



Driving Productivity in Major Asset and System Maintenance, and Billing



Executive Summary

December, 2009

- **Executive Summary**
- Drinking Water Asset Maintenance
- Waste Water Asset Maintenance
- Utility Maintenance Branch
- Utility Customer Services

- **The productivity project included four workstreams:** Drinking Water Maintenance, Waste Water Maintenance, Utility Maintenance Branch and Utility Customer Service
- Each workstream has followed **three core principles** in order to propose a number of initiatives to reduce costs and improve service:
 - Get it right 1st time
 - Use resources efficiently
 - Treat customers fairly
- **Initiatives worth almost \$10m per year have been proposed** which will contribute over \$7m already in FY11. Each workstream identified savings of 8-23% of baseline spend in scope, with **overall savings equal to 18% of spend**
- **All major initiatives have been piloted already** and now need to be rolled out across the utility system. Additionally, plans were made to **extend key initiatives to structurally similar areas** within the next 6-12 months
- To ensure sustainable impact, **detailed implementation plans** were developed for each initiative and success will be tracked using a **set of specific operational KPIs**
- **Your support is necessary** especially in Utility Customer Services as here several key initiatives need political approval
- In the context of the project **several additional areas with significant financial improvement potential** were identified. The highest priority areas appear to be capital projects, contractor performance management and areas in UMB not yet optimized



The improvements proposed as part of the productivity project follow three core principles

Description

Get it right 1st time

- Have the right information to be able to complete work correctly the first time, reducing multiple visits
- Eliminate root causes of repetitive technical failures

Use resources efficiently

- Use all resources, including people, efficiently through better planning and scheduling, appropriately sized teams, reduction of non-value-adding activities and establishing standard operating procedures

Treat customers fairly

- Improve quality of customer facing processes
- Charge appropriate fees to cover the direct costs of work done for specific customers to ensure customers are not cross-subsidizing each other



Each workstream has identified initiatives across these principles

SELECTED
EXAMPLES
ONLY

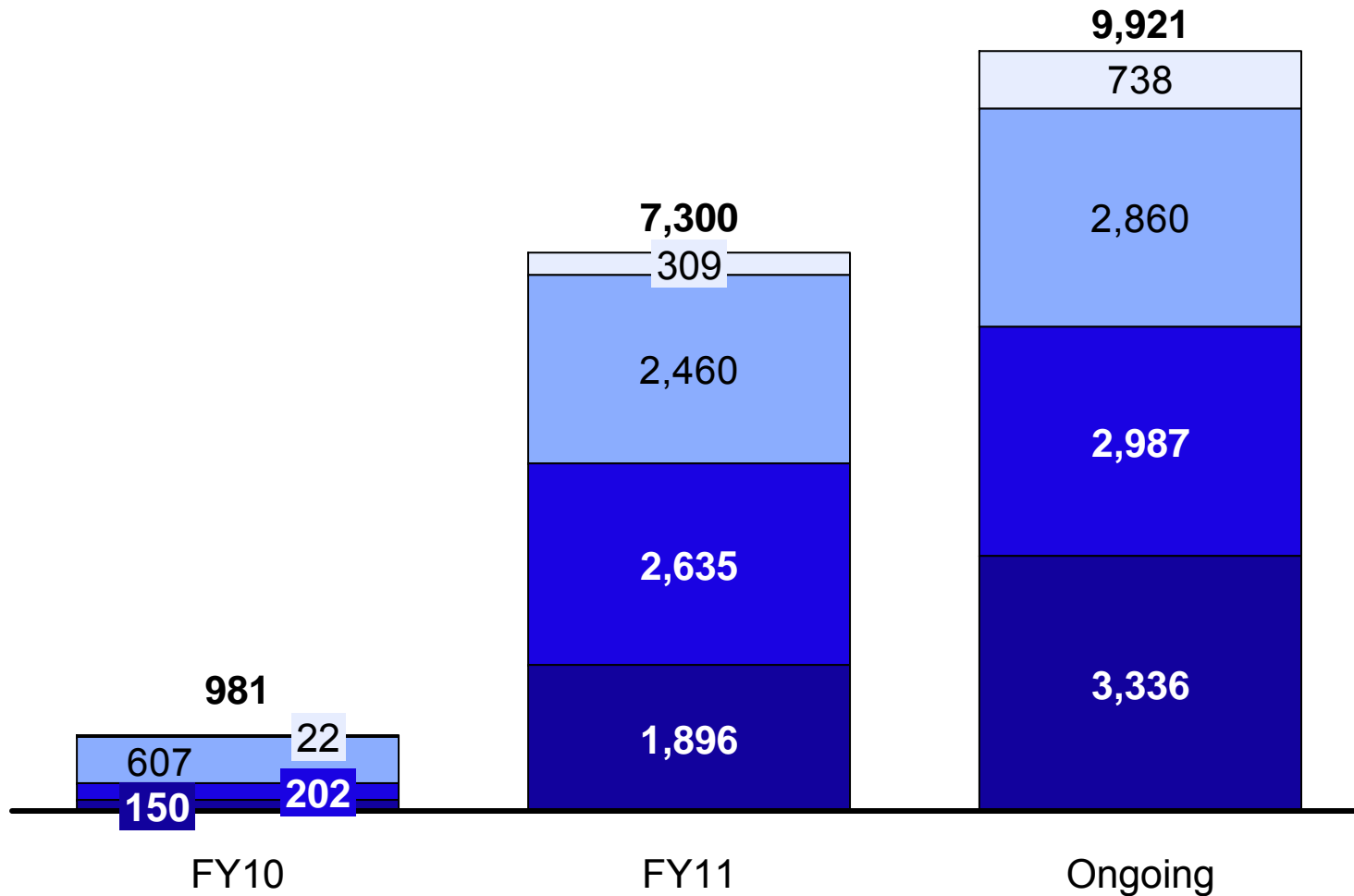
	Drinking Water Operations/ Waste Water Operations	Utility Maintenance Branch	Utility Customer Service
Get it right 1 st time	<ul style="list-style-type: none">Complete more preventative maintenance to reduce repetitive failures	<ul style="list-style-type: none">Write detailed investigation reports so crews know what parts are required to complete the job	<ul style="list-style-type: none">Prioritize fixing endpoints over taking manual reads repeatedly
Use resources efficiently	<ul style="list-style-type: none">Improve planning and scheduling of maintenance technicians to reduce driving and waiting time	<ul style="list-style-type: none">Use less white rock and replace with cheaper crushed concreteAssign jobs to 2-men crews where possible	<ul style="list-style-type: none">Screen out unnecessary field jobs before they go to the field teams
Treat customers fairly	<ul style="list-style-type: none">Prioritize work based on availability of assets	<ul style="list-style-type: none">Prioritize repair jobs based on objective criteria, communicate targeted completion time to customer and meet promised response times	<ul style="list-style-type: none">Increase connect and reconnect fees to cover direct costs and eliminate cross-subsidization



In total these initiatives are worth almost \$10m/yr, with over \$7m effective in FY11

\$ 000s

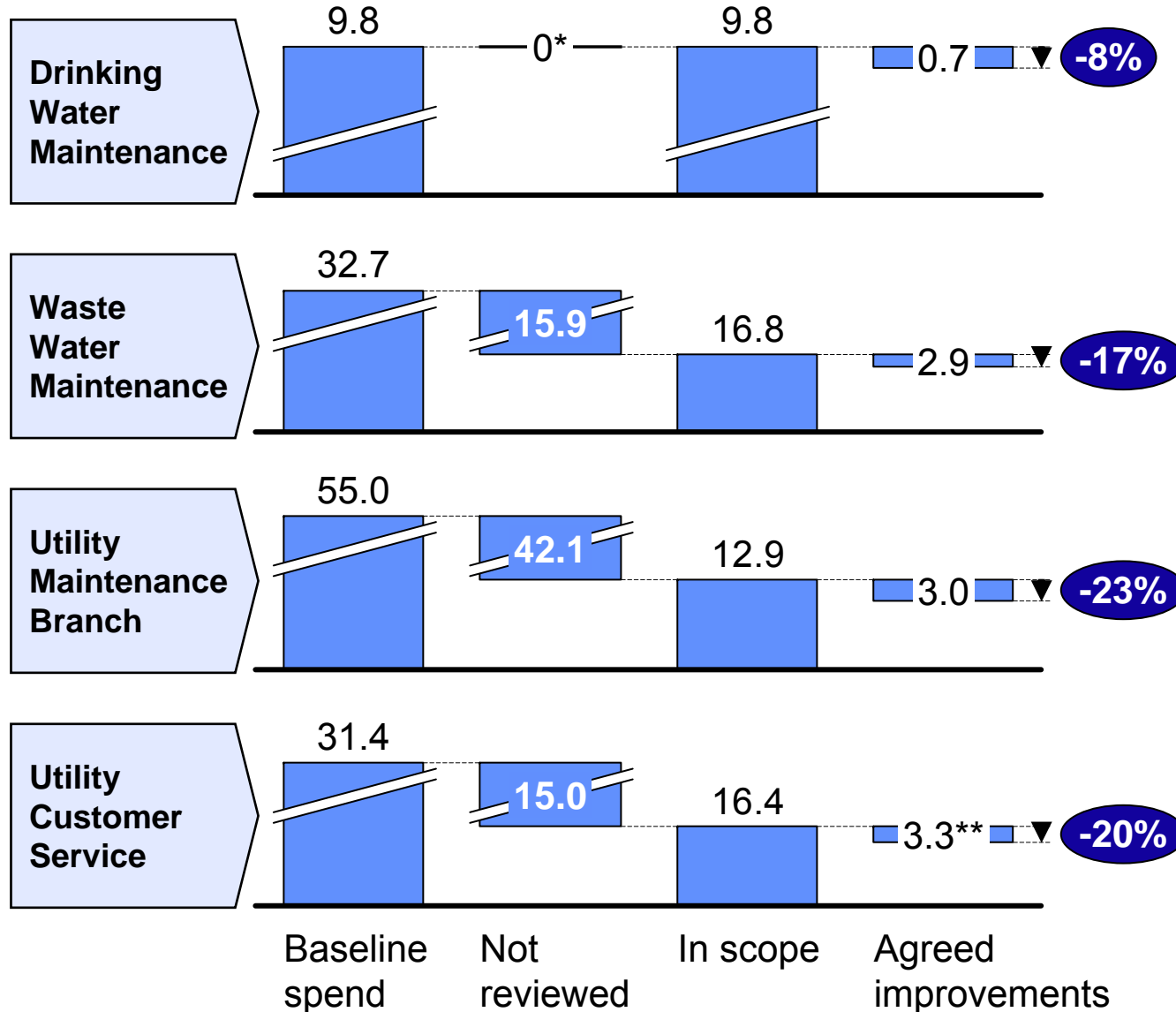
- Drinking Water Operations
- Waste Water Operations
- Utility Maintenance Branch
- Utility Customer Service





Each workstream identified savings of 8-23% of baseline spend in scope, with overall savings equal to 18% of spend

\$m annualized impact



Overall improvements agreed are equal to 18% of baseline spend in scope

* Not full scope reviewed – quantification of reviewed share still pending

** Includes revenue increases



Your support is necessary to implement key improvements in Utility Customer Service

	Rationale for measure	Required support	Impact*, \$000s/yr
Fix meter issues in billing cycles	<ul style="list-style-type: none"> Still significant technical problems with older generation AMR meters Currently, focus is to get manual meter read rather than fix underlying problems Plan has been developed to massively increase number of first-time fixes 	<ul style="list-style-type: none"> Support read-estimate pattern for meters with technical problems to free up resources for first-time fixes 	
Increase service fees to match cost	<ul style="list-style-type: none"> Multiple service fees (e.g., connect, reconnect) do not cover the costs incurred by these activities leading to cross-subsidizations 	<ul style="list-style-type: none"> Support process of getting political approval for fee increases 	
Close the lobby at Leeland	<ul style="list-style-type: none"> Customers can pay cash at multiple supermarkets across the city and resolve inquiries over the phone Lobby operation is a security issue (armed guard needed) and costly 	<ul style="list-style-type: none"> Approve lobby closure 	
Eliminate yellow bill	<ul style="list-style-type: none"> Customers who do not pay their bill get two reminders – the yellow and the pink bill Yellow bill almost never leads to a payment and hence can be saved 	<ul style="list-style-type: none"> Approve elimination of yellow bill 	

* Annualized savings, FY11 potential depends on implementation date

- Executive Summary
- **Drinking Water Asset Maintenance**
- Waste Water Asset Maintenance
- Utility Maintenance Branch
- Utility Customer Services



2 initiatives in Drinking Water Maintenance will reduce reactive work and improve efficiency

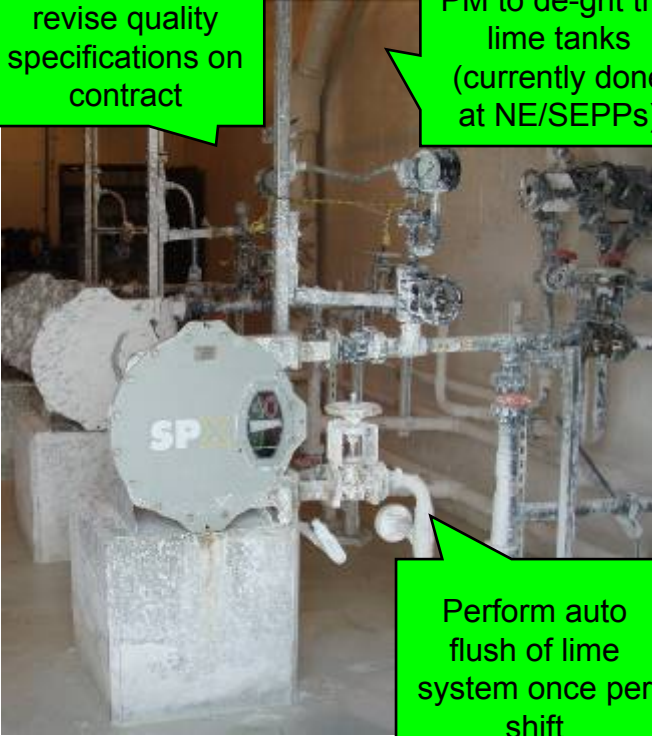
Initiatives	Objective	Ongoing impact*, \$000s
1 Reduce repetitive failures	<ul style="list-style-type: none">Prevent common failures, and minimize the impact of remaining failures, to free up time and reduce costs	246
2 Improve maintenance efficiency	<ul style="list-style-type: none">Make efficient use of technicians' time through better planning and scheduling to enable above changes	492
		738

Current target is to absorb production capacity expansion with current maintenance capacity rather than reduce budgets

* Annualized savings, FY11 potential depends on implementation date



Example: Lime System maintenance costs can be reduced by preventing repetitive failures

Issue	Solutions identified ■ Prevention ■ Mitigation	Impact
<ul style="list-style-type: none">▪ Grit is present in the lime received from the supplier▪ Grit coats the lime tanks and can cause blockages in lime system piping and components resulting in ~300 reactive service trips each year	 <ul style="list-style-type: none">■ Investigate potential to revise quality specifications on contract■ Perform annual PM to de-grit the lime tanks (currently done at NE/SEPPs)■ Perform auto flush of lime system once per shift	<ul style="list-style-type: none">▪ Annual savings of \$71K identified▪ Based on reduction in blockages seen at SE/NEPP



Example: A scheduling board is in use at EWPP to help individuals plan ahead and be prepared

WEEKLY WORK SCHEDULE

	Monday 12/7	Tuesday 12/8	Wednesday 12/9	Thursday 12/3	Friday 12/4
8:00	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing
10:00	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing
12:00	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing
14:00	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing	E-Basin - Washing
16:00	D-Basin Wormgear Assemble	D-Basin Wormgear Assemble	CL ₂ Whip Line	CP-2 - Install	D-Basin Wormgear Assemble / Test
18:00	Call Off to schedule Backflow / CL ₂		Filter B Waste Valve	D-Basin Wormgear Assemble (Parts In)	
19:00	D-Basin Wormgear Assemble	D-Basin Wormgear Assemble	CL ₂ Whip Line Waste Filter & Waste Valve	CP-2 - Install	D-Basin Wormgear Assemble / Test

PI / Hot List

PRI	JOB	Status
1	224754 E-Basin - Washing	On G
3	119562 CL ₂ Whip Line	Schedule
4	119406 Filter B Waste Valve	Schedule
5	180397 Filter 1 Eff. Value	Schedule
6	180404/180405 Filter 5&7 Waste Valve	Schedule
7	178400 D-Basin Wormgear Assemble (Parts In)	Assemble
2	178400 D-Basin Wormgear Assemble (Parts In)	Follow Up
8	178400 CP-2 - Install	Follow Up
9	178400 D-Basin Wormgear Assemble / Test	Follow Up
10	178400 D-Basin Wormgear Assemble / Test	Follow Up
11	178400 D-Basin Wormgear Assemble / Test	Follow Up
12	178400 D-Basin Wormgear Assemble / Test	Follow Up
13	178400 D-Basin Wormgear Assemble / Test	Follow Up
14	178400 D-Basin Wormgear Assemble / Test	Follow Up
15	178400 D-Basin Wormgear Assemble / Test	Follow Up
16	178400 D-Basin Wormgear Assemble / Test	Follow Up

Visual scheduling board

WORK SCHEDULE

	Wednesday 12/9	Thursday 12/3	Friday 12/4
8:00	224754 E-Basin - Washing	224754 E-Basin - Washing	224754 E-Basin - Washing
10:00	224754 E-Basin - Washing	224754 E-Basin - Washing	224754 E-Basin - Washing
12:00	19562 CL ₂ Whip Line	223236 CP-2 - Install	178400 D-Basin - Wormgear Assemble / Test
14:00	180406 Filter B Waste Valve	178400 D-Basin - Wormgear Assemble (Parts In)	
16:00	180404/180405 Filter B Waste Valve	223236 CP-2 - Install	178400 D-Basin Wormgear Assemble / Test
18:00		178400 D-Basin Wormgear Assemble (Parts In)	

Detail shot

PI / Hot List

PRI	JOB	Status 12/3/09
1	224754 E-Basin - Washing	On Going
3	119562 CL ₂ Whipline	Schedule w/OP
4	119406 Filter B Waste Valve	Schedule w/OP
5	180397 Filter 1 Eff. Value	Schedule w/OP
6	180404/180405 Filter 5&7 Waste Valve	Schedule w/OP
2	178400 D-Basin Wormgear	Assemble 12/3/09
7	178400 CP-2 - Install	Follow Up on Parts
8	178400 D-Basin Wormgear Assemble (Parts In)	Parts In

Priority list

- Executive Summary
- Drinking Water Asset Maintenance
- **Waste Water Asset Maintenance**
- Utility Maintenance Branch
- Utility Customer Services



5 initiatives in Waste Water Maintenance will reduce reactive work and improve efficiency

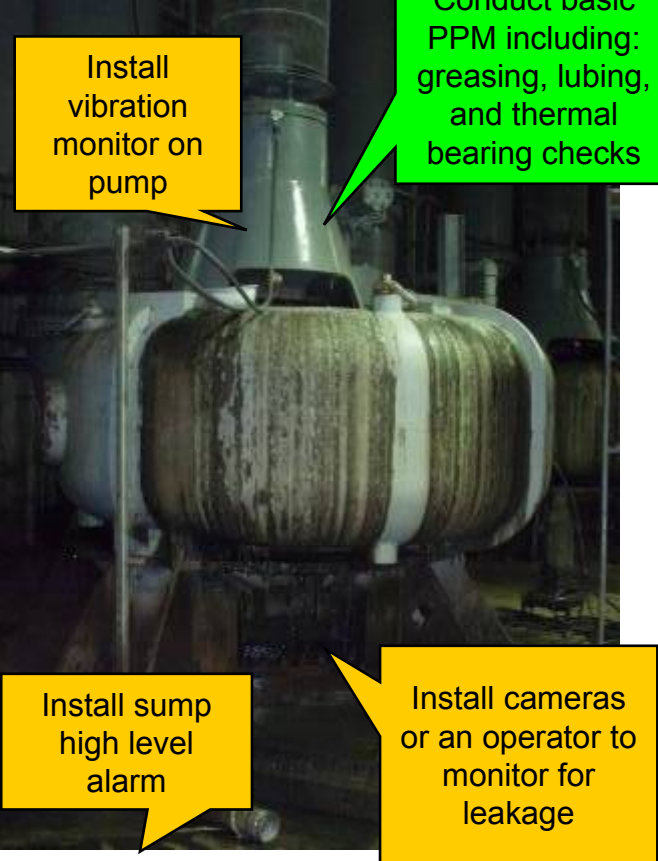
Initiatives	Objective	Ongoing impact*, \$000s
1 ■ Reduce repetitive failures	▶ ■ Prevent common failures, and minimize the impact of remaining failures, to free up time and reduce costs	1,030
2 ■ Optimize dissolved oxygen control	▶ ■ Use only as many blowers as needed to reduce electricity costs	1,030
3 ■ Insource pump maintenance	▶ ■ Complete a portion of pump maintenance in-house to reduce costs	300
4 ■ Optimize centrifuge operation	▶ ■ Operate two centrifuges per dryer to reduce natural gas consumption	500
5 ■ Improve maintenance efficiency	▶ ■ Make efficient use of technicians' time through better planning and scheduling to enable above changes	0**
		2,860

* Annualized savings, FY11 potential depends on implementation date

** Savings reinvested into enabling other initiatives



Example: Preventing common Lift Pump failures at 69th Street could save \$252k each year

Issue	Solutions identified	Impact
<ul style="list-style-type: none">▪ Low lift pumps pump sewage from sewer wet well into works▪ Pump vibration occurs due to large debris and leads to packing deterioration▪ If packing leakage is not caught and fixed, catastrophic damage to the bearings, shaft and motor can occur▪ Pump room flooding occurs once per year due to catastrophic pump failure in which all 8 pumps are affected	<p>■ Prevention ■ Mitigation</p> 	<ul style="list-style-type: none">▪ Annual savings of \$252K identified▪ Assumes the solutions identified will be 50% effective at preventing catastrophic damage▪ Requires \$20K upfront investment for alarm, vibration monitors, and thermal gun▪ Additional investment will be required for cameras

1 Savings are in the process of being validated

SOURCE: 69th Street Initial Maintenance Strategy Workshop, 10/20/2009

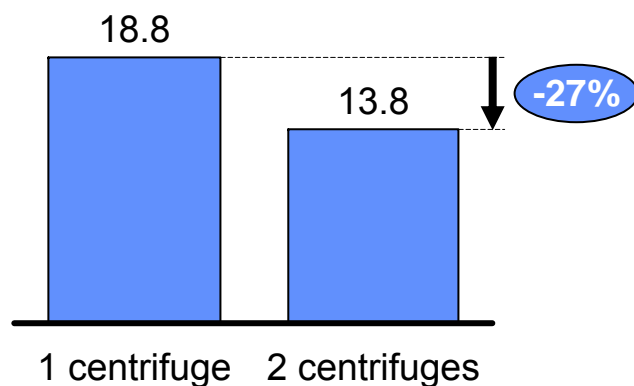


Example: Operating 2 centrifuges per dryer will result in ~\$550K in annual natural gas savings at 69th St

- Sludge dryers at 69th street are more efficient if operated at higher throughput
- However, due to technical issues dryers are operated with only one centrifuge instead of two ~60% of the time (throughput of 150 gpm instead of 200 GPM)
- Consistently operating dryers with two centrifuges would reduce natural gas consumption by ~27% and also allow to operate less dryers

Gas consumption per ton of dried sludge¹

Kcf/ton



Savings opportunity

- Consistently operating with 2 centrifuges per dryer would save ~ 550k US\$ on natural gas costs
- In addition, running fewer dryers at higher throughput has the potential to reduce maintenance costs

Implementation steps

- In the short term, implementation might require re-allocating centrifuges between dryers to ensure availability of 2 centrifuges per operating dryer
- In the long term, diverter valves should be changed/repared to allow for centrifuge maintenance while dryers are operational

¹: 6 random days selected for analysis, impact measured on dryers run during a full day
SOURCE: October 2009 69th Street dryer data

- Executive Summary
- Drinking Water Asset Maintenance
- Waste Water Asset Maintenance
- **Utility Maintenance Branch**
- Utility Customer Services



6 initiatives in the UMB will improve work processes and reduce non-value-adding activities

Initiatives	Objective	Ongoing impact*, \$000s
1 Better investigations	▪ Reduce repeat visits to job sites by improving investigation quality and communication	1,035
2 2 men teams for applicable tasks	▪ Align crew size with job requirements instead of having 3-men teams for all jobs	
3 Performance management	▪ Make field performance transparent and engage employees in performance dialogs to identify and resolve issues	925
4 Better scheduling and prioritization	▪ Assign jobs to crews based on investigation results to ensure each crew has a fully loaded schedule with minimal waiting times	
5 Quality assurance	▪ Reduce the number of in person QA visits – Improve photo quality – Make QA everyone's responsibility	525
6 Better planning	▪ Improve compliance with standard procedures – Well stocked trucks – Use less fill material – Reduce waiting for dump trucks	502
		2,987

* Annualized savings, FY11 potential depends on implementation date



Example: Written investigation reports help ensure teams have the information they need

Reports being completed by all field investigators

RW Investigation report (1/2)

Service request number: 1142592 Work order number: 41232007

Investigator name: John Smith Investigation date: 11/15/16

Address of actual location: 7000 Main St

Address of actual location: 7000 Main St

City: San Jose State: CA Zip: 95128

Service line: Water

Material: AC CPVC Other

Priority: High

Estimated time: 2 hours

Number of crew: 2

Time on site: 1.5 hours

Comments: Always call in network cover for 4 valves. Prioritization of many NTS & will help 2nd day. Be available for the 10 days.

- Investigation report now being used across the quadrant
 - Used for scheduling and planning
 - Size of crew needed
 - Time on site needed
 - Priority
 - Given to supervisors to eliminate duplicate visits
 - Given to crews to reduce time on job site (e.g., find valves faster)

Reports scored for completeness and accuracy

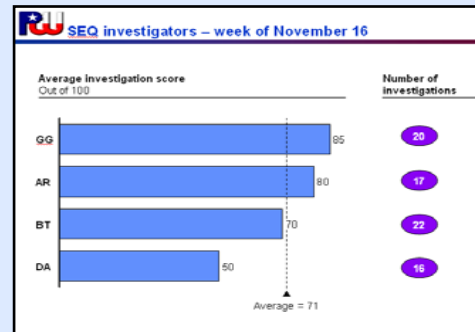
RW Investigation report scoring sheet

Investigator name: John Smith Investigation date: 11/15/16

	WOC: 11/15/16	WOC: 11/15/16	WOC: 11/15/16	WOC: 11/15/16	WOC: 11/15/16	WOC: 11/15/16
Main & service line	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Res. crew size	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Est. depth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Est. crew time	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Difficulty	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Priority	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Direction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Values	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Equipment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Radiation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: Always call in network cover for 4 valves. Prioritization of many NTS & will help 2nd day. Be available for the 10 days.

Investigation scores tracked over time to facilitate performance management and training



Teams sent to the field with a 'job packet'

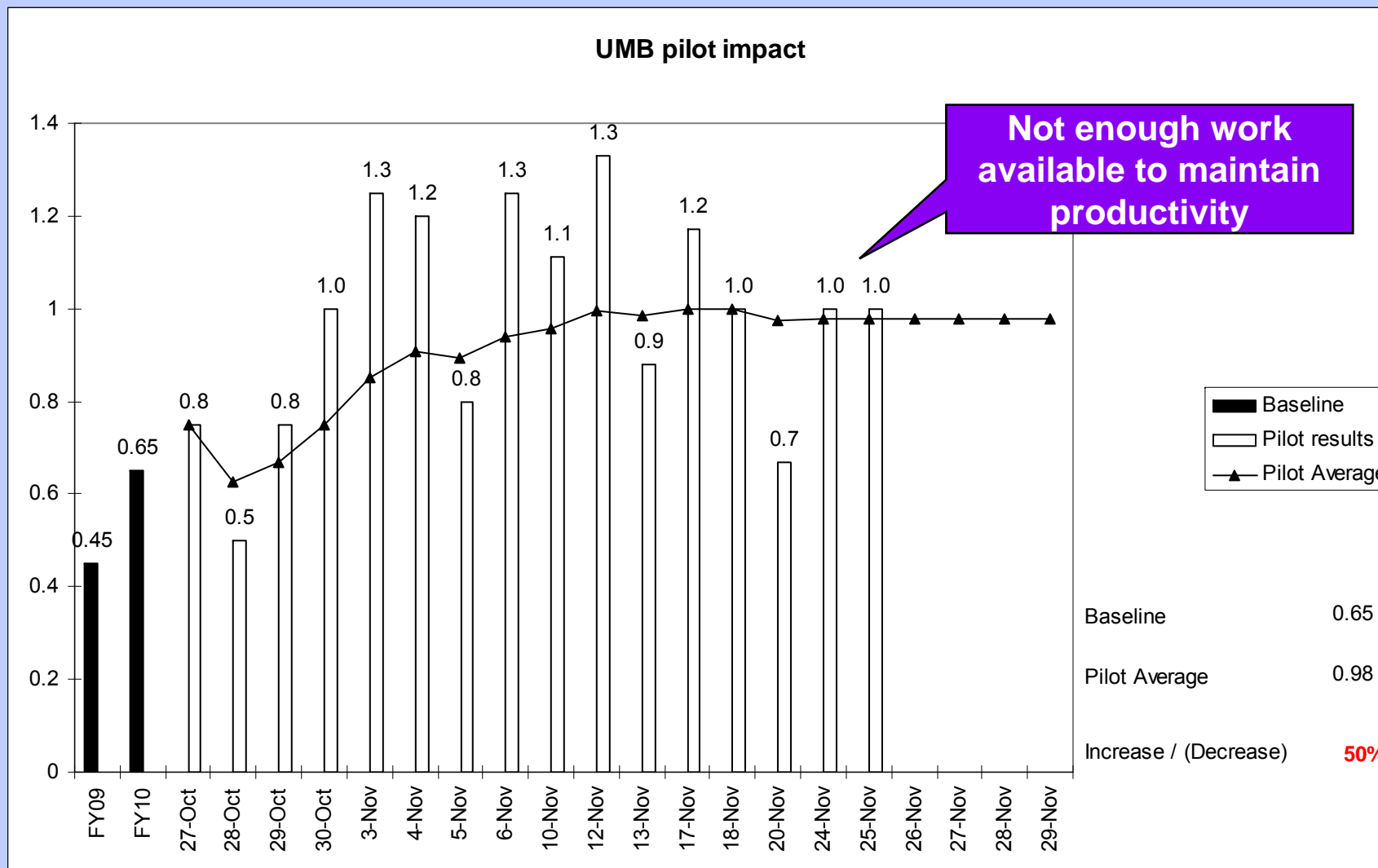
Stack of documents including an RW Investigation report (1/2) and a GEM map.

Contains:

- Investigation report
 - Detailed information on the job
- GEM map
 - Detail on the surrounding area
 - Location of valves
- Work order
 - Maintains current documentation for IMS



The performance management system shows the 50% productivity improvement achieved in the UMP pilot



- Executive Summary
- Drinking Water Asset Maintenance
- Waste Water Asset Maintenance
- Utility Maintenance Branch
- **Utility Customer Services**



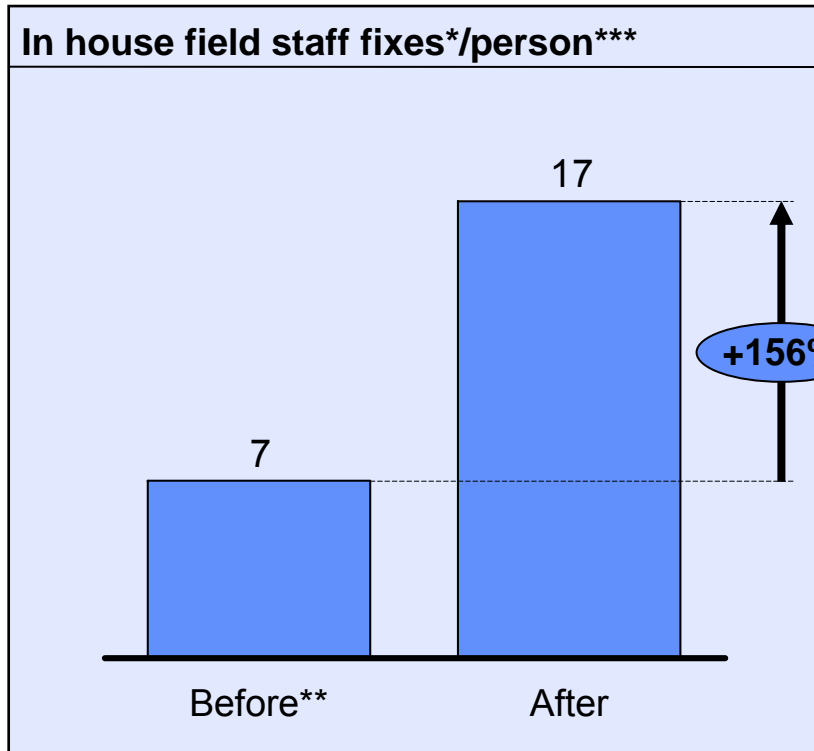
5 initiatives in UCS will improve work processes and reduce waste

Initiatives	Objective	Ongoing impact*, \$000s
1 Reduce field operations workload	▪ Eliminate need for contractors and bring work down to a more manageable level through first time fixes	1,560
2 Increase service fees to match costs of services provided	▪ Increase revenue using a fair method of charging for services	940
3 Increase use of low cost billing and payment channels	▪ Save on costs of materials by converting customers to e-bill and electronic payments; improve the environment	305
4 Close the lobby at Leeland	▪ Reduce costs and inefficiency of having multiple cash payment locations in the same area by closing lobby at Leeland	309
5 Eliminate the yellow bill	▪ Save costs of sending out yellow bill as yellow bill has shown to have minimal impact	222
		3,336

* Annualized savings, FY11 potential depends on implementation date



Example: During the pilot, in-house staff fixes increased 156%, reducing repetitive field work



Key findings

- Field staff emphasized fixes over getting reads and given tools and time to address problems
- Field managers expressed enthusiasm over the increase in accounts fixed citing the reduction in future workload
- Room for increase in-house staff fixes/day as contractors average roughly 23-24 fixes/day****

* Fixes defined as when account endpoints or meter are updated, newly installed, or changed out

** Before based on sample data from October

*** Uses average of 12 full time field staff

****Contractors completed 157 fixes/day prior to pilot and 173 fixes/day during pilot



Example: Decisions are required on increasing fees to cover direct costs and limit cross-subsidisation

- Comprehensive field observations and time in motion studies were conducted to establish the true costs of key services provided
 - Cost of opening a new account are ~\$20 compared to current \$5 fee
 - Restoration of service (includes termination, restoration and all attempts to collect bill) costs ~\$45 compared to current fee of \$30
 - Commercial customers and apartment complexes still receive paper bills free of charge despite cost of ~\$4.80 per annum
- Further fees still under review, e.g., for returned checks and illegal reconnection

Measure	Impact estimate*
▪ Connect fee to be increased from \$5 to \$20 with a \$5 discount for customers who sign up to e-bill	▪ ~\$440,000
▪ Restoration of service fee to be increased to \$45	▪ ~\$213,000
▪ Commercial customers and apartment complexes to pay \$5 annual paper bill fee if they do not switch to e-bill (in line with what other utilities charge)	▪ ~\$200,000