Guidelines for
Implementing Total Management Planning

Asset Management

OPERATIONS MANAGEMENT
Implementation Guide

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LIST OF ACRONYMS

KPI	key performance indicator
O&M	operation and maintenance
SWOT	strengths, weaknesses, opportunities, threats
TMP	Total Management Plan
WSP	Water Service Provider

1 PURPOSE

This guide is intended to provide guidance for water service provider (WSP) practitioners and their consultants on the processes involved in establishing and implementing effective operations management strategies and procedures and developing associated documentation.

2 INTRODUCTION

Outcomes

Effective operations management will ensure:

- achievement of operational (including environmental) objectives at least cost;
- provision of cost-effective services, which are regularly reviewed to achieve appropriate best practice;
- shared knowledge within the WSP of its operating philosophy and procedures; and
- compliance with statutory requirements.

Outputs

Outputs from the operations management process include:

- Operations Management Plan (TMP sub-plan); and
- documented operational philosophy and procedures.

3 THE OPERATIONS MANAGEMENT PROCESS

The operations management process involves two interrelated phases:

- macro phase; and
- detailed phase.

3.1 The macro phase

The purpose of this phase is to develop:

- a policy framework for the WSP's operations management;
- a framework by which operational performance can be optimised; and
- a strategy for the delivery of operational services.

Developing, documenting and refining the operating philosophy

There are a number of benefits in documenting the operating philosophy, including the following:

- Managers, planning and operational staff develop a consensus as to how the system operates.
- Through documenting the operating philosophy, opportunities for efficiency improvements can be identified.
- Planning assumptions/intentions will reflect operational reality.

Documentation consists of an overview document which explains in succinct terms how the system works, preferably with the aid of a schematic layout (or a hierarchy of schematic layouts for larger schemes). For a water supply, for example, the information given might include:

- relative locations of major facilities;
- capacities of facilities (e.g. pumps, reservoirs);
- reservoir levels;
- locations of control valves;
- sources of supply of the various zones, and locations of secondary, alternative treated water sources;
- how zones are separated (e.g. closed valves, non-return valves etc.);
- alert levels for system failure;
- responsibilities of key personnel in the decision-making processes;

- communication with bulk suppliers and major customers; and
- actions in the event of system failure.

For larger WSPs the process may involve splitting the system into sub-systems (e.g. surface water sources to treatment plant).

Undertaking process analysis

This involves mapping key operational and support processes. The benefit of this approach is that it allows WSPs to:

- identify critical operation and support activities;
- identify areas requiring policies and procedures (i.e. a basis for a quality management system); and
- assist in activity-based costing.

Developing and refining operations management policies

The process analysis phase will highlight key policies required for development. Some of these would include:

- workplace health and safety;
- delivery of operational services (e.g. level of outsourcing, contractual arrangements);and
- benchmarking and continuous improvement.

Monitoring and optimising system performance

A WSP will rely on a number of information systems to monitor and optimise operational performance and compare these to operational targets. These information systems include:

- customer complaints;
- financial information (e.g. O&M cost/ML);
- system network models. These will allow actual system performance to be compared to theoretical performance and allow anomalies to be investigated.

Monitoring and control systems (telemetry systems) are critical to improving system operation. An effective monitoring and control system can provide:

- summary reports required for planning, operations, system performance monitoring management and regulatory reporting;
- leakage assessment and reduction;
- information for infiltration/inflow management;
- calibration of network models;
- energy management;
- security of facilities against vandalism and sabotage;
- linkage with GIS and network models;
- overflow events;
- information to confirm/refine existing design flows and peaking factors;
- trends in flows/demands within zones/catchments/sub-catchments;
- premature warning of potential problems;
- opportunities for efficiency gains through increased automation;
- risk management;
- internal performance indicators (A range of operation and maintenance indicators are available; a sample is included in Table 1. Many of these would be site-specific.); and
- performance comparison information. This information is becoming more readily available. In some instances it may be a useful tool to identify potential areas of inefficiency.

TABLE 1: Sample of internal O&M performance indicators

Water supply

- O&M and A cost /1000 connections (A represents administration costs associated with O&M)
- O&M and A cost/100 km main
- O&M and A cost/ML
- Average installation time for new water services
- Number of new water services installed
- Average time to rectify problem (time for different priority levels)
- System water loss (litres/100 km of main/day), (litres/connection/day) or distribution efficiency
- Number of service connection repairs/total number of connections
- kW.h/ML (for each major pump station)
- Energy cost/ML (for each major pump station)
- Number of main breaks/100 km of main
- Cost of main repair/main break
- Number and % of defective water supply fittings identified and repaired (and not repaired)
- Number of breakdown jobs/number of planned jobs
- Water delivered versus announced allocations
- actual shutdown versus planned shutdown
- minimum static pressure and/or flow
- % connections with deficient pressure or flow
- %availability (e.g. pumps)

Sewerage

- O&M and A cost/1000 connections
- O&M and A cost/100 km main
- O&M and A cost/ML - collection system
- - individual treatment plant
- Number of new sewerage connections installed
- Average time to rectify problems (time for different priority levels)
- Number and % inspected for infiltration/inflow
- Length of mains inspected by CCTV
- Number and % of defective manholes identified and repaired
- Number and % of confirmed illegal connections remedied
- Number and % of connection defects remedied
- Number and % of defects not remedied in each of the above categories
- % effluent reused from different plants
- % biosolids reused
- kW.h/ML (for each major pump station and treatment plant)
- Energy cost/ML (for each major pump station and treatment plant)
- Length of sewer mains
- Overflows affecting customer properties/1000properties
- No. of blockages/100 km sewer
- Sewage overflows per 100 km of sewer or rising main
- pump station overflows

General

- Employees/1000 connections
- Total days lost
- Real O&M cost index
- Positive internal survey returns (% per survey)

3.2 The detailed phase

This phase will support and further develop the activities within the macro phase. Essentially it will involve:

- documenting operational procedures and schedules; and
- identifying operational efficiency gains.

The process analysis undertaken in the macro phase will identify a range of operational activities. These should initially be prioritised for documentation based on criticality of the activity to service standards.

Operational procedures should have a consistent, user-friendly style that is suitable for incorporation into a quality management system. Flow charts should be used where appropriate. Procedures should address operation under 'normal' and 'abnormal' (system failure) conditions. Operational schedules (in tabular format) outlining daily, weekly and monthly operations should also be developed.

The operational procedures should include a section on risk management, particularly in relation to the following categories:

- safety — ensuring compliance with workplace health and safety requirements;
- environmental — minimising environmental harm;
- political/social — e.g. communicating with the public, minimising complaints; and
- public health – e.g. preventing contamination of the water supply.

The process for developing operational procedures (including schedules) will involve:

- development of initial documentation; and
- peer review of documentation to:
  - ensure clarity and succinctness of information;
  - ensure compliance with current standards; and
  - identify opportunities for more efficient procedures.

The identification of operational efficiency gains will involve:

- a detailed assessment of existing procedures;
- consultation with staff on opportunities for cost savings;
- benchmarking (where appropriate), including:
  - metric benchmarking — establishing current performance levels and defining appropriate target performance levels; and
  - process benchmarking — how to improve performance. This may require looking beyond the water industry.

The benchmarking process, if done properly, is a highly structured, resource-intensive team activity. Nevertheless, if it focuses on critical, high-expenditure, operational activities, it can produce significant dividends.

4 RISK ISSUES

Potential risks associated with operations management include:

- non-compliance with service standards;
- non-compliance with regulatory requirements;
- workplace health and safety risks;
- inadequate customer communication/ consultation;
- environmental impacts of operational practices;
- public health risks;
- political/social risks;
- customer complaints;
- inadequate emergency response;
- lack of (or conflicting) corporate knowledge of system operation;
- sub-optimal operational practices;
- accuracy or reliability of operational data and information;
- inadequate feedback to planners and designers;
- competition for service (third party access);
- industrial action;
- poor contractor performance;
- sabotage; and

- vandalism.

5 TMP REQUIREMENTS

Each WSP's Total Management Plan (TMP) should include an outline of key issues and identified strategies addressing these issues for the WSP's services in respect of operations management. Appendix A provides indicative content and appropriate TMP development level for this sub-plan.

A hierarchy has been established to define the level to which a WSP should develop its plan under total management planning. This is discussed in more detail in the TMP Development Guide. The development level depends on the size of the WSP (in terms of the replacement cost of its assets).

REFERENCES AND FURTHER READING

Asset Management Guidelines for Water Supply and Sewerage Schemes, Department of Public Works, New South Wales, July 1992.

National Competition Policy, Australian Government Printing Service, Canberra, 1993.

Total Management Planning – Urban Water-related Services: Management Issues, Department of Primary Industries (Water Resources), Brisbane, 1994.

Appendix A: Content and development level of sub-plan

TABLE A1: Indicative sub-plan content

Sub-plan features	Operations Management Plan content
Issues covered in sub-plan	▪ Operating philosophy. ▪ Operational policies and procedures. ▪ Optimising system performance. ▪ Delivery of operational services.
Purpose of plan	To provide summary information on: ▪ system operational philosophy and practice; and ▪ planned initiatives in optimising system operation.
Policies that may be required	▪ Workplace health and safety; ▪ Delivery of operational services; and ▪ benchmarking and continuous improvement.
Other Total Management Plan elements that are intimately linked to this sub-plan	▪ Financial Management Plan: financial projections of operational costs will reflect efficiency gains. ▪ Maintenance Management Plan: interaction of operation and maintenance. ▪ Service Standards Plan: service levels will be aligned to the efficiency and effectiveness of system operations. ▪ Information Management Plan: effective information systems are required to support system operations.
External issues contributing to the current operating environment that need to be considered	▪ Increasing emphasis by the government on improving efficiency and service delivery within the water industry, as evidenced by the National Competition Policy. ▪ Automation of system operation can facilitate improved operations and response times.
Issues that need to be considered in summarising the status of current operations	▪ Schematic layout of schemes outlining major facilities, their capacity and how scheme operates. ▪ Brief description of system operation and control and monitoring systems and outputs. ▪ An overview of current operational problems. ▪ Delivery of operational services (e.g. in-house and outsourcing). ▪ Current status of documented operational procedures. ▪ Communication with bulk suppliers and customers. ▪ Water quality monitoring. ▪ Tabulation or graphs of critical operational performance indicators. ▪ Broad SWOT analysis of operations management practices.
Strategic basis of the plan	The strategic elements forming the basis of the plan should include: ▪ goal for asset management; ▪ objective(s) for operations management; ▪ adopted KPIs; and ▪ management strategies and performance targets. The management strategies developed will be based on the identified key strategic issues and SWOT findings, including risk assessment, in respect of operations management, and on the required TMP development level. Many WSPs are likely to require strategies for optimising system performance; documenting the operating philosophy and procedures, and establishing an operation performance and benchmarking program. The strategies should be supported by detailed action plans covering a period of up to 3 years.

Suggested performance measures	**Outcome:** ▪ Percentage of irrigation water requests fulfilled within target time; ▪ Number of customer complaints per 1000 customers: ▪ confirmed pressure/flow complaints; ▪ water quality (aesthetic, health); ▪ confirmed pressure complaints; and ▪ sewerage odours. **Output:** ▪ Operations, Maintenance & Administration (OMA) cost/100 km main. ▪ OMA cost/1000 properties. ▪ OMA cost/ML. ▪ Administration cost/1000 customers.
Supporting documentation	▪ Documented operational philosophy, procedures and schedules. ▪ Operation and maintenance manuals.

TABLE A2: Required sub-plan development level

Development level[1]	Target management mechanisms of Operations Management Plan
3	▪ Schematic layout available, outlining major facilities, their capacity and how scheme operates. ▪ Operational philosophy documented. ▪ Operational procedures fully documented. ▪ Sophisticated control and monitoring systems in place. ▪ System performance optimisation is a continuous process. ▪ Active operational performance and benchmarking program.
2	▪ Schematic layout available outlining major facilities, their capacity and how scheme operates. ▪ Operational philosophy documented. ▪ Operational procedures fully documented. ▪ Automated control and monitoring systems in place. ▪ Processes in place for optimising system operation.
1	▪ Schematic layout available outlining major facilities, their capacity and how scheme operates. ▪ Operational philosophy documented. ▪ Basic documentation of operational procedures and schedules. ▪ Basic control and monitoring system in place.

[1] Defined in Section 4.2 of TMP Development Guide.