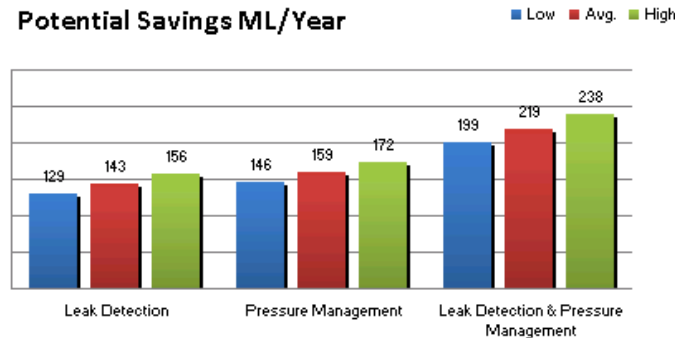
Estimated Residential Night Usage	3.00	3.00	litres/conn/hour
95% confidence limit	50%	50%	percentage
Night use for Non-Residential is	6	6	times that of Residential Properties
95% confidence limit	50%	50%	percentage
Leak Detection effectiveness	60%	60%	percentage

System Average Pump Head	60	60	m Head
--------------------------	----	----	--------

Estimated Unavoidable Background Leakage

Km of Mains	20	20	per Km per hour
Metered Service Connections	1.250	1.250	Connection per hour
Unmetered Service Connections	1.50	1.50	Connection per hour
Plumbing Systems	0.125	0.125	Connection per hour

### Potential Savings ML/Year



	LD	PM	LD & PM	
Best Estimate Savings	143	159	219	ML/Year
	355	397	545	L/conn/day

# DMA Analysis Software

## Economic Analysis

Water Loss Management Program  
FOR REGIONAL NSW WATER UTILITIES

### Discounted Cash Flow Analysis for Water Loss Management Program

Council	Shire	In Brief
Sector/DMA	Sector 1	NPV
Project Number	IP??	\$1,361,462
Updated by	Engineer	HL Water saved 100 gpa
Date	1 January 2010	Cost Benefit Ratio
		1.932
		Discounted Payback year
		<1

The analysis on this page is based on the following assumptions:

Project	Leak Detection and Metering
Base Case	De Metering
Real Discount Rate	7%
Real Life (years)	10
Analysis Period (years)	10
Base Year (spread year)	2010
Pumping Cost per M3	\$0.28

Project Option	Cost
Metering Cost	\$7,000
Pressure Management Cost	\$50,000
Relief Leak Detection Cost	\$20,000
Repair Cost	\$44,000
Overflow Project Cost	\$0
Road RLD after 5 years	\$0
Road RLD reduction in savings	\$0
Total Lifetime Cost	\$146,000

### NET EFFECT OF UNDERTAKING PROJECT: Leak Detection and Metering

Yr	Year	Project Cost	Net Water Saving Cost	Net Pumping Cost Saving	Other Savings	Net Annual Cashflow	Discount Factor	Present Value [PV]	Cumulative NPV
1	2011	\$666,888	\$218,851	\$41,538	\$0	\$483,828	0.916	\$443,544	\$443,544
2	2012	\$0	\$216,513	\$41,531	\$0	\$226,284	0.834	\$192,575	\$281,513
3	2013	\$0	\$214,135	\$41,452	\$0	\$224,587	0.759	\$169,891	\$451,404
4	2014	\$0	\$211,737	\$41,374	\$0	\$222,364	0.688	\$151,324	\$602,728
5	2015	\$0	\$209,328	\$41,295	\$0	\$220,034	0.621	\$136,485	\$739,213
6	2016	\$0	\$206,901	\$41,217	\$0	\$217,684	0.558	\$124,825	\$864,038
7	2017	\$0	\$204,456	\$41,138	\$0	\$215,318	0.500	\$115,454	\$979,492
8	2018	\$0	\$202,001	\$41,059	\$0	\$212,942	0.446	\$108,352	\$1,087,844
9	2019	\$0	\$199,528	\$40,981	\$0	\$210,547	0.396	\$103,463	\$1,191,307
10	2020	\$0	\$197,038	\$40,902	\$0	\$208,136	0.350	\$99,747	\$1,292,054
<b>Total</b>		<b>\$666,888</b>	<b>\$2,056,862</b>	<b>\$412,522</b>	<b>\$0</b>	<b>\$4,559,482</b>		<b>\$4,559,482</b>	<b>\$4,559,482</b>

Discount Rate @ 7%	\$666,888	\$1,433,237	\$1,361,462	11.33	<1	\$10.33	-\$132,841 p.a.	IRR
Discount Rate @ 4%	\$666,888	\$1,415,747	\$1,388,178	12.55	<1	\$11.55	-\$224,861 p.a.	Indeterminable
Discount Rate @ 10%	\$666,888	\$1,312,514	\$1,384,432	18.24	<1	\$3.24	-\$158,535 p.a.	

### Cumulative Net Present Value

(Discounted Payback Period where NPV=0)

## DMA Analysis for Water Loss Management Program

### Data Analysis Worksheet

Water Loss Management Program  
FOR REGIONAL NSW WATER UTILITIES

Council	Shire	Estimated Savings
Sector/DMA	Sector 1	143 ML/Year
Project Number	IP??	355 L/cann/day
Updated by	Engineer	***** \$/Year
Date	1 January 2010	

The analysis on this page is based on the following assumptions:

Average Minimum Night Flow	10.0	Litres per second
Average 24hr Night Pressure	60.0	m Head
Ext. % of hazard zone by leak detection util to be	60%	
Night Flow Measurement Accuracy (+/-)	5%	
Estimated Residential Night Usage (+/- 50%)	3.0	Litres/Conn/Hour
Estimated Non-Residential Night Usage (+/- 50%)	18.0	Litres/Conn/Hour
Water loss value at	\$1.00	per Kilolitre
Night Day Factor	.24	
Average H/F Factor	1.00	

### Main Calculations

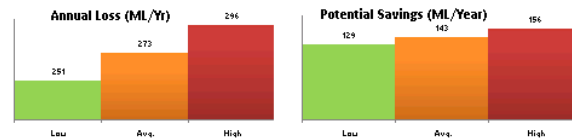
Average Minimum Night Flow	36.0	KL per Hour
Estimated Residential Night Use	3.0	KL per Hour
Estimated Non-Residential Night Use	18	KL per Hour
Exceptional Night Use	0.0	KL per Hour
Current Unavoidable Background Leakage	4.1	KL per Hour
	31.2	KL per Hour
Assessed Unreported Leakage (includes unavoidable leakage)	28.4	Litres/Conn/Hour
	273.3	ML per Year

Conservative	Best	Optimistic	
Estimated Water Savings	129.3	142.7	156.1
ML/Year			
Estimated Leak Detection Cost	322	355	389
L/cann/day			
Estimated Repair Costs	13.4	14.8	16.2
L/cann/hour			
ILI Before	4.7		C
ILI After	2.2		B

World Bank Banding

Value of Potential Water Savings	\$142,700	/ year
Estimated Leak Detection Cost	\$22,000	
Estimated Repair Costs	\$44,000	
Permanent Metering Costs	\$25,000	
Estimated Total Cost	\$31,000	
Simple Payback Period	8	months

Carbon Savings	41530	kg CO2
Energy Savings	38886	kWh
Equivalent Carz off road	9.2	



# WLMP Water Loss Estimation

## Water Balance

- System Input
- Reporting / Benchmarking

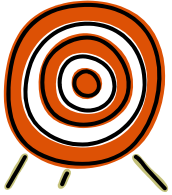


## Minimum Night Flow

- DMA Analysis
- Operational



# Why is Continuous Data Collection important?



Targeted expend

Quick response



Sustainable savings

System profiling



# Implementation

Permanent Metering

Online Monitoring

Active Leakage Detection

Pressure Management

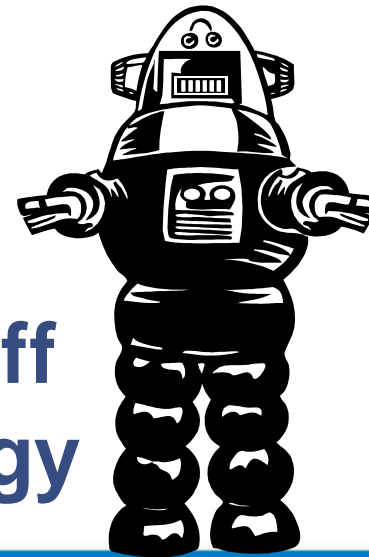
Leak Repair

# WLMP mechanism in reality

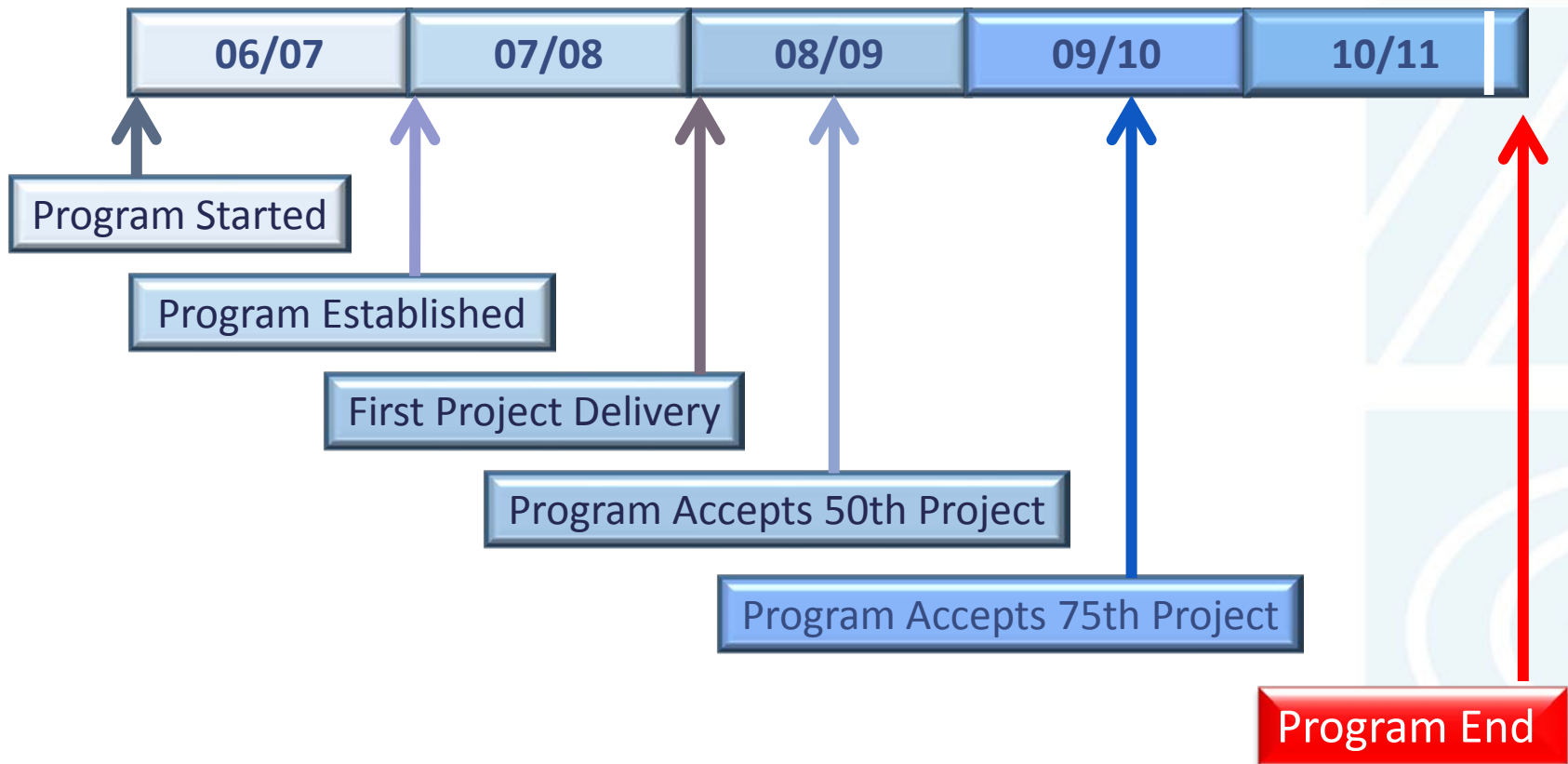
**Gentle Encouragement**

**Funding**

**Specialist staff  
and Technology**



# Where are we at?





# Case Study data

CASE STUDIES - SUMMARY		Orange	Gosford	Griffith	Oberon	Nambucca	Summary
<b>Estimated savings</b>	Units						
	ML/year	349.4	53.0	225.4	56.6	35.2	719.6
	\$/year	349447	50,214	214,083	56,647	49,321	719,712
	l/conn/day	64	488	188	118	39	
<b>Actual savings</b>							
	ML/year	501.4	100.9	252.3	69.9	60.4	984.9
	\$/year	501422	100,915	239,674	69,852	60,410	972,273
	l/conn/day	91	900	211	146	48	
<b>Project cost</b>							
total	\$	303466	84,860	368,446	60,000	113,356	930,128
from program	\$	100144	28,004	115,500	20,000	37,407	301,055
<b>Project Results</b>							
project value	\$/ML	605	841	1460	858	1877	944
funding value	\$/ML	200	278	458	286	619	306
carbon savings	kg CO2	133768	36,934	79,542	10,165	8,791	269,200
energy savings	kWh	125251	34,582	74,478	9,517	8,231	252,059
cars off road	Number	29.7	8	18	2	2	60

# Water Saved

To date:

- 4,000 Million Litres

Expected total:

- 7,000 Million Litres per year



# Cost of Water Saved

Average Project Cost

\$1,053 per ML

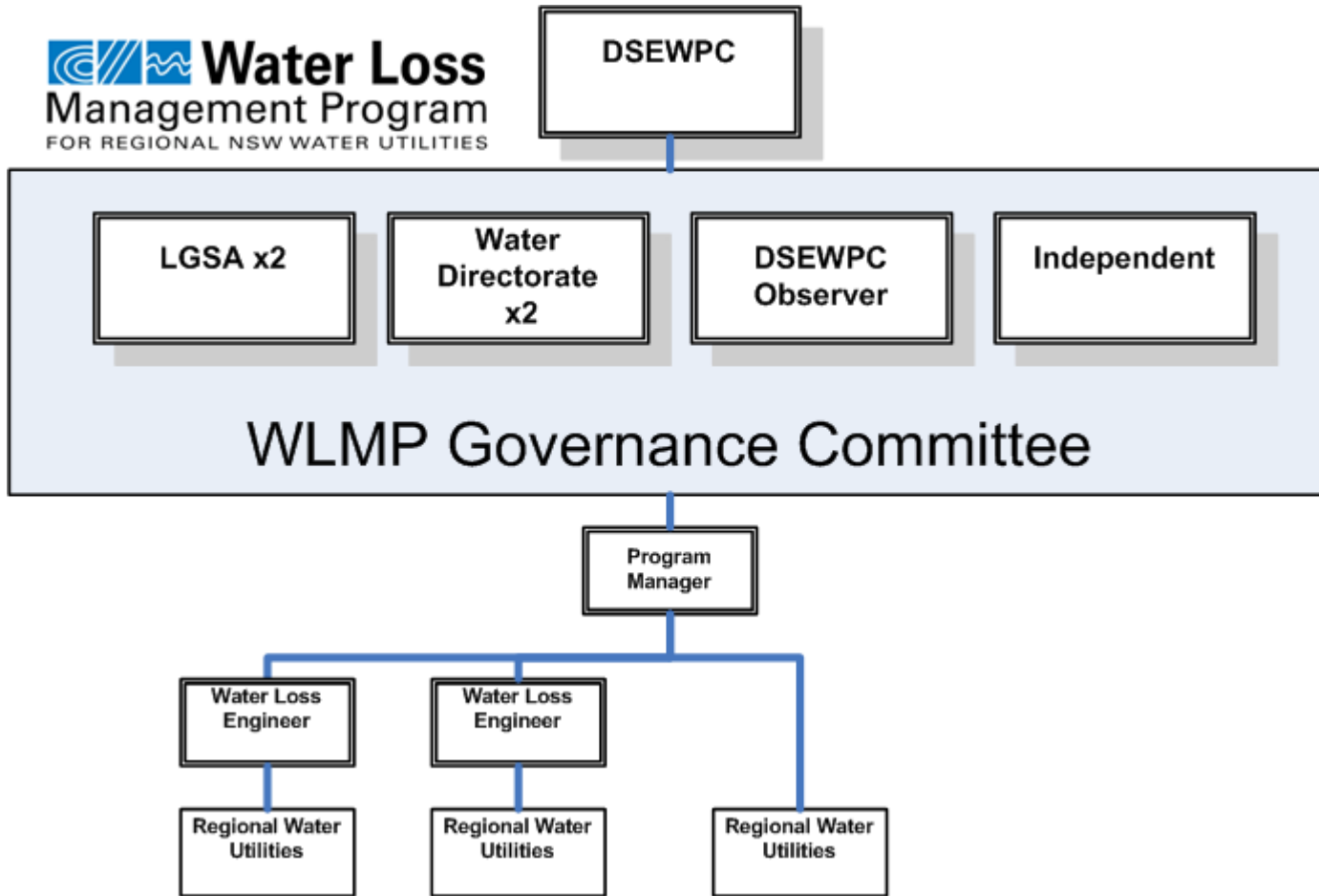


Long run cost (10 years)\*

\$150 per ML

\*Assuming further leakage surveys required

# Unique Governance



# Water Loss Management Goals

## Short Term

- Deliver WLMP projects by end June 2011
- Write Final report for Australian Government

## Medium Term

- Produce easy DMA software for councils
- Write Water Loss Management Plan for all NSW water utilities

## Long Term

- 95% water supply monitored
- Economic level of leakage achieved by all NSW Water Utilities

# Who should fund?

Federal Government



State Government



Local Water Utility



# Would we do it differently?

- “Water Loss Management Plans”
- Fund permanent metering upfront
- Consistent methodology
- Both Water Balance and MNF survey

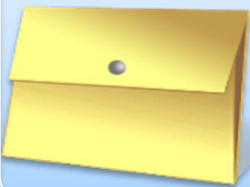
# Future of the WLMP



20 Letters of support from  
Councils



In principle support from  
LGSA and Water Directorate



Submission currently with  
State Government



# Water Loss Management Program

FOR REGIONAL NSW WATER UTILITIES

Local Government  
Association of NSW



Shires Association  
of NSW



Ian Maggs  
Program Manager  
[ian.maggs@lgsa.org.au](mailto:ian.maggs@lgsa.org.au)



**Australian Government**  
**Water for the Future**