Waterbody Management Guideline

Module 3

# Asset Management

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waterbydesign

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## 3.1 INTRODUCTION

### 3.1.1 Purpose of module 3

The purpose of this module, *'Asset Management'*, is to assist local government officers to apply asset management skills and techniques to local government owned waterbodies. The module helps to ensure that waterbodies are managed efficiently and effectively to agreed standards of service. This module helps both new and experienced asset managers to manage waterbodies in a manner that is consistent with traditional asset management techniques.

### 3.1.2 How to use module 3

Module 3 is divided into seven key sections. Figure 3.1 describes how to use each section.

**Figure 3.1 How to use module 3**

| | |
|---|---|
| **Section 3.2** | |
| Getting Started | This section contains foundational knowledge for managing waterbodies. |
| **Section 3.3** | |
| Identify Roles, Responsibilities and Resources | This section outlines how to ensure each waterbody management task is assigned to the most appropriate department. |
| **Section 3.4** | |
| Identify and Characterise Waterbodies | This section provides advice on how to identify, locate and gather data on waterbodies in a timely and efficient manner. |
| **Section 3.5** | |
| Manage Finances | This section provides guidance on building a business case for maintaining waterbodies and whether or not to capitalise them. |
| **Section 3.6** | |
| Prioritise Waterbodies | This section discusses how to balance the outcome sought with the cost of works to prioritise which waterbodies to spend resources on maintaining. |
| **Section 3.7** | |
| Review and Revise | This section outlines the importance of continually improving waterbody management and processes. |
| **Section 3.8** | |
| Worked Example | This section uses a hypothetical example to demonstrate the waterbody management processes documented in this module. |

## 3.2 GETTING STARTED

Asset management is well established within local government for hard infrastructure such as roads. *The International Infrastructure Management Manual* (IIMM) (INGENIUM, 2011) and the *Australian Infrastructure Financial Management Guidelines* (AIFMG) (IPWEA, 2010) establish a framework for asset management that is applied by many local governments.

Applying asset management principles to waterbodies is a relatively new concept. It presents some unique management challenges. Despite this, the principles applied for other asset types can be applied and adapted for waterbodies. This module provides waterbody specific asset management advice that complements the IIMM and AIFMG.

### 3.2.1 Balancing effort and reward

When managing waterbodies, it is important to achieve a balance between effort and reward. To establish a comprehensive asset management framework from scratch requires a lot of effort. While the outcome at the end of this process will be very beneficial in the long term, it can be time consuming and resource intensive to get to this point. In fact, in some cases, when comprehensive asset management is the goal, the sheer scale of the task can prevent meaningful progress from being made at all.

On the other hand, when first beginning to manage waterbodies, a small targeted amount of effort in specific areas can produce significant rewards. For example, identifying for the first time all the waterbodies under the control of a local government and storing this information in a basic asset register is a simple task, but one which greatly assists in future waterbody management activities such as developing a budget for works. The benefit achieved from these early, simple projects can then be used as a catalyst for further, more time and resource intensive initiatives.

### 3.2.2 Procedures, guidelines and legislation

When maintaining and operating waterbodies care must be taken to comply with all relevant legislation. Users of this module should refer to their internal processes, including occupational health and safety processes, risk assessment procedures, work method statements and standard operating procedures. Maintenance should be undertaken in accordance with local, state and national legislation and guidelines.

**Climate change**

Climate change will impact waterbodies via more frequent and intense rainfall events, extended periods of high temperature, more intense drought, rising sea level and higher storm tides. Waterbodies are a long lived asset. The majority of waterbodies currently managed by local governments will still exist as the effects of climate change become more severe in the future. When managing waterbodies, always consider whether the management actions undertaken are appropriate in a changing climate.

**A Hard Infrastructure Asset Management Perspective on Climate Change**

The IIMM framework used by local government in the managing and maintaining of hard infrastructure does not consider climate change and limits the capacity of local governments to manage climate change impacts (Balston, 2012). In 2012 the National Climate Change Adaptation Research Facility published the results of a research project to develop a financial simulation model and supporting decision tools to provide a clear, comparative analysis of the financial impacts of climate change on three major asset classes of importance to Australian Local Government (Balston, 2012). While only addressing a select group of hard infrastructure assets, the report, *Quantifying the cost of climate change impacts on local government assets* (Balston, 2012) provides an insight into how climate change may be considered within traditional asset management frameworks in the future.

## 3.3 IDENTIFY ROLES, RESPONSIBILITIES AND RESOURCES

This section should be applied when looking to understand the roles, responsibilities and resources within a local government that are related to managing waterbodies and to streamline how activities are undertaken. How this section is applied, and to what level of detail will depend on the circumstances of the individual organisation. Some local governments may already understand how their existing corporate structure relates to managing waterbodies. In such cases, a detailed review may be unnecessary. However, most local governments will not be in this position. Small local governments may only have a limited number of staff and waterbodies. They may simply wish to improve how tasks are coordinated by facilitating regular briefing sessions with key staff from relevant departments. Large local governments responsible for managing a large number of assets within a complex corporate structure may require a more detailed assessment.

**Local governments are dynamic entities**

Local government's structures and roles frequently change. A review should be carried out following each major restructure to ensure that roles and/or tasks are not 'lost' within the system.

The process documented in this section provides sufficient detail for the largest and most complex of local governments, but is still simple enough to be scaled and adapted to smaller or less structurally complex local governments. The three steps of this process are:

- understanding the existing skills base (Section 3.3.1)
- identifying existing roles, responsibilities and resources (Section 3.3.2)
- identifying required roles, responsibilities and resources (Section 3.3.3)

Identifying roles, responsibilities and resources between departments, can help to ensure waterbody management is efficiently coordinated, required tasks are undertaken, budgets are identified and assigned, and duplication of effort is avoided. Identifying roles, responsibilities and resources can be carried out by either in-house staff or by contractors. Table 3.1 documents the pros and cons of each approach.

**Table 3.1 Pros and cons of in-house vs. external review**

| Method | Pros | Cons |
|---|---|---|
| **In-house** | • good existing knowledge of assets, staff, structure and issues<br>• high level of ownership. | • takes people off-line<br>• potential focus on one skill area<br>• process may be overlooked in favour of everyday duties and never gain necessary momentum<br>• lack of independence. |
| **External** | • good experience with undertaking similar work<br>• good understanding of other local government structures for waterbody management<br>• broad, impartial views and experience. | • can be expensive<br>• may not have full understanding of local government's key issues<br>• limited ownership. |

### 3.3.1 Understanding the existing skills base

Some waterbody management tasks are likely to be already addressed by asset management or operations teams, as part of their existing activities for managing other types of assets. However, budgets and resources are often not allocated specifically to managing waterbodies. This makes it difficult to determine exactly how much of each department's budget is for managing waterbodies. It can be difficult to establish overall costs (and hence budgets) for ongoing work.

It is important for each organisation to have a good understanding of what their existing skills base is, what suitable equipment for managing waterbodies is available in-house and what budgets may have been assigned for managing waterbodies.

In some cases, the existing in-house expertise will be sufficient. In other cases it may be necessary to raise awareness of the importance of the various aspects of managing waterbodies and how this can be incorporated into existing operations and maintenance regimes. Utilise in-house expertise where possible which will provide both access to valuable knowledge, and build ownership of waterbody management with internal stakeholders.

### 3.3.2 Identifying existing roles, responsibilities and resources

Methods to identify existing roles, responsibilities and resources for managing waterbodies may include:

- undertaking internal workshops or discussions with key staff
- developing questionnaires/task checklists
- engaging a third party to undertake a detailed review.

The level of detail will depend on what the local government wants to achieve from the review. A review aiming to streamline activities may be as simple as determining who currently does what. A review to assist with developing a business case for appropriate funding may be more detailed.

A good way to quickly understand who does what within the organisation and what existing budgets are available is by developing a simple task checklist (Table 3.2), coupled with a questionnaire (see below example questions.) The questionnaire and task checklist should be sent to key staff and followed up with consultation to identify the responsibilities of different stakeholders for specific tasks. The task checklist should cover all phases of lifecycle, including:

- planning and policy development
- management and maintenance
- renewal and rectification.

The questionnaire and task checklist should provide enough information to gain a preliminary understanding of:

- what tasks are currently being completed at the department, team and individual levels
- how much money is currently being spent on waterbody management tasks within each department
- how much of this money is budgeted specifically for waterbody management
- how each department, team or individual determines what activities to do and when
- where any gaps or duplication may be occurring.

The information collected should be collated, reviewed and summarised. Further consultation should then be undertaken with senior staff (e.g. department heads, team leaders, directors) to see how the responses align with current practices. In particular, cross check that what staff 'think' they should be doing and what they actually should be doing is aligned.

**Example questions to ask internal stakeholders**

1. What triggers an inspection? (e.g. Is it part of a routine maintenance schedule? Is it generally reactive such as in response to a complaint or incident?)
2. Does your team determine what activities to undertake or does it receive direction from other groups or departments within local government?
3. What is the process to request inspection or maintenance be carried out?
4. Does your team have a written inspection and maintenance plan or strategy?
5. What human resources does your team currently have for undertaking the tasks identified in Table 3.2?
6. What equipment does your team currently have for undertaking the tasks identified in Table 3.2?
7. What is your team's overall annual budget allocation for undertaking the tasks identified in Table 3.2?
8. Do you think that you have sufficient budget and resources for undertaking the tasks identified in Table 3.2?
9. How many waterbodies does your team currently inspect or maintain?

**Table 3.2 Example task checklist for waterbody management**

Department: _____

| Task | Is the task assigned to your department? | To what extent is the task completed? | | |
|---|---|---|---|---|
| | | Fully | Partially | Not at all |
| **Stage: Planning for physical works and policy development** | | | | |
| Flood modelling and management | | | | |
| Stormwater modelling and management | | | | |
| Design of new waterbodies | | | | |
| Modification of design for existing waterbodies (renewal/upgrade) | | | | |
| Strategic assessment of waterbody condition (regional) | | | | |
| Asset handover – conditions and constraints | | | | |
| Research and design of best practice water sensitive urban design (WSUD) infrastructure | | | | |
| Research and design of best practice waterbody design and construction | | | | |
| Planning for removal of 'end-of-life' infrastructure | | | | |
| Strategic assessment of waterbody management and resources (regional) | | | | |
| Policy development for waterbodies | | | | |
| Assessment of development related waterbody proposals | | | | |

| Task | Is the task assigned to your department? | To what extent is the task completed? | | |
|---|---|---|---|---|
| | | Fully | Partially | Not at all |
| Construction supervision | | | | |
| Preparation of a business case for capital spend | | | | |
| Other (please specify) | | | | |
| **Stage: Ongoing maintenance and inspections** | | | | |
| Aquatic weed spraying | | | | |
| Aquatic weed harvesting | | | | |
| Aquatic macrophyte revegetation/planting | | | | |
| Riparian/edge weed spraying or removal | | | | |
| Riparian and edge revegetation/planting | | | | |
| Mosquito monitoring and control | | | | |
| Routine water quality monitoring | | | | |
| Routine algal monitoring | | | | |
| Reactive water quality or algal sampling (e.g. in response to complaints, spills, fish kills) | | | | |
| Sediment removal or dredging within the waterbody | | | | |
| Litter monitoring and removal | | | | |
| Inspection and maintenance of surface gross pollutant traps | | | | |
| Inspection and maintenance of underground gross pollutant traps | | | | |
| Inspection and maintenance of inlet structures | | | | |
| Inspection and maintenance of outlet structures | | | | |
| Inspection and maintenance of amenities | | | | |
| General inspection of overall waterbody condition | | | | |
| Inspection and management of batter scour | | | | |
| Inspection and management of pests (e.g. birds, fish) | | | | |
| Inspection and management of water levels | | | | |
| Other (please specify) | | | | |
| **Stage: Renewal and rectification** | | | | |
| Excavation to increase storage capacity or re-size sediment basins | | | | |
| Installation of additional sediment capture infrastructure (e.g. gross pollutant traps) | | | | |
| Waterbody reprofiling/re-sizing | | | | |

| Task | Is the task assigned to your department? | To what extent is the task completed? | | |
|---|---|---|---|---|
| | | Fully | Partially | Not at all |
| Modification of existing hydraulic structure (e.g. to optimise water levels and flushing) | | | | |
| Installation of new hydraulic structures (e.g. inlet and outlet structures) | | | | |
| Installation of erosion protection infrastructure | | | | |
| Construction of flow redirection paths | | | | |
| Construction of access ramps (for weed harvesting) | | | | |
| Installation of permanent fencing/vegetation to restrict access | | | | |
| Installation of temporary fencing | | | | |
| Installation of signage | | | | |
| Excavation of adjacent areas for sediment drying/ compacting | | | | |
| Modification or removal of bird habitat | | | | |
| Removal or culling of pests (e.g. birds, fish) | | | | |
| Acid sulfate soil treatment (e.g. capping, replacement, remediation) | | | | |
| Sediment treatment within the waterbody (e.g. sediment capping, aeration, recirculation) | | | | |
| Installation of other water quality treatment infrastructure (e.g. floating wetlands) | | | | |
| Installation of WSUD infrastructure (e.g. swales, bioretention systems, sediment basins) | | | | |
| Other (please specify) | | | | |

### 3.3.3 Identifying required roles, responsibilities and resources

Using information gathered when identifying existing roles, responsibilities and resources for managing waterbodies (see Section 3.3.2), a gap analysis can be performed to determine which tasks are:

- assigned and being completed
- assigned but only partially completed
- assigned but not completed
- not assigned and not being completed.

The information gathered will also help to determine where there are gaps in funding, equipment and resources.

An example of a gap analysis matrix is provided in Table 3.3.

The outcomes of the gap analysis should be discussed with key local government representatives in order to identify a more efficient and streamlined process for managing waterbodies. This will ensure that:

- all tasks are appropriately assigned and completed
- all roles and responsibilities are clearly defined
- appropriate levels of funding and resources are allocated
- inefficiencies, such as duplication of tasks are avoided.

**Who should be responsible for managing waterbodies?**

One of the common problems encountered by local governments with managing waterbodies is unclear responsibilities. For example, one department may be responsible for managing hydrology and hydraulics within a waterbody, while another may be responsible for vegetation, when really both tasks are interrelated. There is merit in allocating the responsibilities and resources to manage all aspects of waterbodies to a single department. This one department should be responsible for ensuring the wellbeing of the waterbody as a whole, and where appropriate, sub-contract specific tasks to other departments.

**Table 3.3 Example matrix showing outcomes of a gap analysis**

| **NO GAP: Task is assigned and being completed** | **GAP 1: Task is assigned but only partially completed** | **GAP 2: Task is assigned but not completed** | **GAP 3: Task is not assigned and not being completed** | | | | |
|---|---|---|---|---|---|---|---|
| **Task** | | **Department** | | | | | |
| | | Strategic Planning | Development Services | Engineering | Asset Management | Environmental Planning | Environmental Health |
| **Stage: Planning for physical works and policy development** | | | | | | | |
| Flood modelling and management | | | | | | | |
| Stormwater modelling and management | | | | | | | |
| Design of new waterbodies | | | | | | | |
| Modification of design for existing waterbodies (renewal/ upgrade) | | | | | | | |
| Strategic assessment of waterbody condition (regional) | | | | | | | |
| Asset handover – conditions and constraints | | | | | | | |
| Research and design of best practice water sensitive urban design (WSUD) infrastructure | | | | | | | |

| Task | Department | | | | | |
|---|---|---|---|---|---|---|
| | Strategic Planning | Development Services | Engineering | Asset Management | Environmental Planning | Environmental Health |
| Research and design of best practice waterbody design and construction | | | | | | |
| Planning for removal of 'end-of-life' infrastructure | | | | | | |
| Strategic assessment of waterbody management and resources (regional) | | | | | | |
| Policy development for waterbodies | | | | | | |
| Assessment of development related waterbody proposals | | | | | | |
| Construction supervision | | | | | | |
| Preparation of a business case for capital spend | | | | | | |
| **Stage: Ongoing maintenance and inspections** | | | | | | |
| Aquatic weed spraying | | | | | | |
| Aquatic weed harvesting | | | | | | |
| Aquatic macrophyte revegetation/planting | | | | | | |
| Riparian/edge weed spraying or removal | | | | | | |
| Riparian and edge revegetation/planting | | | | | | |
| Mosquito monitoring and control | | | | | | |
| Routine water quality monitoring | | | | | | |
| Routine algal monitoring | | | | | | |
| Reactive water quality or algal sampling (e.g. in response to complaints, spills, fish kills) | | | | | | |
| Sediment removal or dredging within the waterbody | | | | | | |
| Litter monitoring and removal | | | | | | |
| Inspection and maintenance of surface gross pollutant traps | | | | | | |
| Inspection and maintenance of underground gross pollutant traps | | | | | | |
| Inspection and maintenance of inlet structures | | | | | | |
| Inspection and maintenance of outlet structures | | | | | | |
| Inspection and maintenance of amenities | | | | | | |
| General inspection of overall waterbody condition | | | | | | |

| Task | Department | | | | | |
|---|---|---|---|---|---|---|
| | Strategic Planning | Development Services | Engineering | Asset Management | Environmental Planning | Environmental Health |
| Inspection and management of batter scour | | | | | | |
| Inspection and management of pests (e.g. birds, fish) | | | | | | |
| Inspection and management of water levels | | | | | | |
| **Stage: Renewal and rectification** | | | | | | |
| Excavation to increase storage capacity or re-size sediment basins | | | | | | |
| Installation of additional sediment capture infrastructure (e.g. gross pollutant traps) | | | | | | |
| Waterbody reprofiling/re-sizing | | | | | | |
| Modification of existing hydraulic structure (e.g. to optimise water levels and flushing) | | | | | | |
| Installation of new hydraulic structures (e.g. inlet and outlet structures) | | | | | | |
| Installation of erosion protection infrastructure | | | | | | |
| Construction of flow redirection paths | | | | | | |
| Construction of access ramps (for weed harvesting) | | | | | | |
| Installation of permanent fencing/vegetation to restrict access | | | | | | |
| Installation of temporary fencing | | | | | | |
| Installation of signage | | | | | | |
| Excavation of adjacent areas for sediment drying/ compacting | | | | | | |
| Modification or removal of bird habitat | | | | | | |
| Removal or culling of pests (e.g. birds, fish) | | | | | | |
| Acid sulfate soil treatment (e.g. capping, replacement, remediation) | | | | | | |
| Sediment treatment within the waterbody (e.g. sediment capping, aeration, recirculation) | | | | | | |
| Installation of other water quality treatment infrastructure (e.g. floating wetlands) | | | | | | |
| Installation of WSUD infrastructure (e.g. swales, bioretention systems, sediment basins) | | | | | | |

## 3.4 IDENTIFY AND ASSESS WATERBODIES

### 3.4.1 Waterbody Asset Register

A waterbody asset register is a list or database that stores information on all the waterbodies in a local government area. It may be a standalone database or part of a broader wetland or water asset database. An asset register assists local government to effectively and cost efficiently manage local government owned waterbodies. It does this by documenting the number, location and characteristics of the waterbodies to be managed.

An asset register provides local government with the following benefits:

- Easy capture of data for future use.
- Quick and easy access to information on waterbodies.
- Informed planning and budgeting for maintaining and rectifying waterbodies.
- Streamlined, efficient and effective waterbody management.

The following sections provide guidance on how to establish a register of waterbody assets, including:

- information to be included in the waterbody asset register
- the form of the asset register
- populating the asset register
- maintaining the asset register.

### 3.4.2 Information to be included in the waterbody asset register

To create a waterbody asset register, first identify what information should be included. A broad range of data and information can be included on a waterbody asset register. The asset register should provide enough information to understand the key characteristics and condition of the waterbody.

The types of information that can be included on the waterbody asset register are listed in Table 3.4.

Individual local governments can determine what information to include on their register according to their existing asset management structure and waterbody management objectives.

Creating an asset register can be staged. Basic information can initially be collected on all waterbodies. More detailed information can be collected and added later.

**Public vs. private waterbodies**

Local governments have the option of capturing information on both the waterbodies that they are responsible for maintaining (public waterbodies) and those that are privately owned. Before creating a waterbody asset register, check with other departments regarding their needs. Other departments may be willing to share the workload of developing the asset register if it satisfies their needs. Different information may need to be collected for public and private assets.

Table 3.4 Types of information that could be included in a waterbody asset register

| Category | Example of information to include | Source/s |
|---|---|---|
| **Waterbody identifier** | Unique identification (ID) code for each waterbody. This code becomes the link for all databases | Manually created, automated in Geographic Information System (GIS) |
| **Waterbody name** | Waterbody name, wetland name, park name or street name | Manually created and applied using combination of GIS, Nearmap, Google maps and street directory, Wetland*Maps* |
| **Location** | Street address<br>Lot and plan numbers<br>Grid reference | GIS (cadastre) |
| **Catchment/basin** | Catchment and sub-catchment name<br>Catchment and sub-catchment area | GIS (catchment boundaries) |
| **Connectivity** | Waterbody isolated, within a riverine system, within a floodplain | GIS, field verification, Nearmap, Google maps, Wetland*Maps* |
| **Waterbody fringe area** | Riparian zone, surrounding wetland zone | GIS, development approvals, as-constructed drawings, field verification, Nearmap, Google maps, Wetland*Maps* |
| **Waterbody formation** | Artificial, modified from natural - farm dam, ornamental lake, stormwater treatment wetland etc. | GIS, development approvals, as-constructed drawings, field verification, Nearmap, Google maps, Wetland*Maps* |
| **Current use** | Farm dam, ornamental lake, stormwater treatment wetland etc. | GIS , development approvals, as-constructed drawings, field verification, Nearmap, Google maps, Wetland*Maps* |
| **Responsibility** | Local government division, local government team | GIS |
| **Sewerage** | Sewered, un-sewered, combination within catchment | GIS |
| **Age** | 0-5 years, 6-10 years, 11-20 years, >20 years | GIS, development approvals, as-constructed drawings, field verification, Nearmap, Google maps, Wetland*Maps* |
| **Waterbody size** | Waterbody surface area, waterbody 'system' surface area, depth, volume etc. | GIS (surface area and volume), field assessment to determine depth |
| **General description** | General description of the waterbody and surrounds, including key issues, aesthetic values, location, size, amenity values and proximity to landuses | GIS, Nearmap, Google maps, field assessment, consultation, Wetland*Maps* |
| **Waterbody physical features** | Presence of islands, shape, structures etc. | GIS (aerial photographs, Digital Elevation Map, drainage, stormwater), Nearmap, Google maps, field assessment |
| **Park category features** | Service levels<br>Local, district, region etc. | GIS (parks layer or hierarchy) |

| Category | Example of information to include | Source/s |
|---|---|---|
| **Water type –Salinity, temperature and pH** | Fresh, brackish, saline<br>Tidal – yes or no<br>pH – alkaline or acidic | GIS, field assessment |
| **Water quality** | In situ data (turbidity, dissolved oxygen)<br>Nutrients (total phosphorus, filtered reactive phosphorus, total nitrogen, ammonia, nitrogen oxides)<br>Microbial (*Escherichia coli*, intestinal enterococci) | Historical datasets or monitoring, field assessment, consultation |
| **Waterbody floor** | Mud, sand, rock, cobble | Substrate classifications |
| **General field observations** | Rainfall, wind, cloud cover, debris, odours, suspended matter, algae, water column/ substrate, gross pollutants, surface scums, sediment accumulation | Historical datasets or monitoring, field assessment |
| **Hydraulic function** | Location and condition of inlets and outlets, description of inlets or outlets, flooding, regular overtopping, persistent high/low water levels, erosion/scour | GIS (stormwater, WSUD, drainage), field assessment, consultation |
| **Aquatic habitats** | Structure and condition of aquatic macrophytes, % cover, % native or exotic, % floating, emergent, submerged, exotic species present (weeds/fauna), presence of snags, overhang, shading etc. | Field assessment, maintenance schedules, management plans, consultation |
| **Riparian/wetland habitats** | Structure and condition of the surrounding riparian/wetland vegetation, % cover, % native or exotic, % floating, continuity, exotic species present (weeds/fauna), connectivity/corridor etc. | Field assessment, maintenance schedules, management plans, master plan, consultation |
| **Safety** | Batter slopes (above and below water level), presence and condition of fencing and barriers | Field assessment, management plans, master plan, as-constructed drawings, consultation |
| **Profile/amenity** | Proximity to residential/commercial areas, amenity provisions (seating, pathways, barbeques, playgrounds etc.), aesthetic values/issues, recreational usage etc. | GIS (landuse, proximity), field assessment, consultation |
| **Maintenance data** | Maintenance undertaken, resources used, who undertook works | Maintenance schedules and reports, contracts and invoices |
| **Asset management plans** | Links to asset management plan for individual asset | Asset management plans |
| **Cost** | Direct and indirect costs of managing waterbody | Maintenance schedules and report, contracts and invoices |
| **Public feedback** | Public feedback (both positive and negative) received regarding waterbody | Email, phone call, on-site discussions |
| Note: the above list is not exhaustive. Each local government should determine what information they have available and whether or not it is suitable to include on the asset register. | | |

## 3.4.3 The form of an asset register

The form of a waterbody asset register depends on how advanced the organisation is in managing its assets (both waterbodies and otherwise) and how the asset register will be used.

Table 3.5 describes three common forms of asset register. When deciding what form of asset register to use, consider who will use it and what it will be used for. A local government developing a waterbody asset register is likely to already have asset registers for other types of assets. The custodians of these other asset registers will have useful information to contribute to the waterbody asset register. They should be both consulted and actively engaged in the process. Doing so will promote consistency across the organisation and avoid time consuming alterations to the waterbody asset register in the future to bring it in line with other asset registers.

**Table 3.5 Common forms of asset registers**

| Type | Description/Use | Positives | Negatives |
|---|---|---|---|
| **Spreadsheet based** | Spreadsheet based registers may be useful when first establishing a waterbody asset register because they are simple. However, they will not provide the long term functionality required to comprehensively manage waterbodies. | • simple to establish<br>• inexpensive<br>• easy to operate. | • low functionality. |
| **GIS based** | GIS based registers build on the functionality of an excel spreadsheet, add a visual user interface and allow assets to be spatially located. | • moderate functionality<br>• visual user interface<br>• allows assets to be spatially located. | • moderate level of skill to operate<br>• moderate time and cost to establish. |
| **Combined GIS and asset management software** | Asset registers using linked GIS and asset management software (e.g. Maximo) combine the functionality of a GIS system with the ability to plan for, schedule and undertake maintenance, complete financial planning and easily record the condition of assets. | • high functionality<br>• visual user interface<br>• allows assets to be spatially located. | • moderate level of skill to operate<br>• high time and cost to establish. |

## 3.4.4 Populating the asset register

### Locating and mapping waterbodies

Most local governments will already have a considerable amount of information about their waterbodies such as local knowledge, routine maintenance schedules, pest management plans, water quality monitoring programs, geographic information system (GIS) layers and public complaints. Prior to creating a waterbody asset register, this information is likely to be in an ad-hoc form and managed by several departments, each dealing with its own set of issues and responsibilities.

Locating waterbodies for an asset register is simple. The vast majority of waterbodies will be located easily. A variety of sources of information should be consulted to ensure that all waterbodies are located.

Initial information can be gathered rapidly by undertaking a desktop review. The common sources of information available for the desktop review include:

- existing GIS layers, such as:
  - aerial photographs
  - contours or digital elevation model
  - waterways, waterbodies and riparian zones
  - cadastre (including landuse and zoning)
  - catchment boundaries
  - local government boundaries
  - parks and open space and natural areas designations

- environmentally relevant activities
- conservation areas
- conservation assessments
- state government waterways and wetlands maps
- regional ecosystems
- drainage, sewer and stormwater infrastructure
- flood maps
- Queensland wetlands mapping.

- Nearmap and Google Earth
- Wetland*Maps*
- Queensland's Groundwater Dependent Ecosystems (GDEs) mapping
- street directories
- as-constructed drawings
- existing master plans, management plans or concept plans
- existing flood models and reports.

From this initial review, a preliminary inventory of waterbodies can be established, along with basic information concerning each waterbody, such as:

- waterbody name and unique ID code
- location
- catchment and sub-catchment name
- local government division
- surface area
- surrounding landuse
- park category.

**Data standards**

The quality of data recorded in an asset register greatly influences its usefulness in future applications, but also the time and effort required to collect it. In deciding what standard of data to collect, consider:

- who is the end user of the data
- what the data will be used for
- the level of service intended to be provided to the asset
- the effort required to collect the data.

**Assessing Waterbodies**

Once the initial waterbody asset register has been developed, the local government may wish to assess their waterbodies further using a range of physical, ecological and social indicators. This step should involve a combination of **consultation** and **groundtruthing**.

Certain waterbody characteristics can only be assessed by consultation and groundtruthing. For example:

- condition and structure of aquatic and riparian/ wetland habitats
- condition and function of hydraulic structures
- level of coarse and fine sediment accumulation
- presence of exotic or pest species
- aesthetic issues and values
- safety issues
- water quality and salinity levels
- potential localised contaminant sources.

**Consultation**

Local government officers who have in-house experience with the various aspects of managing waterbodies should be consulted early in the process. They can provide a wealth of local knowledge and experience. It will also help these officers take ownership of and contribute to the overall waterbody management process.

A good method of engaging with local government officers is to conduct an internal stakeholder workshop to:

- present the initial waterbody inventory
- discuss the key issues and values associated with waterbodies
- discuss possible approaches for further characterisation of the waterbodies.

The feedback gained from the workshop can:

- assist with identifying additional sources of data
- provide information on local government's overall issues and values associated with waterbodies
- provide information on specific waterbodies (e.g. historical water quality issues, fish kills, weed problems, algal blooms, profile and usage).

The workshop can also help to identify waterbodies with a range of issues, conditions and values for further field assessment and verification.

**Groundtruthing**

When assessing waterbodies in the field, it is important to consider what level of detail will provide the most information in an efficient, repeatable and cost effective manner. The field assessment should focus on local government's key issues and values (as determined from the stakeholder workshop and consultation). This can be achieved in several ways such as:

- undertaking a rapid assessment of all waterbodies
- undertaking more detailed assessments and/or monitoring of high priority waterbodies (as determined by the prioritisation process in Section 3.6)
- assessing waterbodies that are 'representative' of a range of classes, issues and values.

Efficiency can be increased by digitally recording as much information as possible in the field (e.g. using personal data assistants).

**Maintaining a 'single point of truth'**

Many departments within an organisation will be involved with managing waterbodies. Each department will have different requirements from the asset register in terms of usability, data captured and frequency of update. In situations where an asset register does not satisfy all stakeholders' needs, it may be tempting to create duplicate registers to serve different needs. However, doing so will create inconsistencies between registers (particularly if regularly updated) and lead to time consuming attempts to reconcile registers in the future. The waterbody asset register should therefore be maintained within the organisational asset system as a 'single point of truth'.

### 3.4.5 Maintaining the asset register

Once a waterbody asset register is established, it must be regularly maintained to ensure it continues to provide accurate and up to date information. Maintain the asset register to ensure that:

- the right information is being collected
- information on existing assets remains up to date
- information on decommissioned assets is removed
- all new assets are incorporated into the register in a timely manner.

Local governments will typically already have one or more staff whose role it is to maintain registers for other asset types. Consider either:

- assigning the role of maintaining the waterbody asset register to that person
- creating a new, similar position responsible for maintaining the waterbody asset register.

In many cases, it will be most efficient to assign the task of maintaining the waterbody asset register to an officer who is already completing this task for other similar asset types such as stormwater drainage. The waterbody asset register will be an additional demand on their time, and thus the person must be resourced to undertake the task.

## 3.5 MANAGE FINANCES

Managing and maintaining waterbodies costs money. The goals of managing waterbody finances are to ensure that:

- appropriate funding is available to manage and maintain waterbodies
- the local government remains financially viable in the long term.

This requires a good understanding of the cost of undertaking works (Section 3.5.1), how to make a case for funding (Section 3.5.2) and how financial asset management occurs in local government (Section 3.5.3).

### 3.5.1 Understanding costs

Understanding the cost of maintaining waterbodies assists in preparing budgets and ensures that resources are efficiently used. However, reliable data on the cost of managing waterbodies is hard to find. This is mainly because:

- local governments use different methods to maintain waterbodies and hence the cost of works varies
- waterbodies vary in condition and hence the cost of achieving the same outcome will vary even when the same maintenance techniques are applied
- waterbodies are maintained to different levels of service and different amounts of money will be required depending on the level of service
- money spent managing waterbodies is often not tracked against individual assets, and thus there is a lack of data to perform a detailed costs analysis.

**The cost of proactive vs. reactive maintenance**

Proactive maintenance is undertaking maintenance to a regular schedule. Proactive maintenance occurs more frequently compared to reactive maintenance and is comprised of simple, quick and easily achieved tasks. Reactive maintenance is undertaking maintenance in response to a major adverse event (e.g. a fish kill) and associated negative publicity (e.g. public complaints or media coverage). Reactive maintenance is less frequent but when it is required, more complex, time consuming and costly compared to proactive maintenance. Proactive maintenance is cheaper than reactive maintenance. Experience from multiple local governments has shown that when an adverse event (e.g. a fish kill) occurs in a waterbody, the cost of cleanup can extend into the hundreds of thousands of dollars and may still not prevent the problem from reoccurring. Undertaking simple, proactive maintenance can extend the usable life of waterbodies, prevent adverse events from occurring as well as avoid the cost of clearing up and thus save costs compared to reactive maintenance. This is despite the fact that proactive maintenance incurs a regular, but small, cost.

**Learning more about the cost of managing waterbodies**

It is important to collect data on all works undertaken to all waterbodies and collect and store the data in the waterbody asset register. Attribute the data to a specific task (e.g. weeding) performed on a specific waterbody. Over time the data collected will increase understanding on the cost of managing waterbodies.

Similarly, testing different maintenance regimes and collecting data on each helps assess the efficiency of works. This can be achieved by establishing several case study waterbodies of a similar character and condition, and undertaking different maintenance regimes to determine the relative strengths and weaknesses of each.

### 3.5.2 Business case

In order to manage waterbodies efficiently and effectively, an appropriate budget is required. Without an appropriate budget, necessary works cannot be performed and the condition of waterbodies will deteriorate leading to an adverse event. Adverse events are costly to rectify, and can divert funds away from other important maintenance tasks (both waterbody related and otherwise).

A business case is a tool for obtaining appropriate funding to manage and maintain waterbodies. A business case is a document or presentation that captures the financial rationale for providing adequate funding for proactive maintenance of a waterbody. The level of detail provided in a business case depends on the amount of information required by stakeholders.

The business case must weigh up the benefits and costs to all stakeholders of various options for managing waterbodies to meet community expectations (including a 'business as usual' and 'do nothing' approach). It must consider the target audience (in this case the councillors, executive officers, managers and program leaders who contribute to budget decisions) and respond to their needs such as financial responsibility, value for money and accountability.

In the case of waterbodies, the aim is to achieve an appropriate level of funding to maintain waterbodies to a certain level of service. The business case should therefore weigh up the potential financial benefits of proactive approaches to waterbody maintenance

against other options and identify how this cost saving will benefit the organisation. A business case should focus on the economic benefits that an appropriate maintenance budget can provide.

Because the business case will weigh up various maintenance regimes, with money spent at different times throughout the lifecycle of the asset, it must account for inflation and the relative value of money over time. Undertaking a net present value analysis is a simple method of doing this.

### 3.5.3 Capitalising assets

Capitalisation is a technique used in accounting to help understand whether an organisation can remain financially sustainable in the future. Assets with a long life and variable expenditure during their life should be capitalised. For example, a road has a high construction cost, comparatively low maintenance cost (e.g. street sweeping, repairing pot holes) and periodic high expenditure (e.g. resurfacing the road). Capitalisation enables the organisation to take a lifecycle view of the asset's costs and plan for future expenditure.

A common misconception is that capitalisation is a tool for securing funding for maintaining assets. This is not its purpose and it will not deliver this. A business case is the appropriate tool to secure funding for maintaining assets.

Waterbodies present a financial risk to local governments when they are not appropriately considered in financial forecasts. Therefore, it is beneficial for local governments to capitalise them. Waterbodies share many of the properties of other long life infrastructures and it is therefore technically possible to capitalise waterbodies. At present, the Australian accounting standards, which govern how local governments undertake accounting, are not conducive to capitalising waterbodies or other green assets. Therefore, while it is desirable for local governments to capitalise waterbodies, it is currently very difficult to do so. Despite this, local governments should investigate how to capitalise waterbodies as it is in their overall financial interest to do so.

For further information on capitalising assets see the:

- *Australian Infrastructure Financial Management Guidelines* (IPWEA, 2010)
- *International Infrastructure Management Manual* (INGENIUM, 2011)
- *Australian Accounting Standards Board Standards for Asset Management* (ANAO, 2010).

## 3.6 PRIORITISE WATERBODIES

### 3.6.1 Developing a process to prioritise waterbodies

Waterbodies vary widely in size, condition, value and catchment pressures. Some waterbodies can be very challenging to manage. Budgets may be insufficient to permit all waterbodies to be managed to a desirable standard. In the context of waterbody management, a prioritisation process can be defined as 'a process for ranking the importance or priority for managing waterbodies according to an agreed set of criteria'. Prioritising waterbodies will ensure that work is undertaken in the most efficient manner possible. Prioritisation can be undertaken at the 'regional' level (e.g. ranking waterbodies according to priority) or at the 'waterbody' level (e.g. ranking key issues and values of individual waterbodies). This section only deals with prioritisation at the regional level. Module 4 *'Maintenance and Operations'* provides guidance on identifying waterbody issues and taking action at the waterbody level.

Whether a local government should embark on a detailed prioritisation process will depend on several factors, including the:

- size and population of the local government area
- number of waterbodies to be managed
- existing level of knowledge of waterbody issues and values.

Small local governments may only have a limited number of staff and a minimal number of waterbodies to manage. In such cases, a dedicated process to prioritise waterbody assets may not be required, or may be a simple matter of consulting with key staff to determine and document the priority waterbodies, issues and management tasks.

Establishing a method to prioritise waterbodies becomes more crucial for larger local governments that are responsible for managing a large number of assets.

Processes for prioritising waterbodies can take many forms. Queensland government has developed an assessment toolbox which provides summaries of the various prioritisation methods available. It is important to choose an assessment tool to best fit your organisation. This section outlines a generic assessment process which can be adapted according to local needs. The process presented here focuses on three key steps:

- GIS analysis (Section 3.6.2)
- consultation and groundtruthing (Section 3.6.3)
- scoring systems (Section 3.6.4).

### 3.6.2 GIS analysis

The first step of incorporating GIS analysis into a prioritisation process is to review the datasets available. This may require some level of data screening or validation to ensure that the datasets are complete and/or suitable for use in the prioritisation process. Once a list of suitable GIS layers has been identified, local government stakeholders should be consulted to identify the levels of GIS analysis that will align with local government's key issues, values and priorities concerning waterbodies.

Some examples of the criteria that could be used within a prioritisation process are provided in Table 3.6. It should be noted that these examples incorporate a combination of data sources, including GIS, field assessment and consultation. Each local government will need to adapt the prioritisation process and choose appropriate criteria according to their individual issues, values, risks, data availability and priorities.

**Think outside the box**

When selecting criteria for use in a GIS prioritisation process, try to think about how this information could be used as a surrogate for ranking a criterion. Examples include:

- in the absence of water quality data, landuse (or proximity to environmentally relevant activities) could be used to represent water quality
- in the absence of data on visitation rates or detailed field records, landuse proximity and waterbody size could be used as a representation of profile within the community.

**Tools should be flexible**

Any GIS tool that is developed should provide flexibility to be updated as more information becomes available. This will ensure that the most up to date information is stored within local government's waterbody asset register.

Table 3.6 Examples of criteria for use in a prioritisation process

| Criteria | Indicators | Data Source/s |
|---|---|---|
| **Water quality** | Proximity of waterbody in relation to environmentally relevant activities<br>Proportion of different landuses within waterbody catchment<br>Modelled nutrient or suspended sediment generation rates<br>Ratio catchment area : volume<br>Comparison to Ecosystem Health Monitoring Program (EHMP) water quality classes<br>Historical water quality issues or complaints | Water quality monitoring<br>Water quality modelling<br>Landuse, zoning<br>Environmentally relevant activities<br>Field assessment<br>Consultation |
| **Environmental risk** | Proximity of waterbody to important wetlands, fisheries habitat etc. | Environmental risk layers or calculators<br>Landuse, zoning<br>Water quality modelling<br>Purpose or function<br>Field assessment<br>Consultation |
| **Community expectations** | Historical issues or complaints<br>Social impact scores or risk ratings | Social impact risk layers or calculators<br>Field assessment<br>Consultation |
| **Hazard reduction** | Field assessment of potential safety or environmental hazards<br>Proximity to potential catchment hazards (e.g. high risk environmentally relevant activities) | Hazard risk assessment calculators<br>Field assessment<br>Landuse, zoning<br>Environmentally relevant activities |
| **Biodiversity** | Proximity to protected areas, wetlands, koala protection areas etc.<br>Proximity to conservation areas<br>Potential for habitat enhancement (e.g. connectivity)<br>Conservation (environmental) inventory scores | Regional ecosystems<br>Koala habitat<br>Conservation or environmental classifications<br>State government wetland mapping |
| **Profile/ services/ service levels** | Proximity of waterbody in relation to residential or commercial areas and parkland or open space<br>Actual vs. desired service levels<br>Levels of visitation<br>Class vs. condition | Landuse, zoning<br>Parks hierarchy<br>Park category (local, district, region)<br>Size (surface area)<br>Visitation rates |
| **Cost to manage** | The cost to manage waterbodies to a pre-determined level of service | Parks hierarchy<br>Desired levels of service |

### 3.6.3 Consultation and groundtruthing

GIS analysis is a good way of quickly prioritising a large number of waterbodies, based on a set of agreed criteria. However, there are many issues that cannot be picked up by GIS analysis (e.g. the presence of declared weeds). Therefore a simple desktop assessment should never be undertaken in isolation. Similarly, if groundtruthing and consultation are completed without a GIS component potential issues associated with location will be missed. A combined approach of desktop assessment, groundtruthing and consultation is necessary.

Stakeholder consultation will allow any issues that have not been picked up during the GIS process to be identified and discussed, based on local knowledge and expertise. This could be achieved in a stakeholder workshop or by documenting the outcomes and requesting written or verbal feedback. Groundtruthing should focus on assessing several waterbodies that are representative of a range of issues and values. The outcomes of the groundtruthing and consultation process should be compared to the findings of the GIS prioritisation and the database updated accordingly.

### 3.6.4 Scoring systems

Two examples of scoring methods to prioritise waterbodies are provided below. These examples are provided to illustrate how a scoring system could be devised. Many scoring systems exist and the methodology chosen should reflect the needs, data and priorities of the local government.

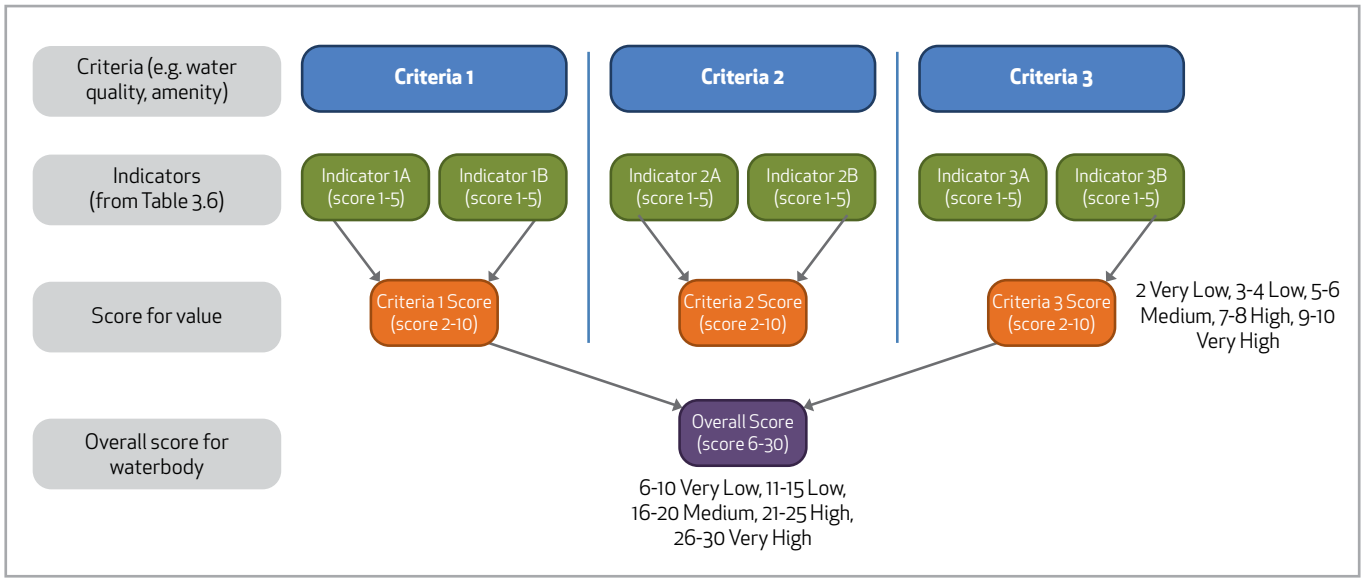
**Option 1: Scoring based on priority criteria**
(amended from DesignFlow, 2012 and Limnologic, 2012)

- Step 1 - Select appropriate criteria (Table 3.6 provides some examples) that will inform the prioritisation based on the local government's issues, priorities, values and available data.
- Step 2 - For each criterion, select several indicators (green in Figure 3.2) on which to rank the criteria.
- Step 3 - Give each indicator a score from 1 to 5 (5 being most valued) for each waterbody based on how well the waterbody performs at that indicator.
- Step 4 - Sum each indicator score within each criterion to give a score for those criteria from 2 to 10 (orange in Figure 3.2).
- Step 5 - Combine the criterion scores obtained in Step 4 to give an overall score from 6 to 30 for the waterbody (purple in Figure 3.2)
- Step 6 - Each criteria score and the overall score can then be ranked qualitatively (e.g. an overall score of 6 to 10 may be a very low priority, 11 to 15 a low priority and so on).

Once completed for each waterbody, the waterbodies are prioritised according to the chosen criteria.

In this option, a weighting could be applied to each criteria to reflect those which are more or less important.

**Figure 3.2 Scoring of waterbodies based on priority criteria**



## Option 2: Scoring based on value for money

The purpose of this method is to prioritise waterbodies on the basis of the value for money that maintenance provides. This ensures that funds are spent where they are most effective at preventing the condition of waterbodies declining. This method is based upon the following principles:

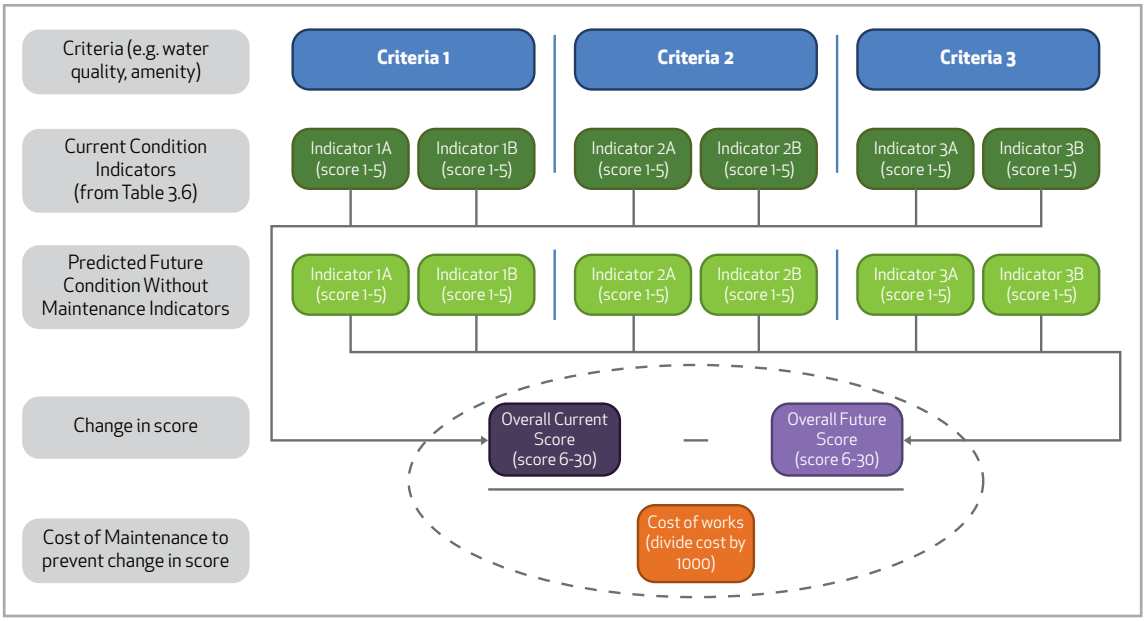
1. without maintenance waterbodies will decline in condition
2. funding for maintaining waterbodies is limited
3. as a waterbody declines in condition, the cost of maintaining/rectifying the waterbody increases (Overview, Figure 0.1)

This method allows waterbodies of a distinct character and maintenance regime to be compared. For example, the scoring system can compare spending large amounts of money rectifying a very poor condition but high profile waterbody to spending a much smaller amount of money to maintain several other high profile waterbodies in their existing condition.

- Step 1 - Select appropriate criteria (Table 3.6 provides some examples) that will inform the prioritisation based on the local government's issues, priorities, values and available data.
- Step 2 - For each criterion, select several indicators (dark green in Figure 3.3) on which to rank the criteria.
- Step 3 - Give each indicator a score from 1 to 5 (5 being most valued) for each waterbody. Base this on how well the waterbody performed in that indicator.
- Step 4 - Sum each indicator score to give an overall score from 6 to 30 for the waterbody (dark purple in Figure 3.3).
- Step 5 - Estimate the likely condition of the waterbody in 12 months time without maintenance. Repeat Steps 3 and 4, and score each indicator based on the predicted condition of that indicator in 12 months time with no maintenance undertaken on the waterbody (light green in Figure 3.3). Then sum the likely indicator scores to calculate the likely future unmaintained score (light purple in Figure 3.3).
- Step 6 - Subtract the likely future unmaintained score (light purple in Figure 3.3) from the current score (dark purple in Figure 3.3).
- Step 7 - Estimate the cost to maintain the waterbody for 12 months (orange in Figure 3.3) and divide the cost by 1000 (e.g. 12 month maintenance cost is $50,000 therefore the value in the orange box is 50)
- Step 8 - Divide the figure obtained in Step 6 by the value obtained in Step 7. The result is a waterbody value score which can be used to compare values.
- Step 9 - Repeat Steps 3 to 8 for each waterbody (and possibly for different maintenance scenarios within a single waterbody)
- Step 10 - Compile the waterbody value scores and rank from highest value to lowest value.

This provides a list of waterbodies in order of priority based on value for money.

**Figure 3.3 Value for money based scoring of waterbodies**



## 3.7 REVIEW AND REVISE

The waterbody management needs of local government change over time. Even the best planned asset management structure may develop faults (e.g. inaccurate data). It is therefore important to continually review and revise waterbody asset management procedures. How this review is undertaken will vary depending on which aspect of waterbody management is to be reviewed. For example, if reviewing roles, responsibilities and resources, a simple survey may suffice, whereas if checking the accuracy of the asset register a random set of data may be audited to check its accuracy.

Regardless of the methods applied, reviewing and revising waterbody management processes will help the local government to efficiently and effectively manage its waterbodies, and respond to changing organisational environments and requirements for managing waterbodies.

## 3.8 WORKED EXAMPLE

This worked example demonstrates how a hypothetical local government may go about managing their waterbodies in a coordinated fashion.

### 3.8.1 Setting

Sunnyside Council is a small to medium sized local government in South East Queensland. It contains several creek systems and one river. The lower reaches of these catchments are typically urban. The upstream reaches are a combination of rural, forest and conservation. There are a large number of waterbodies in Sunnyside Council. Approximately 70% are on private land, with the remaining 30% on Council land.

Due to a series of adverse environmental incidents in Council managed waterbodies, including a fish kill, Sunnyside Council recently undertook to improve how it manages its waterbodies. The two main aims were to achieve acceptable environmental outcomes and avoid unnecessary cost to the community.

### 3.8.2 Identify roles, responsibilities and resources

Sunnyside Council had a reactive approach to waterbody management and only responded when incidents occurred, such as a fish kill. This reactive approach was expensive. In addition, the works undertaken by one department sometimes caused follow up problems for another department. In one instance, one department removed aquatic weeds, which resulted in the accidental removal of aquatic macrophytes. Replanting these aquatic macrophytes was expensive and impacted on the budget of another department. To help coordinate the waterbody management activities across different departments, Sunnyside Council decided to clarify its waterbody roles and responsibilities.

Sunnyside Council decided to undertake this process internally as they are a small local government with good interdepartmental relationships. The Environmental Planning Branch led this process.

A workshop was convened to discuss who was undertaking which tasks and a task checklist circulated to relevant staff in the following departments:

- Strategic Planning
- Development Assessment
- Stormwater Maintenance
- Parks and Natural Areas Maintenance
- Environmental Planning
- Finance
- Pest Management
- Stormwater and Flood Plain Management.

The results of the workshop and task checklist were documented and a gap analysis carried out (Table 3.7).

From the gap analysis presented in Table 3.7 Sunnyside Council determined that it was performing relatively well at planning policy development (although room for improvement still existed). However, they determined that most improvement could be made through improving the way existing Council assets were managed. In particular it became apparent that no single department was considering the waterbody as a whole, and that while most tasks were covered, they were not being addressed in a coordinated manner. It was decided that overall responsibility for maintenance and rectification of waterbodies should be given to a single department, who would sub-contract work to the department with the most appropriate skill set, or engage a contractor. After much discussion, the Stormwater and Flood Plain Management department agreed to take on this role, on the condition that they were to be appropriately funded, resourced and staffed.

Table 3.7 Sunnyside Council roles and responsibilities gap analysis

| **NO GAP: Task is assigned and being completed** | **GAP 1: Task is assigned but only partially completed** | **GAP 2: Task is assigned but not completed** | **GAP 3: Task is not assigned and not being completed** |
|---|---|---|---|

| **Task** | **Department** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Strategic Planning | Development Assessment | Stormwater Maintenance | Parks and Natural Areas Maintenance | Environmental Planning | Finance | Pest Management | Stormwater and Flood Plain Management |
| **Stage: Planning for physical works and policy development** | | | | | | | | |
| Flood modelling and management | | | | | | | | |
| Stormwater modelling and management | | | | | | | | |
| Design of new waterbodies | | | | | | | | |
| Modification of design for existing waterbodies (renewal/upgrade) | | | | | | | | |
| Strategic assessment of waterbody condition (regional) | | | | | | | | |
| Asset handover – conditions and constraints | | | | | | | | |
| Research and design of best practice water sensitive urban design (WSUD) infrastructure | | | | | | | | |
| Research and design of best practice waterbody design and construction | | | | | | | | |
| Planning for removal of 'end-of-life' infrastructure | | | | | | | | |
| Strategic assessment of waterbody management and resources (regional) | | | | | | | | |
| Policy development for waterbodies | | | | | | | | |
| Assessment of development related waterbody proposals | | | | | | | | |
| Construction supervision | | | | | | | | |
| Preparation of a business case for capital spend | | | | | | | | |
| **Stage: Ongoing maintenance and inspections** | | | | | | | | |
| Aquatic weed spraying | | | | | | | | |
| Aquatic weed harvesting | | | | | | | | |
| Aquatic macrophyte revegetation/planting | | | | | | | | |

| Task | Department | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Strategic Planning | Development Assessment | Stormwater Maintenance | Parks and Natural Areas Maintenance | Environmental Planning | Finance | Pest Management | Stormwater and Flood Plain Management |
| Riparian/edge weed spraying or removal | | | | | | | | |
| Riparian and edge revegetation/planting | | | | | | | | |
| Mosquito monitoring and control | | | | | | | | |
| Routine water quality monitoring | | | | | | | | |
| Routine algal monitoring | | | | | | | | |
| Reactive water quality or algal sampling (e.g. in response to complaints, spills, fish kills) | | | | | | | | |
| Sediment removal or dredging within waterbody | | | | | | | | |
| Litter monitoring and removal | | | | | | | | |
| Inspection and maintenance of surface gross pollutant traps | | | | | | | | |
| Inspection and maintenance of underground gross pollutant traps | | | | | | | | |
| Inspection and maintenance of inlet structures | | | | | | | | |
| Inspection and maintenance of outlet structures | | | | | | | | |
| Inspection and maintenance of amenities | | | | | | | | |
| General inspection of overall waterbody condition | | | | | | | | |
| Inspection and management of batter scour | | | | | | | | |
| Inspection and management of pests (e.g. birds, fish) | | | | | | | | |
| Inspection and management of water levels | | | | | | | | |
| **Stage: Renewal and rectification** | | | | | | | | |
| Excavation to increase storage capacity or re-size sediment basins | | | | | | | | |
| Installation of additional sediment capture infrastructure (e.g. gross pollutant traps) | | | | | | | | |

| Task | Department | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Strategic Planning | Development Assessment | Stormwater Maintenance | Parks and Natural Areas Maintenance | Environmental Planning | Finance | Pest Management | Stormwater and Flood Plain Management |
| Waterbody reprofiling/re-sizing | | | | | | | | |
| Modification of existing hydraulic structure (e.g. to optimise water levels and flushing | | | | | | | | |
| Installation of new hydraulic structures (e.g. inlet and outlet structures) | | | | | | | | |
| Installation of erosion protection infrastructure | | | | | | | | |
| Construction of flow redirection paths | | | | | | | | |
| Construction of access ramps (for weed harvesting) | | | | | | | | |
| Installation of permanent fencing/vegetation to restrict access | | | | | | | | |
| Installation of temporary fencing | | | | | | | | |
| Installation of signage | | | | | | | | |
| Excavation of adjacent areas for sediment drying/compacting | | | | | | | | |
| Modification or removal of bird habitat | | | | | | | | |
| Removal of culling of pests (e.g. birds, fish) | | | | | | | | |
| Acid sulfate soil treatment (e.g. capping, replacement, remediation) | | | | | | | | |
| Sediment treatment within the waterbody (e.g. sediment capping, aeration, recirculation) | | | | | | | | |
| Installation of other water quality treatment infrastructure (e.g. floating wetlands) | | | | | | | | |
| Installation of WSUD infrastructure (e.g. swales, bioretention systems, sediment basins) | | | | | | | | |

### 3.8.3 Identify and assess waterbodies

Next, Sunnyside Council identified and assessed its waterbodies. Many waterbodies were already known about because works were being undertaken on them. Others were identified that Council was previously not aware of. The process of identifying waterbodies included inspecting:

- GIS information
- aerial imagery (e.g. Nearmap, Wetland*Maps*)
- development applications
- as-constructed drawings.

Sunnyside Council chose to simply characterise its waterbodies to begin the process. The process of characterising waterbodies included:

- recording data from sources used to identify waterbodies (see above)
- field inspections.

The data captured on each waterbody included:

- waterbody identifier
- waterbody name
- location
- catchment/basin
- connectivity
- waterbody fringe area
- waterbody formation
- current use
- responsibility
- age
- waterbody size
- general description
- park category features
- water type
- water quality
- waterbody floor
- general field observations
- hydraulic function
- aquatic habitat
- profile/amenity

A final year engineering student was engaged by the Stormwater and Flood Plain Management department to undertake these tasks under the guidance of more senior staff. This provided a cost effective resource.

A total of 107 waterbodies were identified on Council land.

### 3.8.4 Prioritise waterbodies

When it came to prioritising waterbodies, Sunnyside Council initially considered prioritising their waterbodies based upon the value for money that maintenance of each waterbody would provide (see Figure 3.3). This was Sunnyside Council's preference because it aligned well with their goals of achieving acceptable environmental outcomes, and minimising cost to the community. Unfortunately, with little experience managing waterbodies, except for when responding to adverse events, Sunnyside Council did not have access to the cost data required. Therefore, Sunnyside Council chose to prioritise their waterbodies on the basis of the value they provide to the community (see Figure 3.2). By doing this they would be able to begin proactive maintenance of high priority waterbodies, collect data and later return and prioritise again based upon value for money.

Sunnyside Council chose to prioritise their waterbodies using three criteria. Two indicators were chosen for each criterion (Table 3.8).

Of the 107 waterbodies identified, the prioritisation for three is demonstrated in Table 3.9.

Table 3.8 Criteria and indicators for prioritisation

| Criteria | Indicator | Type | Indicator of high score (5) | Indicator of low score (1) |
|---|---|---|---|---|
| **Water quality** | Predominant catchment landuse | GIS | Low impact landuse. Undeveloped. | Industrial. Heavily developed. |
| | Environmentally relevant activities in proximity | GIS | No environmentally relevant activities in catchment. | Many environmentally relevant activities in catchment. |
| **Habitat provision** | Mapped vegetation areas | GIS | High quality vegetation present in high quantity. | No or poor quality vegetation present. |
| | Assessment of habitat | Inspection | Habitat present. | No habitat present. |
| **Amenity/profile** | Proximity to residential landuse | GIS | Residential landuse in close proximity. | No residential landuse in close proximity. |
| | Qualitative visual assessment | Inspection | Aesthetically pleasing. Heavily used. Easy access. | Aesthetically unpleasing. No sign of use. No access. |

Table 3.9 Prioritisation of three waterbodies

| Waterbody | Criteria | Indicator | Indicator score (1-5) | Indicator score (2-10) | Criteria Priority* | Waterbody Score(6-30) | Waterbody Priority** |
|---|---|---|---|---|---|---|---|
| **Waterbody 1** | Water quality | Predominant catchment landuse | 3 | 5 | Medium | 19 | Medium |
| | | Environmentally relevant activities in proximity | 2 | | | | |
| | Habitat provision | Mapped vegetation areas | 4 | 6 | Medium | | |
| | | Assessment of habitat | 2 | | | | |
| | Amenity/ profile | Proximity to residential landuse | 4 | 8 | High | | |
| | | Qualitative visual assessment | 4 | | | | |
| **Waterbody 2** | Water quality | Predominant catchment landuse | 2 | 3 | Low | 11 | Low |
| | | Environmentally relevant activities in proximity | 1 | | | | |
| | Habitat provision | Mapped vegetation areas | 3 | 4 | Low | | |
| | | Assessment of habitat | 1 | | | | |
| | Amenity/ profile | Proximity to residential landuse | 2 | 4 | Low | | |
| | | Qualitative visual assessment | 2 | | | | |

| Waterbody | Criteria | Indicator | Indicator score (1-5) | Indicator score (2-10) | Criteria Priority* | Waterbody Score(6-30) | Waterbody Priority** |
|---|---|---|---|---|---|---|---|
| **Waterbody 3** | Water quality | Predominant catchment landuse | 4 | 9 | Very High | 23 | High |
| | | Environmentally relevant activities in proximity | 5 | | | | |
| | Habitat provision | Mapped vegetation areas | 5 | 9 | Very High | | |
| | | Assessment of habitat | 4 | | | | |
| | Amenity/ profile | Proximity to residential landuse | 1 | 5 | Medium | | |
| | | Qualitative visual assessment | 4 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| * | 2 = Very Low | 3-4 = Low | 5-6 = Medium | 7-8 = High | 9-10 = Very High |
| ** | 6-10 = Very Low | 11-15 = Low | 16-20 = Medium | 21-25 = High | 26-30 = Very High |

The results of Council's prioritisation of their 107 waterbodies are shown in Table 3.10

**Table 3.10 Results of Council's waterbody prioritisation**

| Priority | Number of waterbodies |
|---|---|
| **Very high** | 7 |
| **High** | 31 |
| **Medium** | 54 |
| **Low** | 10 |
| **Very low** | 5 |

## 3.8.5 Managing finances

**Collecting maintenance data**

As discussed in Section 3.8.4, Sunnyside Council will collect maintenance data in the future to facilitate maintenance planning and allow costs to be factored into future prioritisation.

**Developing a business case**

In order to appropriately resource their Stormwater and Flood Plain Management department to manage waterbodies, Sunnyside Council decided to develop a business case for funding. Sunnyside Council recognised that developing a business case which compared their current reactive maintenance approach with a more proactive, appropriately resourced approach was the suitable method to make a case for appropriate funding.

For their business case Sunnyside Council had limited cost data on proactive maintenance, but plenty of data on the cost of reactive maintenance. Sunnyside Council contacted other local governments in the region with experience in proactively maintaining waterbodies. These other local governments were able to provide Sunnyside Council with cost data on proactive maintenance.

Using this data, Sunnyside Council undertook a net present value (NPV) assessment of the cost of maintaining their waterbodies reactively versus proactively for the next 25 years. The NPV demonstrated that even when providing for additional human resources, proactive maintenance stood to save Council many millions of dollars over 25 years.

The business case was presented to Council's Infrastructure Committee. Although the Committee was concerned about the total budget requested they agreed to fund 50% of the required budget the following financial year, with a view to fully fund a year later if on-ground results could be demonstrated.

**Capitalising waterbodies**

Sunnyside Council recognised that in order to be sustainable, capitalising waterbodies would be an important task. As Australian accounting standards are currently not conducive to doing this, Council have decided to focus their resources on other tasks and will return to capitalise their waterbodies in the future.

## 3.8.6 Review and revise

Having just completed their first attempt at managing waterbodies, Sunnyside Council intends to review and revise elements of the process in the near future including:

- adding more information to the asset register
- collecting data on the cost of maintaining waterbodies
- continuing to seek an appropriate budget for maintaining waterbodies.

## 3.9 REFERENCES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