Guidelines for the design and construction of swimming pools in remote areas

Acknowledgements:

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Acronyms and abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ASGC	Australian Standard Geographical Classification
AS	Australian Standards
AS/NZS	Australian / New Zealand Standards
CDEP	Commonwealth Development Employment Project
DE	Diatomaceous earth
DoHW	Department of Housing and Works

FaHCSIA	Department of Families, Housing, Community Services & Indigenous Affairs
FW	Filtered water
kL	Kilolitres
kPa	Kilopascals
L/p/d	Litres per person per day
LTS	Learn to swim
MoH	Minister of Housing
m2	Square metres
m3	Cubic metres
NSW	New South Wales
NT	Northern Territory
NWQMS	National Water Quality Management Strategy
OH&S	Occupational Health and Safety
PIRA	Pools in Remote Areas
PWTP	Pool water treatment plant
Qld	Queensland
RASPP	Remote Aboriginal Swimming Pool Project
RO	Reverse Osmosis
RLSS	Royal Life Saving Society
SA	South Australia
SPC	Swimming pool committee
SW	Soiled water
SOPs	Standard operating procedures
UF	Ultra filtration
Tas	Tasmania
UV	Ultraviolet
uPVC	Unplasticised Polyvinyl chloride, a thermoplastic polymer.
UVR	Ultraviolet radiation
Vic	Victoria

1 Introduction

Procuring a swimming pool facility is a complex and often difficult task, especially in remote communities. Many resources and skills are required, and the time needed to properly plan and deliver a swimming pool is easily underestimated (see Figure 1.1). The Royal Life Saving Society – Australia's ***Review of Swimming Pools in Remote Areas of the NT*** (RLSSA 2011) revealed that many communities made errors when approaching the swimming pool procurement process, and the ensuing problems were highlighted. Through extensive consultation with stakeholders from 18 remote communities, as well as local, territory and federal government agencies, the report investigated the issues and opportunities of 18 swimming pools in remote areas of the Northern Territory. The pools were mostly in remote Indigenous communities, although some were in small regional towns. The document concluded that remote area swimming pools are a core community service with potential benefits that reach beyond the simple recreational swimming opportunities for children and interested adults, and that guidelines for the design and construction of swimming pools should be developed as a high priority. These suggestions formed the basis for these guidelines.

Table 1.1 Examples of poorly planned swimming pool facilities

Example 1

In a remote Australian community, there is a swimming facility that includes an empty pool. It sits apart from the main pool and toddler pool, and is rarely used. When the community was planning the facility, someone suggested that it would be a good idea to have a small pool, separate from the other pools, that the community elders could use as a pleasant, cool meeting point in hot weather. However, it is not known why the pool is not used; perhaps it is because the elders do not want to bathe in public, or because the pool has no shade, is quite deep and has narrow, steep steps without suitable handrails.

Example 2

A remote community recently opened a 25 metre pool and toddler pool. The community made many sacrifices and invested substantial resources in this new pool, and the opening ceremony was a proud and satisfying occasion. Later, there was disappointment when the pool filters were backwashed and wastewater was found running from the pool's plant area down a street toward the community store. No allowance had been made for wastewater disposal.

Example 3

A newly built pool facility is closed most of the time because of lack of funds for lifeguards and other operating costs.

These guidelines aim to ensure the sustainability of future public swimming pools in remote areas by providing a best practice framework for the entire process, from planning through to construction and handover to the community. Councils and communities may use these guidelines in their decision-making processes.

Two previous publications, the ***National Indigenous Infrastructure Guide*** (FaHCSIA 2010) and the ***National Indigenous Housing Guide*** (FaHCSIA 2007), are important readings for communities considering building a new swimming pool facility, and will complement these guidelines. These three publications focus on appropriate and sustainable infrastructure based on six key principles:

- access and equity
- environmental health
- health and safety
- appropriateness
- affordability
- sustainable livelihoods.

These principles are as relevant to community swimming pools as they are to other infrastructure. There is ample evidence that, where these principles are followed, the swimming pool facilities have significant positive impacts on remote communities (NCEPH 1999). Swimming pools are linked to a variety of positive health outcomes including improvements in general wellbeing, as well as reductions in eye, ear and sinus infections. Swimming pools in remote communities also provide children with the opportunity to learn valuable and potentially lifesaving swimming skills, and can allow healthy sport and recreation when high heat and humidity may not be suitable for other activities, such as football, tennis and basketball.

The RLSSA report confirms that there is evidence of community benefit, but also acknowledges that:

> *… without a coordinated response to managing swimming pools in remote areas, talk of health, social or economic benefits [is] largely academic, as swimming pools must be accessible, functioning and well integrated into community life for any such benefits to be realised. (RSSLA 2011)*

The report implies that, in addition to needing coordinated management of swimming pools, there must be appropriate design and construction processes, and community wellbeing – both local and in the wider sense – is adversely affected by inappropriate or poorly designed and built swimming pools. These guidelines aim to make communities aware of the pathways and pitfalls in the swimming pool procurement process.

Swimming pool facilities not only involve the actual swimming pools, but also the associated infrastructure, such as ablutions, change rooms, first-aid rooms, plant rooms, shade structures, power and sewerage, air-handling systems and car parking. These guidelines concentrate on

the swimming pools themselves, but the ***National Indigenous Infrastructure Guide*** (FaHCSIA 2010) and ***National Indigenous Housing Guide*** (FaHCSIA 2007) are both valuable resources for communities to use when procuring these related facilities. The infrastructure guide is relevant to the provision of water, energy, telecommunications and other services that are essential elements in the design and construction of community swimming pools in remote areas. The housing guide is specific to Indigenous housing, but it is also a useful resource for anyone involved in building in remote communities. Both guides were developed by the Australian Government in consultation with communities, specialist consultants, builders, architects and health workers, and are supported by research and technical standards.

1.1 Using these guidelines

These guidelines are intended to provide an overview of the process and identify critical stages. They are not a step-by-step action plan, but a recommended process. Although reference is made to some technical issues, the guidelines are not a technical manual. Swimming pool facilities involve many complex technical elements, and it would not be practical to recommend one – or even several – technical designs as the best. The best technical 'solution' for a community will be achieved by following a carefully considered process, and involving the right people and organisations – that is, those who are experienced in successfully delivering swimming pool facilities to remote communities.

Every community will have its own particular circumstances and the guidelines are a 'loose fit' framework that can be modified to suit certain circumstances.

The additional reading lists at the end of each section provide valuable supporting information, and community representatives are encouraged to review the literature before starting the planning stage.

These guidelines include the following sections:

- Chapter 1: Introduction. This section gives background information on swimming facility procurement in remote communities and why it is important to have separate guidelines for this process. It also explains how to use these guidelines.

- Chapters 2–5: Stages 1–4. These chapters detail the processes for each of the four stages of pool procurement.

- Appendixes. Appendixes A–F contain additional data, including case studies; information on water play areas; and samples of preplanning reports, duty rosters, an operations manual contents page and an asset register.

- Bibliography. The bibliography includes a comprehensive list of Australian codes and standards, all the references used in these guidelines, as well as some other useful reading materials.

1.2 Stages for swimming pool procurement

These guidelines identify four key stages in the procurement of a swimming pool, which are summarised in Table 1.1. Figure 1.1 provides more details about each of the four stages.

Table 1.1 Summary of the stage objectives for swimming pool procurement

Stage	Objectives
1 – Preplanning	To identify and quantify the existing community situation and needs, and predict trends and future needs To decide whether to proceed to a more detailed analysis (ie Stage 2 – Feasibility), or abandon or defer the swimming pool proposal
2 – Feasibility	To thoroughly test the viability of the swimming pool proposal, so that a decision to proceed to detailed design and construction is based on objective facts and is in the community's best interests
3 – Design and construction	To design and construct a swimming pool facility that fully reflects the needs of the community, and supports the principles of access and equity, environmental health, health and safety of community members, appropriateness, affordability and sustainability
4 – Conclusion	To ensure that: • project objectives have been met • all parties have complied with their contractual obligations • ongoing service, maintenance and warranty arrangements are in place • critical documentation has been prepared and delivered • the facility has been handed over to properly trained swimming pool management and staff

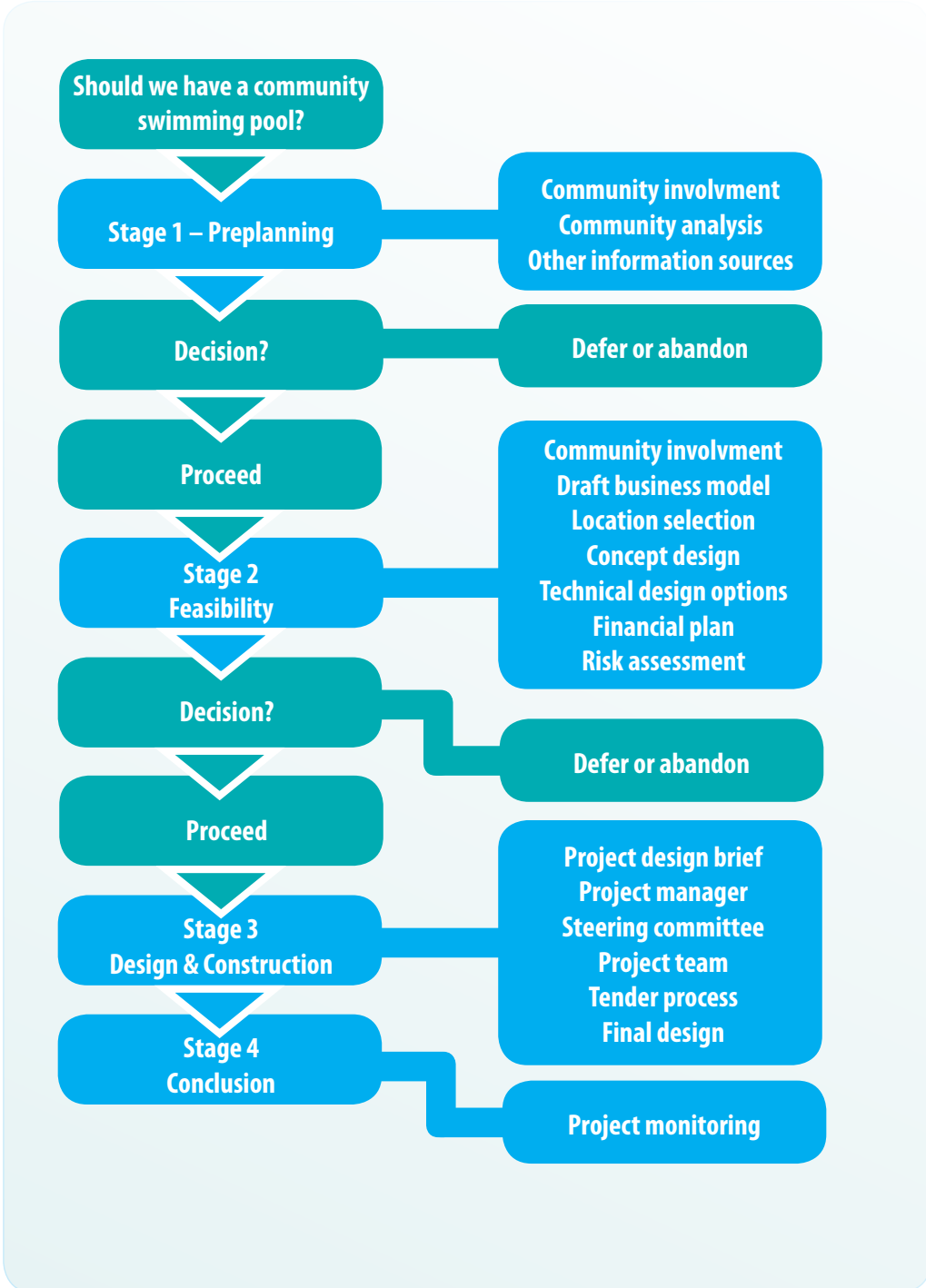


Figure 1.1 Stages for swimming pool procurement

1.3 Definitions

1.3.1 Remote community

The 'remoteness' class of the Australian Standard Geographical Classification (ASGC), used by the Australian Bureau of Statistics (ABS), comprises five categories that identify a region in Australia as having a particular degree of remoteness. The categories range from 'major cities of Australia' to 'very remote Australia'. These guidelines relate to communities in the 'remote' and 'very remote' categories.

The majority of remote and very remote communities have a largely indigenous population. People living in remote Indigenous communities may experience more difficulties than other Australians when trying to access basic housing, infrastructure and community services, due to their isolation from large population centres. Access to a community swimming pool is a fundamental expectation of most Australians, yet many remote communities have no swimming facility, and children resort to swimming in a range of dangerous and unhealthy alternatives, such as creeks, waterholes and tanks.

The ABS reported that, in 2006, approximately 80 000 people lived in 1112 discrete Aboriginal and Torres Strait Islander communities in remote and very remote areas of Australia. Of these 80 000 people, 26% lived in one of the 14 communities with a population of at least 1000, such as Yuendumu, Northern Territory, and Hope Vale, Queensland. A further 41% lived in communities with between 200 and 1000 residents, and 20% were in communities with between 50 and 199 residents. Nearly 13% of people lived in 838 communities with a population of less than 50 people (see Figure 1.2).

Source: ABS (2006)

POPULATION DISTRIBUTION, REMOTE COMMUNITIES, BY SIZE OF COMMUNITY - 2006

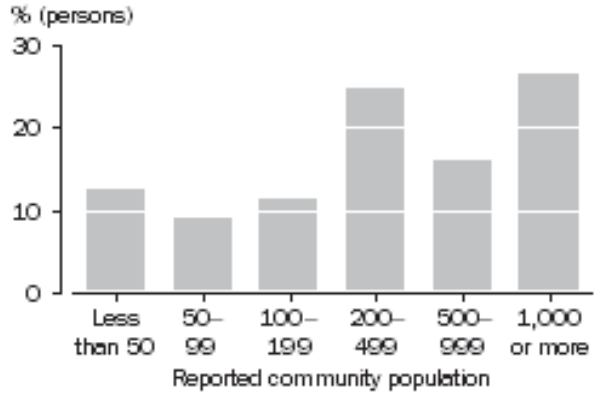


Figure 1.2 Population Distribution, Remote Communities by Size of Community – 2006 – source AB

Remoteness is not only a matter of distance from major city centres. Circumstance is also relevant; for example:

- Local resources. Suppliers of important resources may not exist or, collectively, may not have the necessary skills, materials or equipment to deliver the swimming pool.
- Seasonal conditions. Some communities are remote because they are isolated and inaccessible by road for many months in the northern Australian wet season.
- Transport. Some communities are only accessible by water (ferry or barge) or unimproved, dry weather–only roads. This makes these communities vulnerable to the uncertainties of weather conditions, and limits the type of equipment and materials that can be delivered.

These guidelines were produced with the aim of facilitating community swimming pool procurement in remote communities, but the principles set out in these guidelines have wide application, and can also be used to guide procurement in more populated, less remote areas of Australia.

1.3.2 Public swimming pool

The definition of a public swimming pool – that is, a pool to which these guidelines apply – is contained in various codes produced by state and territory governments. Definitions vary, but all are consistent in excluding pools that are used solely for private or domestic purposes. Every other swimming pool or spa, especially community facilities, is a public swimming pool for the purposes of regulations, and for these guidelines.

1.3.3 Water play area

A water play area (WPA) is a collection of water features on an area that, although wet when in use, does not hold water. Therefore, WPAs do not have the same functional and risk characteristics as swimming pools.

1.4 Useful terms

Codes	A set of rules, design regulations or standards that outline the responsibilities of a supplier to comply with proper practices.
Infrastructure	The permanent buildings and technical structures that support a community, such as roads, water supply, sewers, power grids, telecommunications and swimming pools.
Procurement	The acquisition of appropriate goods or services at the best possible total cost of ownership that best meet the needs of the purchaser.
Warranty	A written assurance that the product or service will be provided or will meet certain specifications.

1.5 References and further reading

ABS (Australian Bureau of Statistics) (2006). ***Community Housing and Infrastructure Needs Survey***, ABS, Canberra.

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2007). ***National Indigenous Housing Guide***, FaHCSIA, Canberra.

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2010). ***National Indigenous Infrastructure Guide***, FaHCSIA, Canberra.

NCEPH (National Centre for Epidemiology and Population Health) (1999). ***Swimming Pools in Remote Indigenous Communities,*** NCEPH, Canberra.

NHMRC (National Health and Medical Research Council) (2008). ***Guidelines for Managing Risks in Recreational Water***, NHMRC, Canberra.

RLSSA (Royal Life Saving Society – Australia) (2011). ***Review of Swimming Pools in Remote Areas of the NT***, RLSSA, Broadway.


100'
FIBER GLASS TAPE

2 Stage 1 – Preplanning

Stage objectives:
To identify and quantify the existing community situation and needs, and predict trends and future needs
To decide whether to proceed to a more detailed analysis (i.e. Stage 2 – Feasibility), or abandon or defer the swimming pool proposal

Communities often begin the procurement process without having a clear and consistent idea of exactly what the community needs and wants. If the majority of the community does want a swimming pool, it is still unlikely that there will be a common opinion on location, size, management and financial responsibility.

If a community asks 'Do we want a swimming pool?' without first completely understanding the issues and options, the procurement process becomes impractical and may waste valuable resources and alienate people.

Preplanning will enable the community to prove or add definition to the abstract idea of a swimming pool, and help address potential problems such as if:

- there is no suitable location for the swimming pool
- there is insufficient water or power supply
- there is opposition to a swimming pool from a significant proportion of the community
- there is no identified source of ongoing operation funding.

Preplanning helps avoid wasting time and money on detailed feasibility, design or even construction, if a swimming pool is not a viable option for a community.

A better question for the community in the first stages of consideration is 'Do we want to conduct or commission a study into whether we can and should have a swimming pool?' This is addressed in this chapter of these guidelines.

Preplanning should be based on needs. It aims to identify and, as much as possible, quantify the existing community situation and needs, and predict trends and future needs (e.g. population growth). At the end of Stage 1, the community should understand whether to proceed to Stage 2 (Feasibility), or to abandon or defer the swimming pool proposal. Importantly, preplanning should also aim to improve the community's understanding of what is required to open and maintain a swimming pool facility, such as how it would operate and what costs would be

involved. If there is any misunderstanding – and there often is – then community support for a swimming pool will be difficult to determine.

2.1 Community involvement

> *'Informed decision making that considers the local, environmental, social, human and financial contexts … requires local involvement.'* (FaHCSIA 2010)

Community needs cannot be identified without involving the community. In the preplanning stage, this means involving community members to develop an understanding of what needs are important for a swimming pool facility. When the needs are identified, then the community can define, in nontechnical language, the type of swimming pool facility that should be considered.

The benefits of involving the community, together with appropriate techniques, are discussed in detail in Chapter A1 of the ***National Indigenous Infrastructure Guide*** (FaHCSIA 2010). This guide recommends integrated community involvement at all stages of the project, particularly at the outset.

2.1.1 Swimming pool committee

The first step in involving the community is to establish a swimming pool committee (SPC), with a chair and partner (e.g. a nongovernmental or private organisation, local government). This committee would be made up of interested and experienced community members who would be responsible for and guide the preplanning process. It would also provide feedback to other stakeholders such as the shire, land council or funding body.

The SPC should nominate a representative organisation to act on behalf of the members. The partner organisation must be an incorporated body, because insurers, funding agencies and government departments will usually deal only with incorporated bodies. Also, the rules of association that govern an incorporated body will be useful guidelines for conducting SPC business. Other than working under an incorporated body, there is no preferred form or make-up for an SPC.

Preplanning is a form of information gathering and sharing that can be unpredictable in duration and complexity. The time and effort that is required of SPC members should not be underestimated. Ideally, there should be several members to help share the workload, and members must be prepared for what could be a lengthy involvement. If it is a voluntary position, then SPC members should be reimbursed for travel and other expenses to avoid being personally out of pocket, which will discourage people from volunteering. The SPC may form part of the steering committee for the design and construction of the pool, as outlined in Section 4.3 of these guidelines.

2.1.2 Preplanning process leadership

Some remote communities may find people with the skills and capacity to carry out the preplanning within the community or the shire office. Other communities may need assistance from external agents to gather information or act as a facilitator. If external assistance is needed, the consultant would work with and under the guidance of the SPC. However, either way, it is advisable to appoint an independent (external) consultant to analyse the information. A report that summarises the conclusions of the preplanning stage must be prepared and presented to the community. This task may also be carried out by an external consultant on behalf of the SPC.

Local government, and state, territory and federal agencies are familiar with consultants who work in this area. Cross-cultural communication can be difficult and, if consultants are employed at this stage, they should be appreciative of cultural protocols and language, as well as have experience in remote community infrastructure planning. See page 16 for a list of the advantages and disadvantages of hiring an external consultant.

These guidelines could form the basis of a consultant's brief, which could then be used to obtain quotations from suitable consultants.

2.1.3 Budget

Sufficient funds to complete the preplanning must be available. The amount required will vary with factors such as the size of the community, the number of users or special interest groups, the remoteness of the community, and the general level of interest in the community.

The amount spent on preplanning is usually considerably less than the amount required for a feasibility study because it does not involve the same level of detail. Note that the preplanning outcomes will include a comprehensive understanding of community needs and they are therefore the main supporting element for the feasibility study. Money well spent in preplanning should reduce the cost of Stage 2 – Feasibility.

2.2 Community analysis

A community analysis will give structure to the preplanning stage. By analysing community-specific factors relevant to a swimming pool (described in sections 2.2.1–2.2.12), a profile of the community – including its need and support for a swimming pool facility – can be created. The inability to create such a profile would create serious doubts about whether a strong need or genuine support for a swimming pool even exists in the community.

This analysis is both information gathering and feedback. The SPC works to create a detailed profile of the community and its needs; at the same time, the community will learn much about a swimming pool facility, how it might operate, staffing issues, costs, maintenance and other important matters. This sharing of information promotes community ownership of the project, which will help make the swimming pool project more successful.

2.2.1 Population and demographics

Population size, age, gender, mobility, disability, family structure, housing, employment, income and education are all factors that will indicate what the community needs are, and therefore the type of swimming pool facility required.

2.2.2 Town or community plan

Ideally, the procurement of a community swimming pool should be guided by a town or community plan that sets out the strategic direction for infrastructure development and, in particular, the development of sporting or recreation facilities such as a swimming pool.

2.2.3 Community tenancy arrangements

Planners should fully understand tenancy and any rights attached to the land on which community facilities, such as the proposed swimming pool, are located.

2.2.4 Location options

The views of the community should be sought to determine potential swimming pool locations. Ultimately, location will be based on multiple factors – technical and otherwise. This community analysis aims to identify the most likely and available options within the neighbourhood. A location should be considered as an option only if it meets the criteria established in Sections 2.2.2 and 2.2.3.

2.2.5 Power and water

Some communities simply do not have an adequate electricity supply, or suitable and sufficient water resources to maintain a swimming pool. Utility companies should be approached to understand their capacity constraints and future plans. A detailed water analysis, including costing, should be undertaken. This information can be sourced from an appropriate utility company, and should include the town's surface water and groundwater supplies.

2.2.6 Current arrangements for swimming

The location of current swimming activities needs to be considered. For example, where do children and others in the community swim now? Is there a nearby community with a swimming pool?

Although less convenient than having a swimming pool right in the community, it may be more practical and less costly to upgrade the local bus service between the community under consideration and another community that already has a swimming pool.

Children playing in a creek

2.2.7 Potential user groups

If there is to be a swimming pool in the community, who will use it and what will they need as part of the swimming facility?

User groups may include schools, swimming and other sporting clubs, mothers with preschool children, local or visiting health workers, or other communities in the region. Each user group will have specific needs that must be clearly understood. Ultimately, specific programs will need to be developed to meet these needs.

2.2.8 Alternative recreation or sporting facilities

A swimming pool facility is unlikely to satisfy all community recreation and sporting needs. The preplanning stage should attempt to measure and take into account community support for alternative facilities – such as football ovals, or basketball and netball courts – that could also benefit the community.

The cost–benefit ratio measures the benefits a community gains from a particular facility against capital and operating costs. The preplanning stage may reveal an alternative to a swimming pool that offers a better cost–benefit outcome.

2.2.9 Local employment and training

Many remote communities suffer from a lack of employment and training opportunities, especially for youth. The skills associated with public swimming pools include maintenance (plant, buildings, and grounds) and lifeguarding. Also, various administrative positions would become available, including managing admissions, a canteen or pool shop, general staffing, and

compiling and reporting management information. It is essential that the remote community has access to these skills and can offer training to replace staff as required, and to give existing staff and trainees the opportunity to develop their skills.

A training and employment plan should be developed during the preplanning stage to help ensure that the pool will be safe and sustainable. Considerations for local and nonlocal employees will form part of the training plan. Some communities underestimate the training and employment opportunities that a swimming pool facility may offer. The Royal Life Saving Society – Australia (RLSSA) is an excellent source of information when considering this issue (see also Section 2.3 for other information sources).

2.2.10 Community groups and leaders

It will often be necessary to do the community analysis with the help of community groups or leaders. These key community members may provide valuable information regarding community resources, funding and a wide range of other subjects, and may represent the views of significant groups of community members. The *National Indigenous Infrastructure Guide* (FaHCSIA 2010; p. 36) contains a helpful list of community groups and stakeholders. Disabled people or their representatives could also be added to this list.

2.2.11 Cultural values

Cultural values and protocols vary between communities. The community analysis should show how this will affect the building of the proposed swimming pool, its programs and its patronage.

2.2.12 Sources of funding for community projects

Communities rely on different sources for capital funding of new facilities and for the revenue needed to meet operating costs. Local government, often assisted by federal, state or territory governments, is a common but by no means certain source of funding. In this preplanning stage, the community may need to look to other sources, both private and public, to ensure that the interest of financial supporters is real and the relevant organisations will be approachable if there is a decision to proceed to Stage 2 – Feasibility. Note that the feasibility study will include a detailed financial analysis and modelling – Stage 2 is when the community will seek firm commitments for funding.

2.3 Other information sources

The experience of other comparable communities can be a valuable guide. Some of this experience is documented in shire records. The SPC can also visit similar communities where recently planned pools are up and running, to learn from the experiences of others. Discussions with pool managers, pool consultants and other influential pool industry players may also be useful.

Relevant information can also be found in the publications of various authorities. The community should research information published by government departments and other organisations including:

- RLSSA
- Australian Government and/or state or territory government departments of
  - education
  - health and human services
  - sport and recreation.

Information from these sources will help the community understand various issues, and will also assist in approaching potential funding sources.

2.4 Decision – defer, abandon or proceed?

The need and support for a swimming pool facility and its viability must be established before proceeding to the next stage – the detailed feasibility study. If the need for a swimming pool is not established, or if there is clear evidence that it will not be viable, then the decision should be to either:

- defer development and revisit the preplanning process in the future

  or

- temporarily abandon the idea of a swimming pool

  or

- repeat the preplanning stage, instead considering other sporting facilities or a water play area (WPA) (Section 2.4.1).

In this preplanning stage, the viability test is nonspecific and not detailed. The community is looking for a guide, not specific financial statements that prove capital and operational funding is available and sufficient. However, it will be necessary to have an approximate idea of the capital and operating costs of a swimming pool facility in the preplanning stage. If an external agency is used to summarise the preplanning and prepare a conclusion, they should be able to determine these approximate costs. The case studies in Appendix A may also provide an indication of costs, although these must be verified in the feasibility study.

Before making a decision to proceed, the community should ensure that it has considered options such as providing regular transport to a swimming pool in another community or joint development of a swimming pool with a nearby community.

If the appropriate conclusion of the preplanning stage is to proceed to Stage 2 – Feasibility, then the results of preplanning should be expressed clearly and quantifiably as a statement of community needs. For example, 'A significant majority of community members has identified the need for a swimming pool. The key needs are:

- **A safe swimming environment.** In the absence of a community swimming pool, people – especially children – are drawn to water sources such as creeks, waterholes and tanks to swim in, which are unclean and unsupervised.

- **Learn to swim.** The children of this community and neighbouring communities have to travel great distances to learn to swim in a safe environment. The lack of a swimming pool also prevents children from enjoying intraschool and interschool swimming competitions. The small school swimming pool, which was recently closed, was not suited to swim classes or competitions.

- **Recreation.** This analysis found that families with children would use the swimming pool facility as a place to gather and socialise in an environment that is safe, clean and fun for children'.

These needs point to a concept design that should include a variable-depth lap pool for recreational and learn-to-swim activities, plus a toddler pool so that all families, even those without small children, can use the facility. The toddler's pool area could also incorporate some play features to add to the range of available activities.

For a sample preplanning report, see Appendix B.

2.4.1 Water play areas

If a public swimming facility is found to be not feasible in the preplanning stage because of funding or water shortages, a community may consider a WPA. WPAs offer some advantages over full swimming facilities. Appendix C lists some features of WPAs, including advantages and disadvantages.

Note that if a community wants to pursue the idea of a WPA, they will still need to complete the same four stages as a community would if they were considering a swimming facility.

2.5 Useful terms

Cost–benefit ratio	The ratio of the benefits of a project or proposal relative to its costs.
Demographics	The characteristics of a particular human population.
Facilitator	Someone who impartially guides a group or meeting towards a successful outcome.
Incorporated body	A body that is formed into a corporation with a legal identity that is separate from its members.
Programs	Planned swimming pool activities over a period of time. These could include recreational swimming, lap swimming, learn to swim, aqua aerobics and so on.
Rules of association	Rules that regulate the management of the incorporated body, providing for matters such as (swimming pool) committee elections, meetings and financial records. Incorporated bodies are required, by state and territory law, to adopt rules of association (also known as a 'constitution').
Tenancy	The way in which property is owned or occupied.

2.6 References and further reading

DSR (Western Australian Government Department of Sport and Recreation) (2004). ***Asset Management Guide***, DSR, Perth.

DSR (Western Australian Government Department of Sport and Recreation) (2008). ***Sport and Recreation Facilities***, DSR, Perth.

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2007). ***National Indigenous Housing Guide***, FaHCSIA, Canberra

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2010). ***National Indigenous Infrastructure Guide***, FaHCSIA, Canberra.

RLSSA (Royal Life Saving Society – Australia) (2011). ***Review of Swimming Pools in Remote Areas of the NT***, RLSSA, Broadway.

Feasability Study

3 Stage 2 – Feasibility

Stage objectives:

To thoroughly test the viability of the swimming pool proposal, so that a decision to proceed to detailed design and construction is based on objective facts and is in the community's best interests

If Stage 1 identifies a need for a swimming pool, then the community can move onto the next stage of the swimming pool procurement process: Stage 2 – Feasibility. The feasibility study should provide all the necessary information to decide whether to abandon or proceed with the proposal to build a swimming pool facility.

The final feasibility study document will be made available for community comment and, if the decision is made to proceed with the swimming pool proposal, will be presented to potential funding organisations. Therefore, the feasibility study must be accurate, comprehensive and completely objective. Involving an external consultant to undertake the feasibility study is highly recommended. The advantages and disadvantages of using an external consultant are identified below.

Advantages and disadvantages of using an external consultant

Advantages

Removes bias. Bias, whether perceived or actual, can seriously damage the study findings. Using an external consultant will eliminate bias. Sources of funding will be reluctant to approve resources where they perceive a lack of objectivity and bias will erode community support.

Experience. The feasibility study process can be quite difficult. An experienced researcher will use specific methods to gather the required data. Many consultants have worked across a wide and varied cross-section of industries, organisations and communities and, as a result, they can provide valuable experience and ideas that the community may not have considered.

Project planning. Normally, a consultant will commit to a feasibility study without provision for leave or other time off. This makes it easier to plan the study and milestones.

Freedom of expression. Criticism is, if necessary, relatively easy. The community does not have to be concerned about criticism creating ill feeling between members.

Financial. The cost is usually fixed, purely for the term of the contract, and therefore can be easily budgeted. Once the feasibility study is complete, there are no ongoing employment costs.

Project focus. Community members or shire employees, or whoever would be the alternative to a consultant, will have their own personal priorities. They are concerned with day-to-day issues, such as family and job, which means they have limited time to spend on the feasibility study. Consultants tend to focus on the particular project and its deadlines, which normally ensure that the work is completed according to the feasibility study milestones.

Commitment. Consultants tend to gain employment by referral and, therefore, it is in their best interest to do a good job.

Disadvantages

Higher cost. A consultant will probably cost more than appointing community members or shire employees to do the study.

Consultants can fail. Consultants may struggle with their own time constraints, language difficulties, or understanding of cultural protocols and customs. It is important to select the right consultant.

Local situation. Consultants will not be as familiar with the community as community members are. They have to go through a learning period the first time they are engaged. Note that a thorough preplanning process will lessen this disadvantage.

These guidelines could form the basis of a brief that could be used to obtain quotations from suitable consultants. Figure 3.1 outlines the main steps of Stage 2.

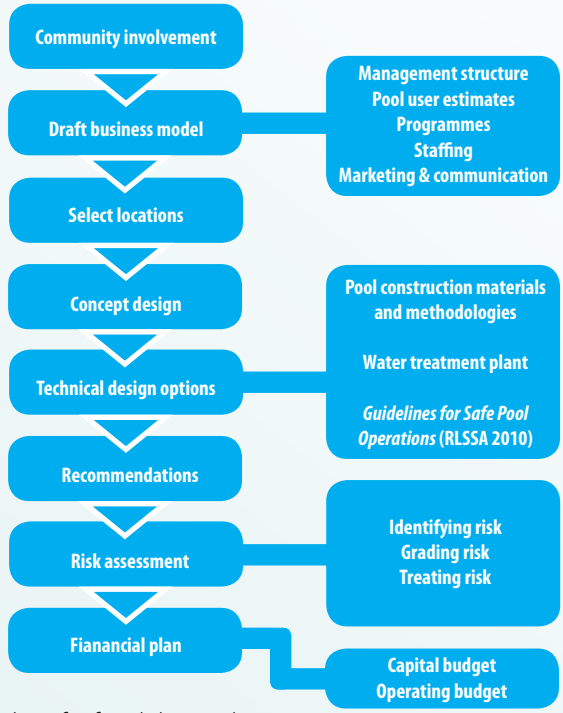


Figure 3.1 Flowchart for feasibility study

3.1 Community involvement

As in Stage 1, community involvement is essential. The swimming pool committee (SPC) would usually continue to function and facilitate the exchange of information and ideas between the community and the consultant.

Broadly speaking, the SPC would:

- have overall responsibility for planning and conducting the feasibility study, including engaging the consultant
- advise the consultant as required
- support the consultant in achieving key milestones
- ensure community input is received and passed on
- advise on changes to the procedure as required
- identify and advise of problems as they arise
- help resolve differences and disputes
- track the consultant's performance and ensure accountability
- participate, as required, in small working groups whose function will be defined by a specific feasibility study issue
- provide verbal and written updates to the community and key stakeholders
- approve and distribute the final feasibility study document.

3.2 Draft business model

Before considering possible swimming pool configurations and options, the community should consider whether a business model would be suitable. For the purposes of a remote community swimming pool, a suitable description of a business model is the particular way in which the swimming pool facility meets the needs of the community – including the choice of strategies, programs, organisational structures, and operational processes and policies.

This business model should consider:

- management structure

- pool user estimates
- programs
- staffing
- marketing and communications.

In 2011, operators of remote pools in the Northern Territory workshopped a business plan template to assist this process. The template can be sourced through state or territory branches of the Royal Life Saving Society – Australia (RLSSA).

3.2.1 Management structure

Different swimming pool management options are available to the community, including:

- **Owner management**. The owner of the swimming pool facility (e.g. the shire), employs a manager and staff. The owner is responsible for all facility operations, including finances and maintenance.
- **Contract management**. The owner contracts out the management of the facility to an organisation or an individual. The owner and the manager negotiate responsibilities and finances. Typically, this structure allows the owner to divest themself of some of the risks associated with day-to-day operations, but does not reduce the owner's overall financial commitment.

Most other arrangements are, in practice at least, variations of these two basic types. The objective is swimming pool management that is cost-effective and meets community needs.

3.2.2 Pool user estimates

The business model will consider the community analysis that was carried out in the preplanning stage. Stage 1 identified and (at least partially) quantified potential pool user groups (also referred to as bather groups) and their needs (see Section 2.2.7). In Stage 2, the potential user groups may need to be more clearly defined and quantified.

The business plan must estimate the number of each type of bather – for example, recreational swimmers, lap swimmers, learn-to-swim participants and toddlers – and clearly define the facilities that each user group will need. There will be some overlap; for example, all bathers will need change facilities, but specific users and their needs must be identified as a foundation for the design stage.

Potential revenue will also be estimated for later use in the financial forecasts. Experience

shows that the most reliable method for estimating revenue is to use a comparable (in terms of location and demographic) swimming pool facility as a guide. However, caution must be exercised because it is easy to overlook important differences between communities.

A 'what if that happens' approach to these and other estimates is advisable.

3.2.3 Programs

A description of various programs and services to be offered at the proposed swimming pool will be developed with the bather estimates in Section 3.2.2. The business plan should identify opening hours to suit these programs, while considering what times are practical and desirable for the community user group concerned.

Table 3.1 in Section 3.2.4 is an example of a daily schedule – combining swimming programs and a staff schedule – for a remote swimming pool facility.

3.2.4 Staffing

Wages and related on-costs are usually the biggest operating expense for a swimming pool facility, and management must take care when planning staffing levels. Overstaffing will cause unnecessary expense, but the consequences of understaffing could be inadequate pool supervision, stressed staff and other serious, undesirable flow-on consequences.

Staff requirements are best expressed in the form of an organisation chart that shows all staff. Figure 3.2 is an example only; actual staff and their responsibilities will vary for each facility.

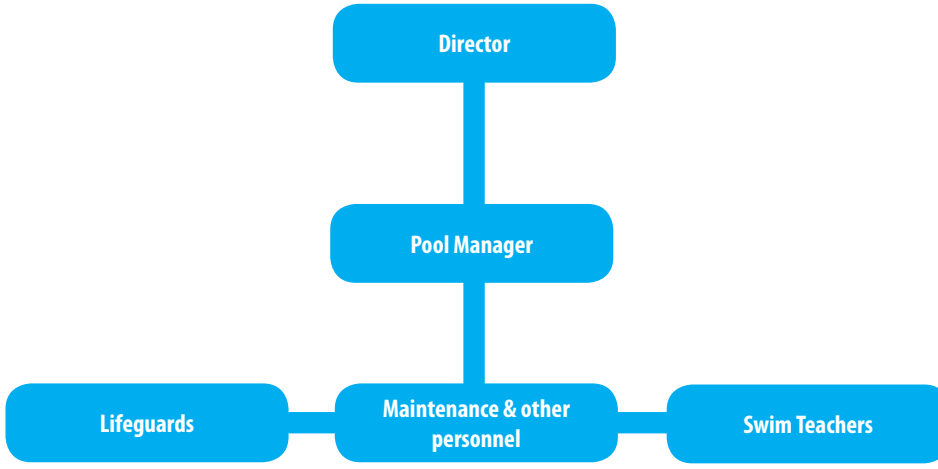


Figure 3.2 Sample organisation chart

Note that the director may be an executive officer of a community group such as the SPC, the community council, or the director of infrastructure or works manager of the shire.

A carefully developed schedule showing proposed opening times, along with programs or activities will be the basis for a list of daily staff requirements that can be used to predict financial costs (Table 3.1). Appendix D also contains some sample duty rosters for a swimming facility.

Table 3.1 Example daily schedule (school term weekday)

	Program/activity	Leisure pool	Toddlers pool
• 6am – 8am	• Lap swimming	• Pool manager	• Closed
• 8am – 9am	• Closed	• Closed	• Closed
• 9am – 11am	• School – learn to swim	• Lifeguard 1	• Closed
• 11am – 1pm	• Closed	• Closed	• Closed
• 1pm – 2pm	• General admission and Waterbabies*	• Lifeguard 1	• Lifeguard 2
• 2pm – 6pm	• General admission	• Lifeguard 1	• Lifeguard 2

** Waterbabies is a program for mothers with babies*

The Royal Life Saving review of swimming pools in remote areas of the Northern Territory 2010 identified that the pool manager has been critical for the sustainable and efficient operation of community pools. They will be in charge of a highly valuable facility, and must have a range of administrative and practical skills that are not easy to find in a remote community. Therefore, pool managers are often sourced externally and consideration must be given to providing accommodation for the pool manager and their family.

In addition to administrative and other duties, the pool manager will occasionally act as the sole lifeguard on duty in small facilities. If facilities do get busy and the number of swimmers increases during a certain period additional resources, staff, should be deployed to assist the lifeguard that is on duty. Lifeguards also have other duties that can be performed when the pools are closed or not busy, including pool or general cleaning, deployment and removal of lane ropes, and so on.

Award rates and conditions, enterprise bargaining and the general availability of appropriately skilled staff are some of the other factors that must be taken into account when planning staffing.

3.2.5 Marketing and communications

Community engagement and consultation is critical to ensure community ownership. This process should be one that:

> *… identifies customer needs and wants, determines which customers the organization can serve best, and designs appropriate products, services, and programs to serve these customers.* (Kotler and Armstrong 1996)

The goal of the engagement process is to understand customer needs, and to find ways to offer superior value, quality and service at the proposed swimming pool facility. This goal could be considered essential if the swimming pool facility is to meet the more general objectives of appropriate and sustainable infrastructure, as expressed in the introduction to these guidelines.

Therefore, the feasibility study should also be a needs-based approach, as recommended in Stage 1.

Communications

Even in small communities, it is important for the swimming facility to establish effective communications and to promote itself. The principles of community involvement are very relevant for the swimming facility to meet community expectations. If the community has not had a swimming pool before, or even if they have, facility management will need to explain the importance of several pool requirements, such as:

- the lifeguards' roles and duties
- limiting bather numbers
- showering before swimming
- wearing proper swimming clothes
- toddlers wearing swim nappies
- supervising toddlers
- excluding pets
- sanitation systems
- vacuuming the pool
- regular shutdown maintenance periods.

Awareness and understanding within the community will create critical goodwill towards the swimming pool and its staff.

The facility will cater to a range of users and need to achieve an optimum balance of programs – that is, the balance between recreational swimming and learn-to-swim activities – which will require communication with users and user feedback. Community expectations can be managed using an effective communication process.

Entrance fees

Some remote communities charge entry fees to swimmers and some do not. The facility can use different methods of pricing, such as charging for pool use only on weekends, or selling season or family tickets.

In reality, entrance fees provide very little revenue to offset operating costs – perhaps as little as 5% of the total operating cost of the facility. It has been reported that some swimming pools operating on a user-pays basis have very low attendance. Fees can be problematic in remote community pools for other reasons, including:

- The most disadvantaged children are further underprivileged because they might not be able to afford entry fees.
- Entry fees add to the tasks of the pool manager. Someone has to monitor the entrance to collect admission fees, and the manager must count and handle the money until it can be deposited in a safe place.
- Collection and storage of cash presents a security risk.

However, there is the argument that entry fees, even if they are nominal, are needed to ensure that the community recognises the value of the facility. Options can be explored with the community for user fees in various forms such as rates or a pool levy (depending on the community's ability or willingness to contribute to the facility), or user-group agreements with schools, police, health facilities and early childhood learning centres.

3.3 Location selection

The preplanning stage will have identified available locations within the community (see Section 2.2.4). These locations must now be thoroughly tested to determine which is the most suitable for a swimming pool. Test criteria include:

- cultural significance of the land
- environmental significance

- ownership
- existing use
- location of services
- zoning or other regulations
- access
- impact of increased traffic in the area
- ground conditions (geotechnical profile)
- topography.

Based on these criteria, the preferred site can be selected. The facility can then be designed to match the site and its boundaries.

3.4 Concept design

- At this point of the feasibility study, it should be possible to prepare a concept design. This is not a final design and will very likely be changed at some point, perhaps radically. Its main purposes at this stage are to:
- enable the community to obtain estimates for the cost of the project
- enable the community to approach funding organisations and financiers
- estimate the requirements of pool managers (i.e. accommodation, if they are externally sourced, and training).

Prioritising needs is important. The temptation to develop a swimming pool facility design that provides for a wide and varied range of patrons and programs may lead to a proposal for a large and complex facility. The larger and more complex the facility, the greater the capital and operating costs. This may in turn make funding more difficult to obtain and create an unsustainable operating cost burden. The concept design should help explain the following elements (see Figure 3.3):

- show the location(s) and dimensions of the water spaces
- explain the function, program(s) and capacities of each swimming pool
- show the locations and dimensions of the building and other spaces, including ablutions,

kiosk, first-aid room, storage areas, office, car parking and shade structures

- show major items of equipment and furniture to ensure spatial requirements are satisfied
- show traffic flows and lifeguard locations.

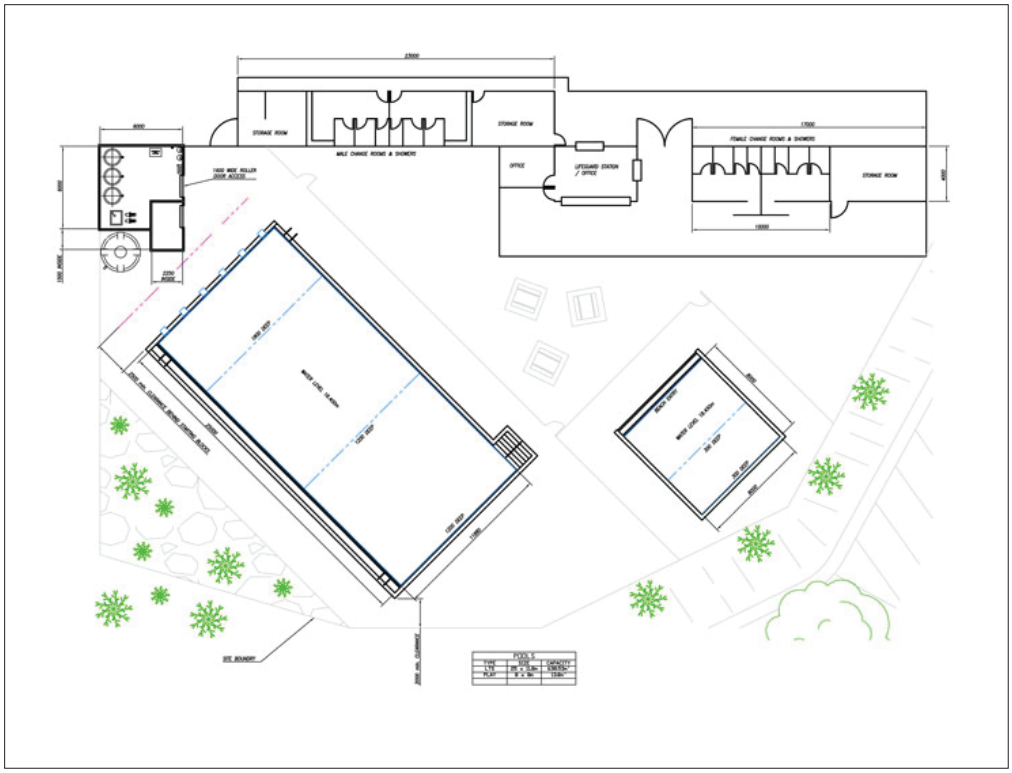


Figure 3.3 Example concept design

3.5 Technical design options

- There is a technical element to the design and construction of public swimming pools that requires specialist input. Communities and any consultants employed to assist communities with the swimming pool feasibility study are advised to engage a public swimming pool specialist, who can provide the necessary technical assistance for the following issues:

- Each state and territory has regulations and standards for the operation of public swimming pools. It is essential to have a detailed understanding of these codes and the legal obligations they impose upon people seeking to build or operate a public swimming facility.

- Modern public swimming pool design involves choices that may have a profound impact on potential programs and community use, operational costs and the economic life of the facility.

- Public swimming facility design is constantly changing due to technology development and user demands for new and varied programs and activities.

- A specialist will consider the needs of disabled users and understand the codes relevant to these users.

- A specialist will be familiar with the *Guidelines for Safe Pool Operation* (RLSSA 2007), which includes a section on facility design.

Note that when seeking a public swimming pool specialist, the community should avoid the common mistake of engaging a person or organisation whose main experience is in the design or construction of domestic or private swimming pools. Domestic swimming pool design and construction is a very different industry, with limited relevance to public swimming pools in remote areas.

The first technical design element to consider is the pool(s) itself. Pool design has implications for management and staffing, power and water requirements, and operating costs. The community should only consider pool designs that meet the essential needs identified in Stage 1. However, in Stage 2, the community should consider particular factors, some of which are discussed in the following sections.

3.5.1 The Royal Life Saving Society – Australia's guidelines

The RLSSA is a recognised authority on swimming pool safety – both bather safety and occupational health and safety. The RLSSA has also published the ***Guidelines for Safe Pool Operations*** (RLSSA 2007), which covers a wide range of subjects, including general operations, pool supervision, facility design and programs.

The community should refer to these guidelines when considering the concept design and the technical design options. The RLSSA guidelines should at least be used as a valuable check against the concept design and the final design to ensure that important elements have been considered. RLSSA also offers an Aquatic Facility Desktop Audit service to communities who wish to check their pool and facility design[1] – this service is highly recommended.

1 www.royallifesaving.com.au/www/html/211-aquatic-facility-desktop-audit.asp

3.5.2 Pool size

Definition

- For the purposes of these guidelines, any pool with a length of more than 15 metres and a width of more than 8 metres is considered large. Depths can vary and are discussed later in this section, but diving pools are not under consideration here. Toddler pools are defined as any pool with a maximum depth of less than 0.4 metres.

- Note that these definitions have little significance beyond these guidelines, because state and territory regulations do not differentiate public swimming pools on the basis of size alone. The exception is that concrete pools greater than 15 metres in length have engineering aspects that must be considered (SA 2009).

Advantages and disadvantages of size

There are advantages and disadvantages to large pools as opposed to small pools. Some are obvious – toddler pools, for example, are suitable for infant bathers but cannot be used for lap swimming. Table 3.2 further outlines some comparisons among different pool sizes.

Table 3.2 Swimming pool size requirements for different programs

Program	Large pool	Small pool	Toddler pool
Recreation swimming	Yes	Yes	Yes (toddlers only)
Lap swimming	Yes	No	No
Swimming competitions	Yes	No	No
Learn to swim	Yes	Yes	Yes (toddlers only)
Adult aqua aerobics	Yes	Yes	No
Hydrotherapy	Yes	Yes	No

Depth

Pool depth is a critical variable in swimming pool design. As with length and width, the depth of a pool will determine not only how it can be used, but also the volume of the pool. Pool volume affects plant size and nature, service and maintenance requirements, power and water consumption, as well as most other aspects of technical design.

An overriding consideration for depth is safety, as deep pools present a greater challenge to inexperienced bathers and to lifeguards. Table 3.3 illustrates how depth affects pool programs. The depths shown are selected as examples for these guidelines only, and have no regulatory or other significance.

Table 3.3 Depth requirements for pool programs

Program	Pool depth in metres (m)		
	0.5–1.0	1.0–1.5	>1.5
Recreation swimming	Yes	Yes	Yes
Lap swimming	No	Yes	Yes
Swimming competitions	No	Yes (restricted dive starts)	Yes
Learn to swim	Yes (bathers ≤10 years old)	Yes	Yes (but not suitable for beginners)
Adult aqua aerobics	No	Yes	No
Adult hydrotherapy	No	Yes	No
Diving	No	Yes (but only in depths of 1.2–1.5 m)	Yes

Deeper pools can be made suitable for some programs, such as learn to swim, by using built-in support or resting ledges, safety rails and benches. Lightweight benches, such as those made with unplasticised polyvinyl chloride (uPVC) or fabric (see Figure 3.4) can be placed in the pool and removed when not in use. Note that this information is provided to illustrate a point – the safety and supervision aspects of these and other features must be considered in the final design.

Figure 3.4 Swim bench

3.5.3 Pool construction materials and methodologies

- The actual swimming pool is usually the largest and most costly component of the whole facility. The choice of pool construction materials and methodology is fundamental to the economic life of the pool structure and therefore to the economic life of the entire facility. That is, if the community proposes the facility should have a minimum life of 30 years, then the swimming pool should have at least the same expected life.

- There are many different materials and methodologies used to build swimming pools; the most common ones are steel reinforced concrete (fully formed or sprayed), metal framed (lined) and fibreglass (moulded or in situ).

Steel reinforced concrete pools

The most common material used in community swimming pool construction is steel reinforced concrete. However, there are two different application methodologies – fully formed and sprayed – which create different results.

Fully formed

After the ground is excavated, the pool floor is made by fixing steel bars horizontally and above the prepared pool base (see Figure 3.5). Concrete is then poured and vibrated so that the floor is a uniform concrete thickness. The vibrated concrete is consolidated around the reinforcing steel, which is centred throughout. After the concrete floor has set, forms (shutters) are set up around the perimeter on the inside and outside of each pool wall with steel bars in the centre. Concrete is poured between the shutters and again vibrated to consolidate the concrete around the steel reinforcement. Once the concrete has set, the forms are removed, leaving the smooth concrete surface to be finished with tiles or paint (see Figure 3.6).

Fully formed and poured concrete swimming pools that are designed and built to the appropriate codes will have an expected life of more than 50 years.

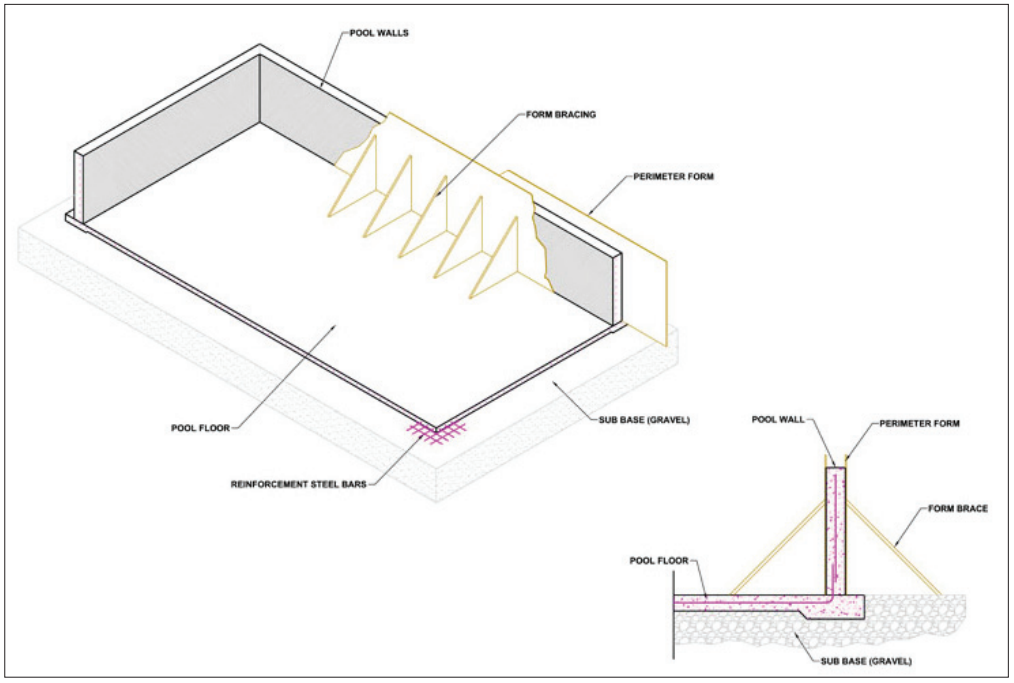


Figure 3.5 Fully formed pool under construction

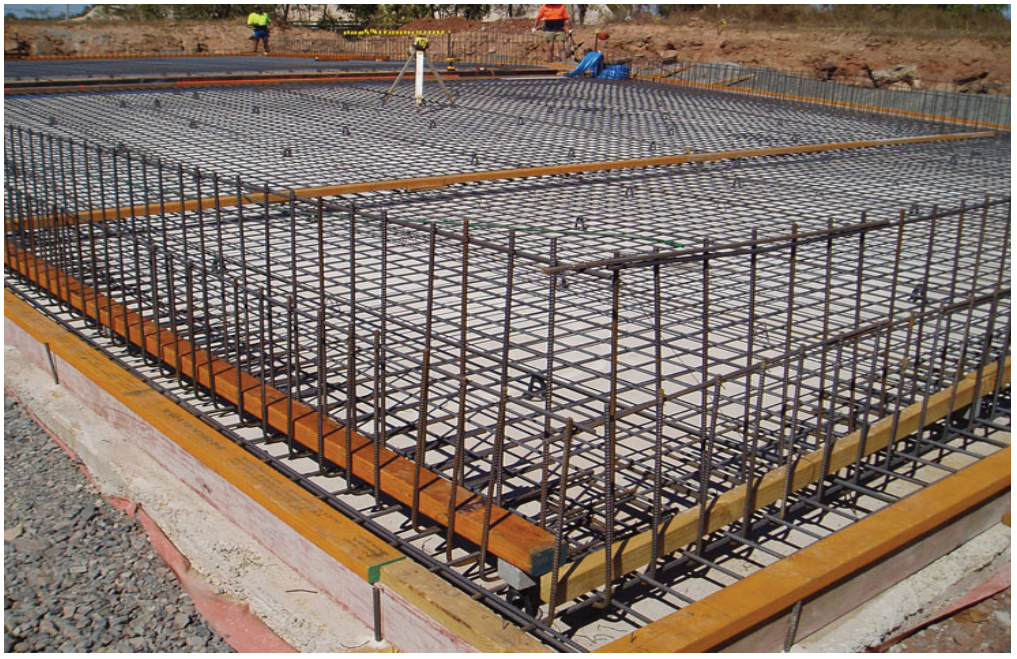


Figure 3.6 Fully formed pool

Sprayed

Sprayed concrete is applied using an air compressor (i.e. pneumatically). The ground is first excavated to the exact shape and dimensions of the pool. The steel reinforcement is then fixed over the floor and continued up the walls in one continuous mat (see Figure 3.7). A pump forces a blend of concrete, which is relatively sticky, through a hose. Compressed air is injected into the hose to increase the pressure and the velocity of the concrete when it is sprayed. When expertly applied, the sprayed concrete covers both the prepared base and the neatly cut earth, which is the outside form for the wall, and encases the steel reinforcement in the floor and the wall (see Figure 3.8).The concrete workers smooth the concrete to become the inside floor and wall faces of the swimming pool.

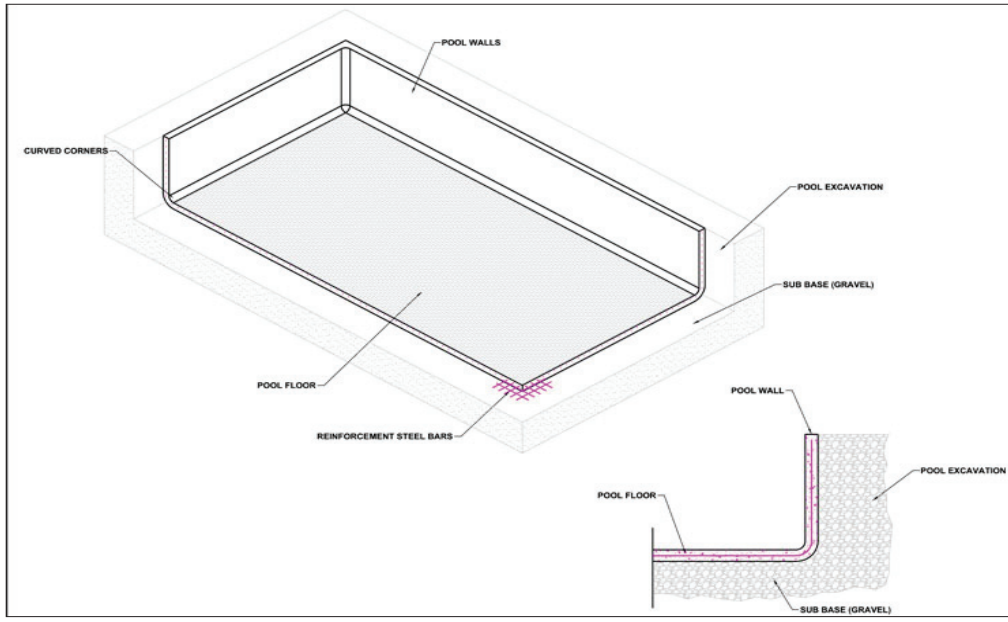


Figure 3.7 Diagram of sprayed pool construction

Figure 3.8 Pneumatically applying concrete on a sprayed pool

Sprayed concrete is mixed with additives that have special properties to enable application by pump and compressed air, and so that the concrete can support itself without internal forms. Remote communities should not underestimate the difficulties in procuring the correct concrete mix and the critical expertise needed for its application. There are significant risks in using sprayed concrete in remote locations.

Sprayed concrete swimming pools cost less to build than fully formed pools. This is because they need relatively little formwork, and the timeframe is shorter because the walls and floor are built in one stage rather than in multiple stages, as is done in fully formed pools.

Sprayed pools have an expected life of approximately 25 years.

Metal framed, lined pools

In recent years, a new type of swimming pool construction has emerged. Manufacturers in Europe have developed a prefabricated swimming pool that is built on a reinforced concrete floor. The floor is built in the same way as for fully formed pools, but instead of concrete walls, this method uses steel panels that are erected on the concrete floor and supported by steel bracing. To make this structure watertight, the swimming pool is lined with a flexible uPVC liner, which is applied in strips and then welded together. As this type of construction is relatively new, the long-term performance of this type of pool in remote areas cannot yet be judged.

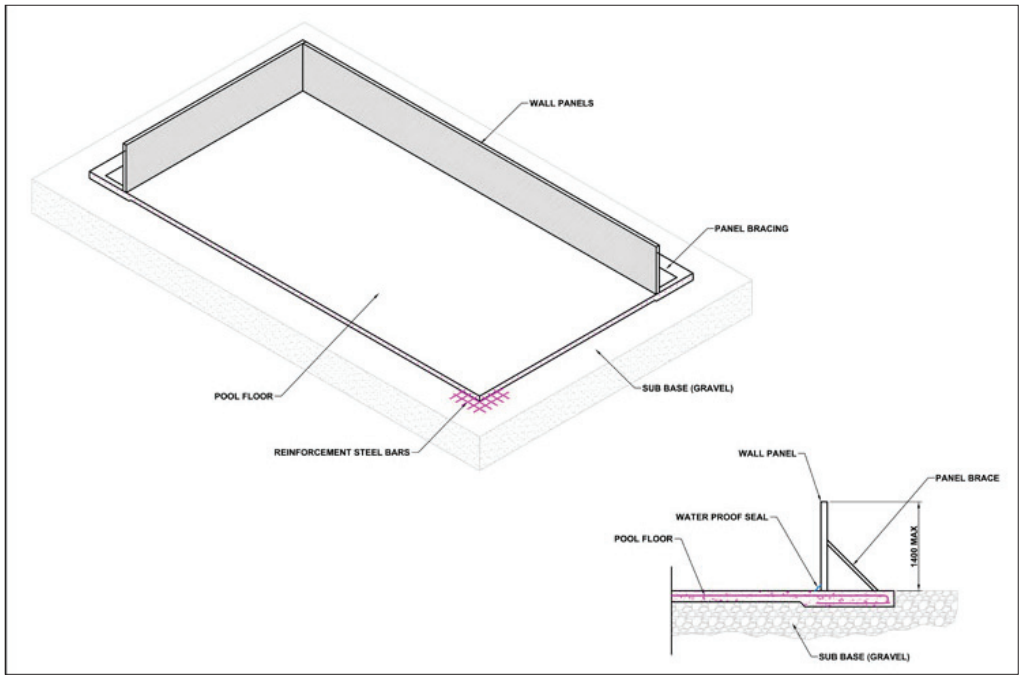


Figure 3.9 Diagram of metal frame pool construction

Fibreglass pools

Moulded

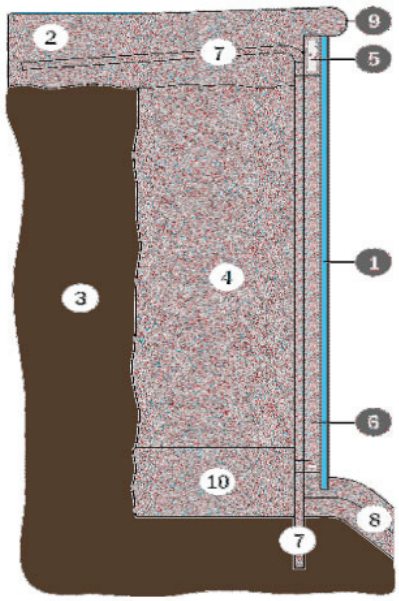
Small (up to 12 metres long) fibreglass domestic pools are very common. Fibreglass is a durable, waterproof material that can be laid over a mould to produce a swimming pool in one piece. However, fibreglass pool manufacturers do not have large moulds to suit most community swimming pool needs and, if they did, transporting the swimming pool from the (probably metropolitan) place of manufacture to a remote community would be extremely difficult. Even if such pools could be structurally engineered for transport, maximum 'wide load' road restrictions would become an issue.

However, if the community only wants a small pool to suit very limited needs, then this type of fibreglass pool is an option.

In situ

Fibreglass has also been used to build in situ swimming pools. This method typically uses a

fibreglass 'chopper' gun to apply the fibreglass against a form to create a continuous, seamless product. Alternatively, fibreglass wall panels can be built off-site, and then cast into a concrete floor, with concrete or mortar poured into the gap between the earth and the panel for support (see Figure 3.10).



1. Fibreglass reinforced wall
2. 100–125 mm pool deck
3. Undisturbed ground
4. Clean crushed rock
5. Stiffener and steel reinforcing receptacle
6. Fibreglass reinforcement
7. Reinforcing bar
8. Reinforced concrete (minimum of 150mm)
9. Coping
10. 250–300 mm concrete

Figure 3.10 Fibreglass panel pool construction

Other swimming pool construction materials and methods

Swimming pools can be constructed from other materials, including concrete blockwork on a concrete floor, and prefabricated concrete wall panels on a concrete floor. Both of these methods require some type of liner on the inside surfaces because the structure itself is not waterproof. However, they are rarely used for building public swimming pools.

3.5.4 Water treatment plant

One of the distinguishing characteristics of public swimming pools is that state and territory authorities regulate water treatment. Flow rates, chemical levels and temperatures are just some of the parameters addressed by the government legislation and regulations (see Figure 3.11).

Effective swimming pool water treatment can be defined as systems that have the capacity to draw an adequate volume of soiled water from the swimming pool, remove pollutants

and microorganisms from that water, dose the water with required levels of disinfectant and distribute the treated water back to the swimming pool.

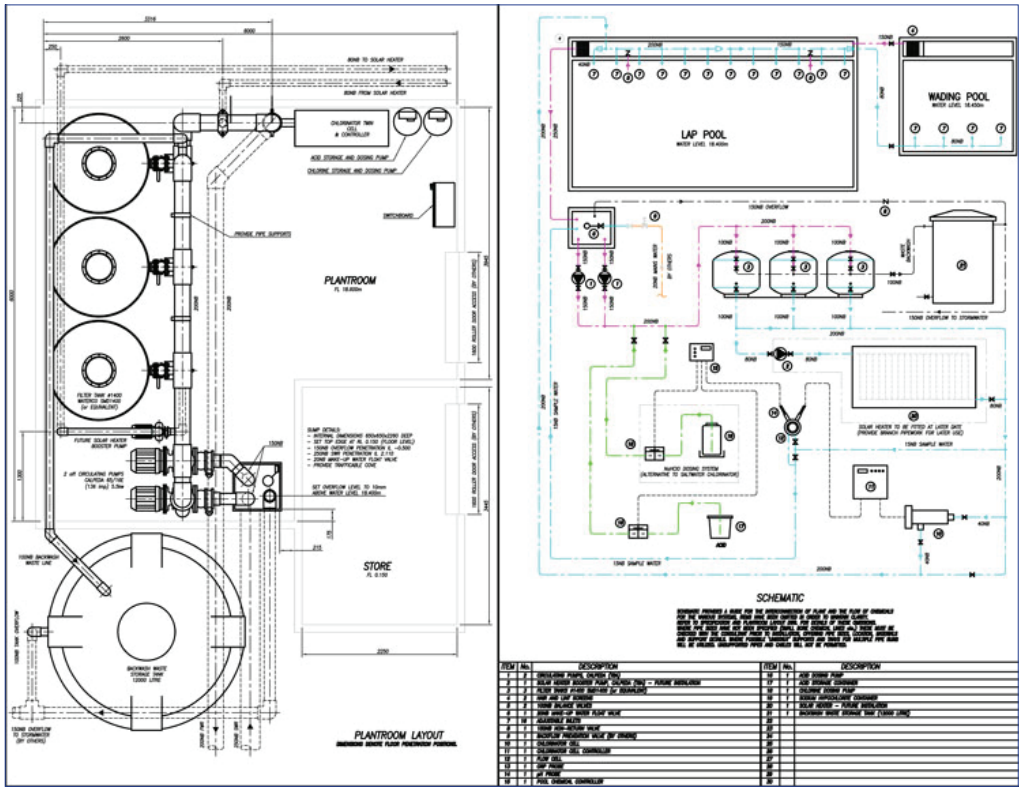


Figure 3.11 Schematic of a pool water-treatment system

Although there is strict regulation of public swimming pools, there are still a wide variety of water treatment design options available to the community. Currently, there are five subcategories of water treatment to consider:

- circulation
- filtration
- disinfection
- heating
- wastewater recycling.

Wastewater recycling is a relatively new concern for swimming pool planning, but is becoming

increasingly important and should be considered in addition to the previous four, more traditional, subcategories.

Note that domestic versions exist for all of these categories of water treatment. Unfortunately, there are numerous examples of domestic systems inappropriately installed in remote community public swimming pools. These installations invariably cause problems for the community – usually after the contractor has been paid and has handed over the pool.

Circulation

The circulation system provides a continuous, regulated flow of water to enable an adequate rate of filtration and an even distribution of chemicals, which allows effective disinfection. The circulation system consists of a pump(s) and pipework. Wetdeck systems also require a balance tank (see 'Surface water take-off'). The pumps, balance tank and pipework must be carefully selected for size and suitability of materials.

High bather loads require higher flows. In many remote communities, high bather loads and high levels of windborne dust and debris can create heavy demands on all systems, and the circulation system must have the capacity to deliver sufficient flows to meet these demands.

Turnover

Turnover is expressed in hours or minutes, and is defined as the 'time taken for the entire volume of a pool to be circulated through the pool water treatment system' (DHF 2006). Therefore, if a swimming pool has a volume of 400 000 litres, a circulation rate of 100 000 litres per hour equates to a turnover time of 4 hours.

State and Territory governments all have regulations stipulating minimum turnover time. Regulations vary between jurisdictions but the following situations generally require a higher turnover time:

- pools with high bather loads
- shallow pools (e.g. toddler pools) with more bathers relative to pool volume
- heated pools.

The Northern Territory's turnover times are shown in Table 3.4. Turnover times for several other states can be found in various state government publications listed in Section 3.10.

Table 3.4 Required turnover times for Northern Territory pools

Loading	Parameters	Examples	Maximum turnover time
Extreme	Very high bather load Very shallow water	Toddler pools, spa pools, slide pools, splash decks	15–30 minutes
High	Very high bather load Heated water Shallow water	Leisure pools, hydrotherapy pool	1–1.5 hours
Moderate	High bather load Heated water Medium depth water	Heated leisure pools, unheated leisure pools	2 hours
Low	Low to medium bather load Heated water Medium to deep water	Heated school pools, unheated leisure pools	2.5–5 hours

Source: DHF (2006)

The Northern Territory does not have the strictest turnover regulations in Australia, but they likely represent an average of all the states and territories.

Communities may wonder why regulators do not simply require a very high turnover value for all pools if it means cleaner water. Higher turnover in a pool would require larger pumps, tanks and pipework. Larger filters would also be needed to manage the increased flows. Therefore, there is a cost penalty to higher turnover times. Regulators and swimming pool designers aim for a balance between bather safety and cost.

Surface water take-off

Most pollutants are found on the surface of a swimming pool and therefore quick removal of debris from the surface is critical. Pollutants such as dust, leaf matter, body oils and fats, and microorganisms should be removed before they have a chance to become dispersed throughout the pool or ingested by bathers. Therefore, systems that facilitate surface water take-off are preferred. Figure 3.12 shows the two types of systems – wet deck and skimmer.

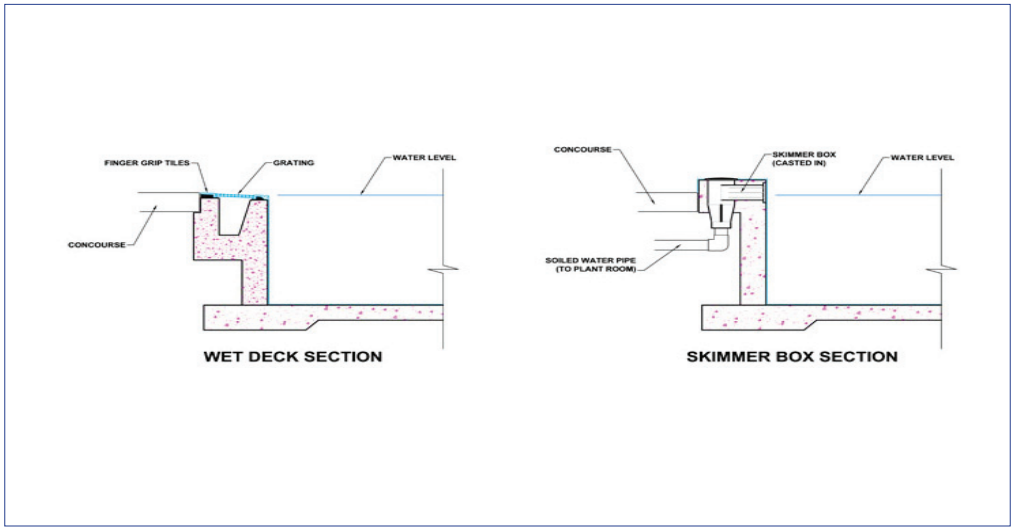


Figure 3.12 Schematic of surface water take-off systems

Wet decks use a gutter or channel system at the edge of the pool (see Figure 3.13).This channel may be around the entire perimeter or on just one of the long sides of the pool. It uses relatively little pipework because the channel itself transports the soiled water along the pool edge to a balance tank located at a point near the plant room. The circulation pumps draw directly from the balance tank.

Figure 3.13 Wet deck

Skimmers are boxes, usually made of plastic, that provide a gap when cast into the pool edge. Soiled water is drawn through this gap. Each skimmer is connected directly to the circulation pump by pipework that is laid close to the pool edge, and must therefore be properly installed to avoid suction entrapment.

Wet decks are the superior method of circulation. They provide more even and rapid surface water take-off and chemical distribution is improved by better reticulation of water and storage of water in the balance tank. Wet decks generally use less pipework than skimmers, which are plumbed individually. However, wet decks are more expensive because of the cost of forming the concrete channel and the additional cost of a balance tank.

Filtration

Filtration is the movement of water through a porous medium to remove matter or pollutants in suspension. Through this process, unfiltered or 'soiled' water becomes filtered water.

The main consideration when choosing a filtration system (see Figure 3.14) is to select appropriate filters and filter media that quickly extract the pollutants from the soiled water. Heavy loads create demands on filtration systems, which only commercial-grade equipment can manage. Inferior or domestic-grade equipment will allow pollutants to build-up in the pool water to the point where the pool becomes unsafe for bathers.

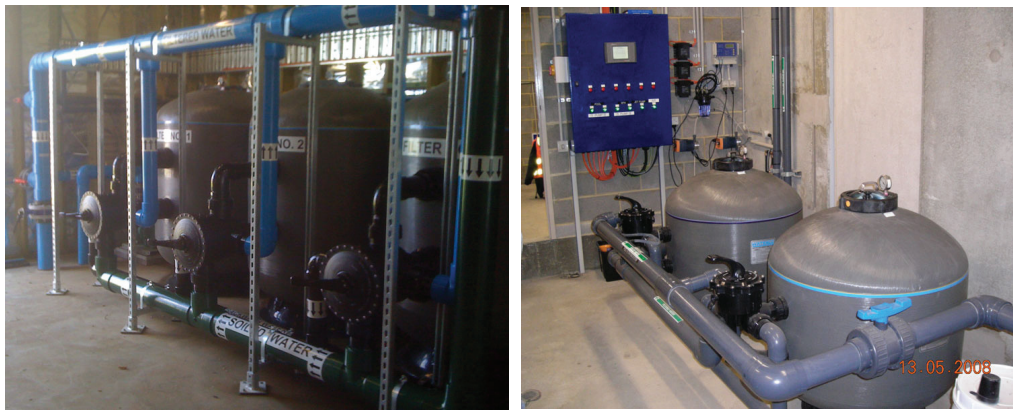


Figure 3.14 A filtration system

The most common types of filtration systems used in community swimming pools are sand filters, cartridge filters and diatomaceous earth filters. Sand filtration is by far the most common, but it has the disadvantage of higher water consumption relative to other systems. This can be a very important consideration in remote communities.

Disinfection

The aim of the disinfection system is to remove the risk of infection. Swimming pool water cannot be sterile, so the purpose of pool water disinfection is to ensure that the number of microorganisms in the swimming pool is minimised and that harmful organisms are rapidly destroyed so that bathers will not become infected.

Chlorine is the dominant form of disinfection chemical in swimming pools both Australia-wide and worldwide. It comes in various forms – gaseous, liquid or solid (i.e. granules or tablets) – and each form has its own chemical characteristics, advantages and disadvantages. The choice of chlorine type will depend on various factors, including:

- **Source water.** The chemical characteristics may differ depending on the water source.
- **Transport.** Chlorine is a hazardous substance, and all types of chlorine require specialised transport arrangements.
- **Space.** The available space for chemical delivery, storage and associated equipment needs to be considered. Some chemicals require more space, and others (e.g. gaseous chlorine) should be kept well away from public areas to meet legislation covering storage of hazardous materials.
- **Service availability.** Some chemical storage and metering equipment – particularly gaseous chlorine – requires highly specialised maintenance.
- **Local expertise.** If specific technical expertise is available in the community, this may influence the choice of chemical.

Salt chlorination is a system that generates chlorine by electrolysis of salt water. Many domestic swimming pools use this type of system, but for public swimming pools, the salt chlorinator must be much larger to cope with sudden increases in bather loads. Salt chlorinators in public swimming pools must also be automatically controlled so that the system generates chlorine when it detects a need for more.

Salt chlorinators avoid some of the limitations and hazards associated with other types of chlorine. The chlorine is not transported – it is generated on-site – and the salt is transported in pallets as normal dry goods. Salt chlorinators take up little space, and they are fairly simple to operate and maintain. On the negative side, salt chlorinators have a relatively high capital cost and, because they require the swimming pool water to be saline, other equipment, such as circulating pumps, must be carefully selected to prevent corrosion.

Even though salt chlorinators require only relatively low levels of salt (about 5000 parts per million [ppm] compared to about 35 000 ppm for seawater), there is anecdotal evidence of health benefits for bathers who swim in saltwater swimming pools. Some consultants and swimming

pool designers are persuaded by this evidence and recommend salt chlorinators. For other benefits of salt chlorinators, see the section on 'Wastewater recycling', below.

Table 3.5 is a guide to the relative costs and operational factors associated with different chlorination systems.

Table 3.5 Comparison of the different forms of chlorination

Chlorination type	Capital cost	Operating cost	Transport and handling	Storage	Service
Liquid	2	2	3	2	1
Solid – tablets, granules	2	2	2	1	2
Gaseous	3	3	3	3	3
Salt	3	1	1	1	2

1 = low cost or difficulty; 2 = medium cost or difficulty; 3 = high cost or difficulty

Note: Ratings may vary with installation location and equipment manufacturers.

Wastewater recycling

Modern technologies have made recycling backwash water for re-use practical and relatively cost-effective. Safe and sustainable disposal of pool wastewater is often a problem for remote communities, and water supplies to the swimming pool could be limited. Consider incorporating some kind of wastewater treatment system in the swimming pool plant, such as the one shown in Figure 3.15.

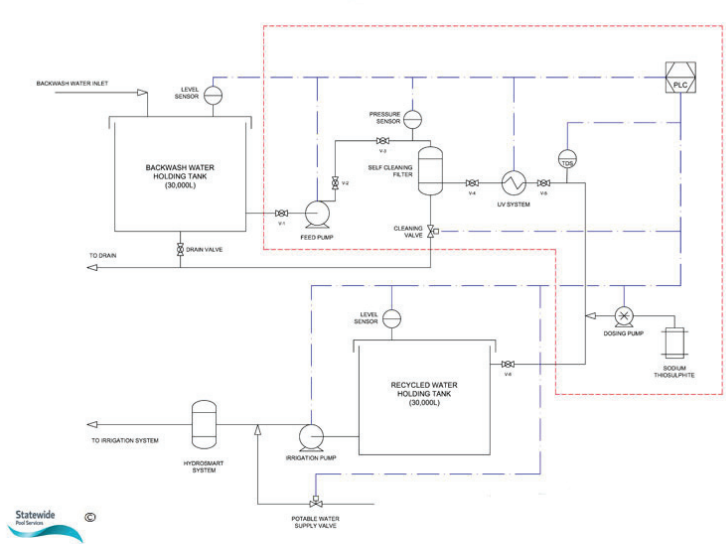


Figure 3.15 Schematic of a wastewater treatment system

Wastewater can be treated to different levels of purity and can therefore have different applications. Lightly treated wastewater may be used for irrigation (provided salt levels and other chemical parameters are suited to the relevant plant species) or toilets. Highly treated wastewater can be returned to the swimming pool. Ultra filtration (UF) and reverse osmosis filtration systems, when combined with chemical and ultraviolet treatment, will effectively remove all dangerous microorganisms and enable a large proportion of the wastewater to be returned to the swimming pool.

Salt chlorination and wastewater recycling are an efficient combination. Wastewater can be processed using UF, which does not remove dissolved salt. Therefore, when treated wastewater is returned to the pool (or to the pool via the pool balance tank) the salt is also returned, thus helping to maintain required salt levels.

Pool heating

In northern Australia, the normal outdoor (ambient) temperatures keep pools warm for most of the year. In winter, however, pool water temperatures can drop to levels that discourage pool activities and pools will need to be heated.

However, in remote desert communities, decreasing temperatures often cause pools to close from about April to September. The cost of energy, particularly liquid propane gas and electricity, makes the cost of heating pools very high and beyond the budgets of most remote communities. Pool blankets can be used to maintain water temperatures, but in the central and southern areas of Australia, heat loss during the day and night over much of the year exceeds natural heat input and therefore the capacity of blankets to retain that heat.

Solar heating is a relatively simple way of extending the pool season by up to 3 months. Different forms of solar heating are available, but the most common type uses absorber material located on the roof of the pool facility building. The sun heats the absorber and, when pool water is pumped through this material, it collects that heat and returns it to the swimming pool(s) (Figure 3.16). Another type of solar heating uses photovoltaic panels, also located on the roof of the facility, to generate electrical energy, which can be used to heat the pool water (Figure 3.17).

Figure 3.16 Solar absorber 'flow-through' panels

Figure 3.17 Photovoltaic electrical panels

To be effective, solar heating systems should be used with pool blankets (Figure 3.18), which prevent heat escaping from the water in cold weather and at night. However, as winter approaches, ambient temperatures will fall to the point where, even with the use of pool blankets, heat input from the solar system cannot keep up with the heat losses and the pools become too cold to swim in. In southern and central Australia, this point is usually reached in April and most outdoor pools close for the winter around this time.

Figure 3.18 Solar blankets

Solar heating systems are useful to bring pools to a comfortable swimming temperature at the beginning of the swim season. Large community pools in parts of remote Australia can be very cold at the end of winter and a well-designed solar system will ensure that swim programs can begin some weeks earlier than would otherwise be possible.

3.6 Financial plan

The financial plan details the estimated capital costs of the proposed facility, including options, and also details the operating costs and revenue.

Financial projections inevitably include many assumptions and these should be detailed in the financial plan. Different scenarios should be considered (for an example, see 'Hypothetical operating scenarios' in Section 3.6.2) to cover a likely range of possible financial outcomes.

3.6.1 Capital budget

Capital costs

The community, or the consultant assisting the community with the feasibility study, will need to engage a specialist cost planner or quantity surveyor to estimate capital costs. The financial plan should show the following capital items:

- site costs
    - land acquisition
    - services to the site, such as water, power, data (telephone, internet, remote monitoring) and sewerage
    - roads
- construction costs
    - site preparation
    - buildings
    - pool structures
    - pool hydraulics and pipework
    - pool finishes and fit-out
    - building services, such as water, power, telephone, data, sewerage and security
    - other buildings or features, such as shade, fencing, concourse, parking, roadworks, pedestrian access, disability access, landscaping and ancillary structures
- equipment and furnishings
    - swimming pool plant and equipment
    - building fit-out and finishes
- administration
    - consultant fees
    - legal
    - other
- contingency.

The capital budget should make allowance for cost increases. The time from the feasibility study to the handover of a completed swimming pool facility could be many months or even years. The capital budget must make allowances for likely increases in cost.

Sources of capital funding

The proposal to build a community swimming pool would probably not have proceeded from preplanning to feasibility if reasonably reliable sources of capital funding had not been identified. The sources identified in Stage 1 must be confirmed in Stage 2. Firm commitments are needed, and a document such as a memorandum of understanding should be drawn up between the pool owners and the sources of funding to ensure that the swimming facility proposal does not proceed under false assumptions.

3.6.2 Operating budget

It is generally recognised that swimming pools, especially those in remote communities, generate insufficient revenues (from admission charges, canteen, etc) to pay operating costs or replacement capital costs. In remote communities in particular, revenues from these sources are almost immaterial compared to the total operating costs (see Section 3.2). The financial plan should include an operating budget that tests the viability of the facility over the long term – that is, for approximately 6–10 years – and conservatively calculates the required operating subsidy. Table 3.6 provides a template for an operating expenditure forecast.

Table 3.6 Operating expenditure forecast

	Yr1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Estimated operating income						
Casual swim entrances						
Pool hire						
Pool programs						
Learn to swim						
Lap swimming						
Aqua aerobics						
Other						
Shop/canteen – net income						
Sundry income						
Total operating income forecast						
Estimated operating expenditure						
Centre manager						
Lifeguards and operations staff						

Staff training and development						
Uniforms and first-aid equipment						
Telephone						
Printing and stationery						
Licences						
Utilities						
Electricity						
Gas						
Water						
Cleaning						
Security						
Insurance						
Maintenance						
Plant-service agreements						
Buildings						
Grounds						
Equipment						
Minor equipment purchases						
Chemicals						
Marketing						
Marketing and promotion						
Other expenses						
Miscellaneous/contingency						
Total expenditure forecast						
Total cash position or subsidy required						

Other comparable communities with an existing facility can be a valuable guide when estimating revenue and costs. Estimates should be conservative, and it is important to avoid understating costs and overstating revenue. There is significant risk in understating the 'bottom line' or subsidy required.

A useful exercise is to prepare several operating scenarios. From the daily schedules prepared in the draft business plan (see Sections 3.2.3 and 3.2.4); different operating scenarios can be included in operating cost calculations.

Hypothetical operating scenarios

This section describes three hypothetical scenarios, and the total operating costs for all three scenarios are calculated in Table 3.7.

Scenario 1

The first scenario is a 25 metre pool with solar heating, operating from mid-September to mid-April (30 weeks) each year.

Scenario 2

The second scenario is a 25 metre pool with solar heating, operating from mid-September to mid-April (30 weeks) each year, but with reduced opening hours.

Scenario 3

The third scenario is a 25 metre pool without heating, operating from October to early April (28 weeks) each year.

Table 3.7 Hypothetical operating scenarios for a remote community swimming pool

	Scenario 1	Scenario 2 (reduced opening hours)	Scenario 3 (reduced season)
Hours of operation per week	30 weeks @ 55 hours/week	30 weeks @ 45 hours/ week	28 weeks @ 45 hours/ week
Hours of operation per year	1 650	1 350	1 260
Net operating costs per year ($)	220 000	205 000	190 000
Administration costs per year ($)	95 000	95 000	90 000
Total operating costs per year ($)	315 000	300 000	280 000

Note: Net operating costs and administration costs are scheduled separately. Operating costs are the variable costs of operating, such as labour, chemicals and power. Administration costs are those that do not vary and are incurred regardless of operating hours, including insurance, security, rent and licences.

3.7 Risk assessment

3.7.1 Identifying risk

Risk management aims to reduce the cost of unexpected events or circumstances, as well as the effects of those events on the proposed swimming pool facility. The risk management process

will also ensure that there is better information for decision making. This will reassure funding providers, community members and insurers. In Stage 2 –Feasibility, the community will be concerned with three types of risks:

- **Strategic.** These are risks associated with the high-level goals, objectives and strategies of the swimming facility. Examples include
    - a mining company has pledged royalties to meet the costs of operation, but the royalties do not materialise because of unexpected financial or other problems encountered by the mining company
    - land tenure is threatened because a lease cannot be renewed for environmental reasons
    - a nearby community had supported the facility, but instead decided to develop their own swimming pool and removed their support.
- **Operational.** Risks associated with functions performed on a daily basis. These risks arise from the staff, systems and processes through which a company operates, and include
    - fraud risks
    - legal risks
    - occupational health and safety, and public safety risks.
- **Project.** Risks associated with the process of designing and building the proposed facility, such as
    - bankruptcy of the main contractor
    - an extreme weather event, which disrupts the building program and causes significant damage or delays.

Identifying risk is an indefinite process. The experience of others is most helpful, and brainstorming various scenarios can also help identify potential risks.

3.7.2 Grading risk

Table 3.8 can be used to help grade risk. Risks that are improbable, and have minimal or minor consequences – that is, those with a score of 1 or 2 – will receive less attention and the pool operators may accept them without remedial action. Other risks that are likely, and have major, serious or catastrophic consequences will definitely require attention.

Table 3.8 Risk assessment chart

Impact / Likelihood	Minimal	Minor	Major	Serious	Catastrophic
Near certain	5	10	15	20	25
Highly likely	4w	8	12	16	20
Likely	3	6	9	12	15
Not likely	2	4	6	8	10
Highly improbable	1	2	3	4	5

3.7.3 Treating risk

Once a risk has been identified, the community has several options:

- accept the risk
- monitor the circumstances that give rise to the risk so that the risk can be re-evaluated and regraded
- reduce the likelihood of the risk
- reduce the consequences of the risk
- transfer the risk (e.g. take out an insurance policy).

3.8 Recommendations

The final recommendation after Stage 2 will be to proceed with the swimming pool proposal, abandon it or defer it. This recommendation should be explained as a logical conclusion from the findings of the feasibility study. For example, if the decision is to proceed, the recommendation should answer questions such as:

- How will the proposed facility meet the specific needs of the community?
- Have other options been carefully considered?
- How does the draft business model and its programs address these and likely future needs?
- Does the concept design and its location satisfy program and future program requirements?

- Is capital and operational viability proven?
- Have risks been thoroughly evaluated and integrated into the financial plan?

3.9 Glossary

Aqua aerobics	A popular way of keeping fit in a swimming pool.
Backwash	The flow of water back through the filter media to remove entrapped pollutants.
Balance tank	A tank used to hold soiled water for the purposes of equalising or balancing water displaced from the pool by bathers and evaporation.
Bather load	The number of bathers using the pool in a given period.
Business model	The way that the swimming pool facility meets the needs of the community, including choice of strategies, programs, organisational structures, and operational processes and policies.
Concrete forms	The term given to moulds into which concrete is poured.
Contingency	A percentage of the construction contract amount budgeted for unforeseen circumstances or design shortfalls identified after a construction project starts.
Cost planner	Person who estimates and monitors costs, typically for construction projects such as swimming facilities, and monitors cost during design development.
Crushed rock	A form of construction aggregate produced by mining a rock deposit and breaking the removed rock down to the desired size using crushers.
Diatomaceous earth	A naturally occurring, soft, **siliceous sedimentary rock** that is easily crumbled into a fine white to off-white powder. It consists of fossilised remains of **diatoms**, a type of hard-shelled **algae**, and is used as a **filtration** aid.
Electrolysis	A process that uses a direct electric current to drive an otherwise nonspontaneous chemical reaction; for example, to create chlorine from salt in swimming pools.
Enterprise bargaining	Legally binding wage and working conditions being negotiated at the level of the individual organisation.
Filtered water	Water that has passed through the pool water treatment plant before being returned to the swimming pool.
Geotechnical	A branch of civil engineering that is concerned with the engineering behaviour of earth materials.
Hydrotherapy	The use of water for pain relief and treating illness; physiotherapy in a water environment.

In situ	Placed in its final position to be hardened or cured, and thus incorporated into a structure.
Lane ropes	Cables or ropes that float on the surface of a swimming pool and mark the separation of swimming lanes or separate pool areas.
Milestone	The end of a stage that marks the completion of a work package or phase. Used to measure progress.
Memorandum of understanding	A document describing an agreement between parties and expressing a convergence of will between the parties indicating an intended common line of action. Often used in cases where parties do not imply a legal commitment or cannot create a legally enforceable agreement. It is a more formal alternative to a '**gentlemen's agreement**'.
Pollutants	Harmful materials or compounds that contaminate another material, such as swimming pool water.
Pneumatically applied concrete	Concrete pneumatically projected at high velocity onto a surface; also known as shotcrete or gunned concrete.
Prefabricated	A product that is manufactured or assembled in a factory or other manufacturing site, and transported whole for on-site installation.
Sanitation systems	Systems that prevent human contact with the physical, biological or chemical agents of disease or illness.
Schematic	Diagram representing the elements of a system, such as a swimming pool, using abstract, graphic symbols rather than realistic pictures. A schematic usually omits all details that are not relevant to the information the schematic is intended to convey, and does not include dimensions.
Soiled water	Water that overflows or is drawn from a swimming pool before being treated.
Suction entrapment	Occurs when a swimmer, often a small child, is trapped by the suction force created by the water being drawn from the drain at the bottom of a pool or from a skimmer, which can result in drowning.
Topography	The study of the earth's surface shape and features.
Toddler	Child under five years old, who requires constant adult supervision within arm's reach.
Vibrated concrete	Wet concrete that has had air pockets removed and voids filled by applying a vibration tool to it. Wet concrete may have as much as 20% of its volume made up of trapped air. This trapped air reduces the density of the concrete, which equates to lower strength and higher permeability.
Zoning	Dividing a community into zones or sections reserved for different purposes, such as residential, business, park or bush.

3.10 References and further reading

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NSW Health (New South Wales Department of Health)(2007). ***Risk Assessment and Management***, NSW Health, Sydney.

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SA (Standards Australia) (2009). AS 3600-2009 ***Concrete Structures***, SA, North Sydney.

4 Stage 3 – Design and construction

Stage objective:

To design and construct a swimming pool facility that fully reflects the needs of the community, and supports the principles of access and equity, environmental health, health and safety of community members, appropriateness, affordability and sustainability

4.1 The project design brief

- If the feasibility study concludes that the swimming pool proposal is viable, it can then form the basis for a design brief. The brief will outline:
- what facilities and programs will be included
- the project budget (including cost limits)
- how the project will be funded
- the project schedule.

The project design brief often includes two elements: the actual swimming pool(s); and the related facilities, such as the buildings.

Well-executed and well-documented preplanning and feasibility stages will be a solid foundation for the design brief. However, preparing a design brief is a specialist area and, although not impossible, a remote community may not have the experience and skills necessary to prepare the brief properly. If there is no community experience available, a project manager can be engaged to prepare the project design brief.

4.2 The project manager

The project manager is ultimately responsible for bringing the swimming pool project to a successful conclusion, which involves:

- creating clear and attainable project objectives
- building the project requirements
- managing the triple constraints of **cost, time** and **quality** (also known as the **scope**).

The project manager seldom participates directly in the activities that produce the end result, but rather strives to maintain the progress and mutual interaction of all parties involved in a way that:

- reduces the risk of overall failure
- maximises benefits
- restricts costs
- simplifies the transition of relevant insurance issues (from the beginning to formal hand over).

4.3 The steering committee

The community should form a swimming pool project steering committee. This committee may be formed from the swimming pool committee (SPC) established in the preplanning stage. However, the primary roles of the SPC in Stage 1 were information gathering and feedback, and the steering committee's roles will be very different.

A project such as building a new swimming pool facility can be a significant experience for a remote community, and may cause some changes and disruption to community life. It is important for the steering committee to make sure the community understands and accepts these changes. The steering committee would meet with the project manager during the course of the contract to monitor progress and ensure necessary interaction between the community and the project team. This will make the project more sustainable as community members gain some ownership of the swimming pool.

The steering committee can also be the means by which the community has input into the design and construction phases. This will ensure that adjustments and changes to the final design fully reflect community needs and wishes.

4.4 The project team

The project manager will assist the community in putting together a project team to manage the project. The team might include consultants such as architects, design engineers, environmental engineers, construction engineers and cost planners, as well as contractors and subcontractors who are responsible for the actual construction work.

The project manager will manage the process of appointing the project team members and ensure that they are engaged to provide specific services with defined outcomes at (as much as possible) a known cost.

The project team members may be appointed through a tender process or another basis.

The project team's tasks and goals will be to:

- design the swimming pool and related facilities
- prepare a specification that will detail what must be provided under the construction contract
- manage the process of selecting a contractor
- arrange contract documentation
- manage payments to contractors
- manage milestones, from the procurement process through to facility handover
- prepare regular progress reports to the community and the owners
- finalise the contract, including documentation and rectification of any defects.

The project team, and the community itself, must take consider scheduling (including payment schedules), materials and labour availability, environmental concerns, cultural issues, weather, site safety, community disruption, and unforeseen delays and their effects. The project team will continue overseeing the risk assessment process, which was started in the feasibility study, as they manage project risks.

The project manager and the community will face the challenge of assembling a project team that will work collaboratively, efficiently and cost-effectively. Two team structure options are available – multiple consultants, and design and construct (D&C).

4.4.1 Multiple consultants

Under this approach, design responsibilities and construction responsibilities are split between the members of the design team and the contractor(s) chosen to build the facility.

As described in Section 4.2, the project manager helps the community to engage directly with the consultants, as well as coordinates the roles of these consultants. The multiple-consultant project team prepares detailed specifications for the work, and these specifications are given to contractors to 'price' the work or components of it.

4.4.2 Design and construct

There are variations to this type of project delivery, but the community essentially contracts one D&C team to build the swimming pool(s), and the associated buildings and other facilities. The D&C team may be an experienced community swimming pool contractor with the necessary

in-house expertise. However, it is more likely to be a contractor who has engaged the services of engineers, architects and so on, and provides the community with simplified contractual arrangements.

D&C is a well-established method of project delivery. In remote communities, it can reduce project timelines by simplifying design procedures. The D&C contractor works closely with the project manager, but manages much of the design detail. This reduces the need for meetings with multiple consultants and may therefore reduce overall cost. The D&C contractor will have a team of consultants – structural, mechanical, hydraulic and environmental engineers, and architects – as well as subcontractors. The responsibility for coordinating that team rests with the D&C contractor rather than the project manager. This reduces the project manager's overall responsibility and the direct risks associated with ensuring the performance of individual consultants and subcontractors.

Since the D&C contractor is responsible for a large portion of the consultants and subcontractors, selecting the right D&C contractor for the job is critical to the outcome of the project.

4.5 The tender process

The tender process can be described in five steps:

- Establish the tender process and decide what work needs to be contracted out and how the work should be done.
- Prepare documents, such as the tender forms and specifications (see Section 4.5.1).
- Invite contractors to bid.
- Assess the bids received.
- Negotiate and award contracts.

The contractors will submit a price(s) to the project manager as a part of the bidding process. The project manager and team then make selections from the offers received and negotiate the details. The successful tenderers are then engaged for each component of the work.

Most shires and government agencies will have established tendering processes that can be adapted to the swimming pool project. When federal, state or territory governments are involved, the tender process will need to follow specific protocols.

4.5.1 Specifications

A specification is a detailed description of the project requirements that defines what the contractor(s) needs to deliver, including quality and performance requirements. Through the project team, specifications will allow the community to:

- obtain cost estimates for the project before it starts
- directly compare competitive offers by contractors
- provide direction to the appointed contractor
- monitor contractor performance
- finalise the contract based on the specified outcomes.

The specification will be part of the construction contract. If the contractor is providing D&C (see Section 4.4.2), the specification will also set out the project design requirements. A D&C specification is usually less detailed than a construction-only contract, because the design is not finalised when the specification is prepared.

In preparing specifications, the project team will rely heavily on Australian Standards. These standards are 'published documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they were intended to. They establish a common language which defines quality and safety criteria'.[2] Nominating standards is important, as it ensures minimum quality and safety requirements, as well as confirming that tenderers are offering comparable products. In the highly technical field of swimming pool design and construction, the standards provide an essential common denominator.

The bibliography at the end of these guidelines contains a list of Australian Standards and other relevant codes. Not all available Australian Standards are listed, only those that are considered important in the design and construction of public swimming pools.

4.6 Final design

Throughout the feasibility study and up until Stage 3, the swimming pool proposal has been based on a concept design. The project team will now develop the concept design to a final design, which includes detailed drawings of the proposed facility. These drawings will become part of the tender documentation (see Section 4.5.1). If a D&C contractor has been appointed, it will be their responsibility to develop the design and prepare these drawings for approval by the community via the project manager and steering committee.

2 www.standards.org.au/DevelopingStandards/WhatisaStandard.aspx
3 www.royallifesaving.com.au/www/html/211-aquatic-facility-desktop-audit.asp

At this point, the project manager should commission a Royal Life Saving Society – Australia (RLSSA) Aquatic Facility Desktop Audit[3] (also see Section 3.5.1). This will ensure that there are no safety defects in the design. A check against relevant disability codes should also be undertaken.

4.7 Project monitoring

- Projects rarely follow the original project plan and schedule. Even a perfectly designed project plan will not predict changes in the environment or in the community. To better accommodate unforeseen changes, the swimming pool project should be broken up into stages that, when completed, are signed off before proceeding to the next stage. This will enable the project manager and the community to make adjustments and to limit the impact of the changes. The end of each stage is called a project milestone. Payments to contractors are often linked to these milestones to ensure that all parties understand and accept the project objectives.

- In remote communities, a swimming pool project will have significant impact within the community, but relatively low visibility to those outside the community. Unfortunately, some consultants and contractors have used the relative obscurity of remote swimming pool projects to leave projects unfinished – that is, before they have completed all project obligations. Hopefully, the community will engage contractors who are committed to project objectives, but it also makes good commercial sense to establish a process that ensures that contractors are paid in line with critical milestones.

4.8 Useful terms

Project milestone	The end of a stage that marks the completion of a work package or phase.
Steering committeew	An advisory committee comprising community members, stakeholders and/or experts who provide guidance on key project issues such as community policy and objectives, budgetary control, marketing strategy, resource allocation and decisions involving large expenditures.
Tender	**The process of submitting a proposal (tender) to undertake a construction project (e.g. a swimming facility).** The tender is treated as an offer to do the work for a certain amount of money (firm price) or a certain amount of profit (cost reimbursement or cost plus). Competing firms submit the tenders, and are known as 'tenderers'.

4.9 Further reading

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5 Stage 4 – Project conclusion

Stage objectives:
To ensure that: • project objectives have been met • all parties have complied with their contractual obligations • ongoing service, maintenance and warranty arrangements are in place • critical documentation has been prepared and delivered • the facility has been handed over to properly trained swimming pool management and staff

5.1 Completion

- The swimming pool project's final outcome should be that the facility has been completed to the mutual satisfaction of the community, the project team and the other contracting parties. A swimming pool project that is completed on time and on budget is a significant achievement. There are other possible outcomes – situations where there is disagreement, controversy, avoidance of responsibility, general dissatisfaction, and sometimes considerable legal turmoil and unplanned expense. Such situations should obviously be avoided at all costs.

- Inevitably, some community members or project team members will identify issues that, if left unanswered, may become a source of annoyance. Simple elements can easily be overlooked in the design or construction phase. Rather than let such issues become the subject of complaint, the project team and the community may decide to address the issue immediately as a variation to the contract or as a plan for additional works in the near future. Either way, such issues should be dealt with as soon as possible.

- At the end of the project, a review should be carried out to understand what happened and why. There will always be some shortcomings and errors, and these should be reflected on positively, objectively and without passing blame. The project manager should write a project report, which will recommend follow-up issues and priorities. It is also important to acknowledge notable contributions and successes.

- Appendix A contains case studies from recent successful swimming pool procurements in four remote communities.

5.2 Handover

The contractor in charge of the main works will usually want to have all systems up and running

some weeks before the community or the pool facility operator takes charge. The contract documentation describes this as handover, which can happen when:

- the pool(s) has been running for some time
- the water is balanced and safe for swimming
- all systems have been checked and are working satisfactorily
- the operator has qualified or trained staff who are ready to take up their duties
- the community is ready to start using the swimming pool(s).

5.2.1 Defects

Working 'satisfactorily' does not mean that the completed works are perfect. The handover of all substantial construction projects, including swimming facilities, is done with at least some remaining small defects that must be corrected. A leaking pipe or valve, a faulty dosing pump, a cracked tile or a loose handrail are examples of common defects that should not be left to the community or the facility operator to fix. The project manager should ensure that contractors are made aware of these defects and that they are addressed.

Although it is reasonable and practical to have a handover of the facility with some outstanding small defects, the project is not completed until all contractual obligations have been fulfilled. Normally, the contractor agrees to a 'defects liability period'. This is when the community or pool management withholds a small percentage of contract payments for 12 months after the project facilities are handed over. This provides an incentive for the contractor to correct all defects.

5.2.2 Safety assessment

Before the handover, the project manager should commission a Royal Life Saving Society – Australia (RLSSA) Aquatic Facility Desktop Audit.[4] This will be the final check that the design has been properly executed, and that there are no obvious or latent hazards that pose a threat to the facility's staff or users.

5.2.3 Training

The specifications (see Section 4.5.1) should detail training procedures, which the contractor should provide to facility staff so they can properly operate the facility. Draft operation and maintenance manuals (see Section 5.3) should be available at least two weeks before handover so that staff can familiarise themselves with essential procedures. It is common for specifications

4 *www.royallifesaving.com.au/www/html/211-aquatic-facility-desktop-audit.asp*

to require the contractor to provide initial training and then, after the operators have been in charge of the facility for approximately two weeks, to conduct additional training.

Note that the community should ensure that staff are appropriately qualified. Lifeguards and plant operators must have received the necessary formal training to perform their duties safely and effectively.

5.2.4 Insurance

It is the responsibility of the pool owner or management to ensure that appropriate insurances are in place and are added to existing policies, including public liability, workers compensation, and building and contents.

5.3 Project documentation

It is important that the community and the pool operators take over the completed facilities with all the documentation and information necessary for them to operate and maintain the facility now and over its expected life. The specifications should require the contractor to provide, as a minimum:

- as-built drawings
- operation and maintenance (O&M) manual(s)
- warranty(or warranties)
- an asset register
- a plant maintenance register.

This documentation is described in more detail in the following sections. Appendix E contains a sample operations manual contents page.

5.3.1 As-built drawings

As-built drawings are those that show the final structures, the plant, the water treatment facility and other processes in fine detail. Detailed electrical drawings should also be included. Design drawings are not suitable as there will have been many changes, some of them significant, over the period of construction. As-built drawings should show what was actually built, not what was planned to be built.

5.3.2 Operation and maintenance manual

The O&M manual(s) will enable the facility's key elements to be maintained well into the future and help maximise their economic life. The O&M manual should include all plant items, as well as any other items that require preventative maintenance. It must be written in a way that allows suitably qualified facility staff or maintenance contractors to understand the tasks, and comprehensive enough to ensure that all necessary procedures are carried out.

O&M manuals normally include manufacturer's documentation, which will provide essential information about detailed maintenance procedures.

5.3.3. Warranty

The contractor must provide certificates of warranty for all works. For a swimming pool plant, this may simply be the manufacturer's warranties, and the owner or operator may need to register the equipment with the manufacturer. For structures, fittings and finishes, such as paint and tiles, the warranty will be as detailed in the specifications and the contract documentation.

5.3.4 Asset register

The asset register is a list of all movable plant items or pieces of equipment. It will enable the community to keep track of each fixed asset, ensuring control and preventing misappropriation of assets. It is also used to keep track of the correct value of assets – this helps to calculate depreciation and insurance values. Appendix F contains a sample asset register.

Engraving an identification number on the asset or on a metal tag attached to the asset is advisable. This tag and number will identify the asset's location and enable cross-referencing to the plant maintenance register.

5.3.5 Plant maintenance register

A plant maintenance register can help ensure that regular or preventative maintenance is carried out. The register will be a record of any maintenance on a particular item or piece of equipment, and will include details such as:

- the date the plant was serviced
- who serviced the plant
- what maintenance or service was done
- any hazards that were identified
- the date of the next scheduled maintenance.

The register will enable the identification of trends in breakdowns and downtimes for various plant equipment.

5.4 Useful terms

Asset register	A list of all movable plant items. Usually confined to items above a certain value.
As-built drawings	The final set of drawings produced at the completion of a project. They include all the changes that have been made to the original design and construction drawings, including notes, modifications, and any other information that the contractor decides should be included.
Contract variation	A request for change to the contract. Variations should not be made verbally because they are difficult to prove if there are disputes. Instead, variations should be put in writing. Variations may or may not change the contract value.
Defect	A deficiency in the design or construction of a building, structure or plant resulting from a failure to design or construct in accordance with the works specification.
Handover	The transfer of responsibility for the swimming pool facility to the community or owner.
Plant maintenance register	A register that records the maintenance and servicing of a plant.
Warranty	A written assurance that some product or service provided will meet certain specifications for a nominated period of time.

5.5 Further reading

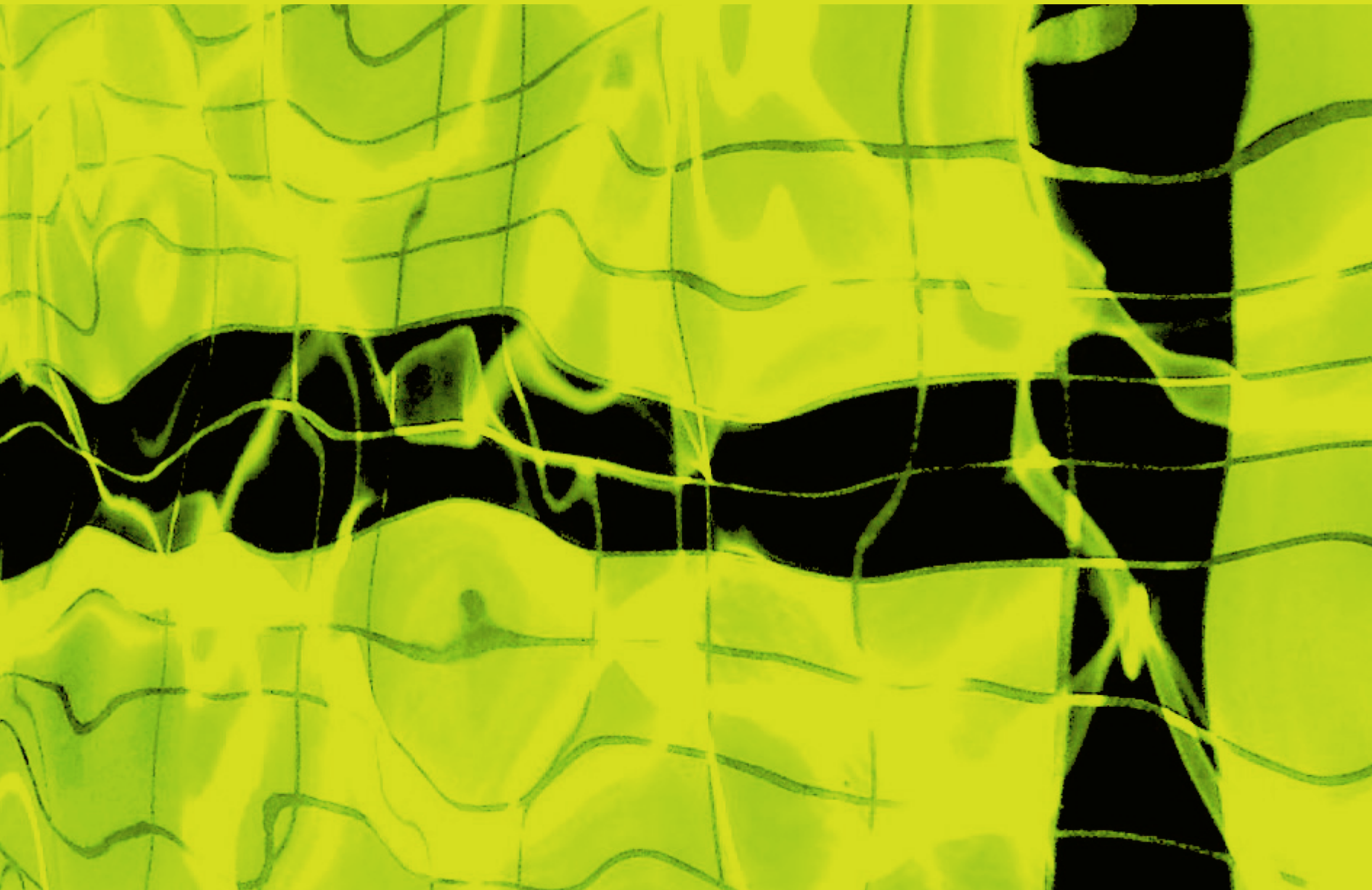
NSW Health (New South Wales Department of Health) (2010). ***Draft Public Swimming Pool and Spa Pool Code of Practice***, NSW Health, Sydney.

DSR (Western Australia Department of Sport and Recreation) (2004). ***Asset Management Guide***, DSR, Perth.

RLSSA (Royal Life Saving Society – Australia) (2010). ***Guidelines for Safe Pool Operation***, RLSSA, Broadway.

Vic DoH (Victoria Department of Health) (2008). ***Pool Operator's Handbook***, Vic DoH, Melbourne.

WA DoH (Western Australia Department of Health) (2010). ***Code of Practice***, WA DoH, Perth.



Appendix A Case studies

The following case studies document actual swimming pool facilities, all of which have been constructed since 2006. Details are provided to inform interested communities about swimming pool and facility layout, pool volumes, dimensions and other relevant details. These case studies do not fully describe the range of options available to communities, but they do represent some useful design concepts and highlight some of the more important technical considerations.

One of the first questions that a remote community will ask is 'How much will the swimming pool cost?' Estimated capital and operating costs are included in the key data. However, communities should not wholly rely on these estimates because they are:

- not up to date, as they are based on financial information that, at the time of this publication, may be up to five years old
- location specific, and the same costs – such as concrete, power, chemicals, transport and labour – will vary significantly depending on the facility's location
- design specific, and even seemingly unimportant design elements can have a significant effect on both capital and operating costs
- possibly incomplete, and some costs – such as financing, project management and facility maintenance – may have been paid directly by organisations or 'sponsors' outside of the project's capital or operations budgets.

However, the estimates may be useful to communities in the preplanning stage to help indicate the scale or magnitude of costs.

Case study 1

Type: single multipurpose, multi depth pool; seasonal opening

Location: Yalata, South Australia

Site plan

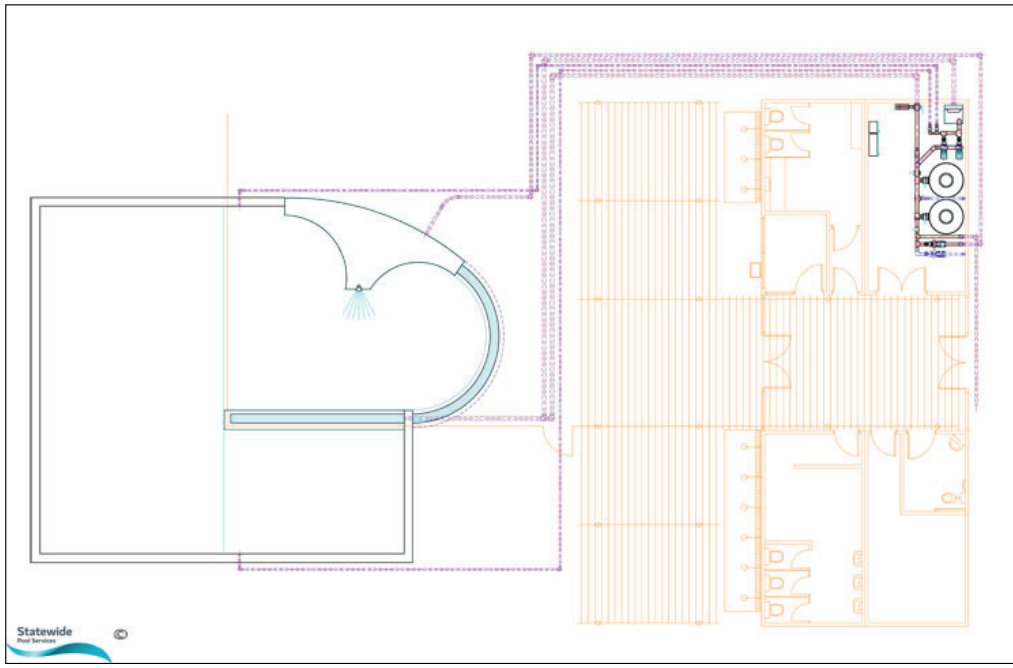


Figure A.1 Site plan of case study 1

Table A.1 Key data for case study 1

• **Capital cost**	$1.8 million
Annual net operating cost	$180 000
Pool dimensions	Outdoor pool: • 5.0 ´ 11.6 metres with wet-deck channel and beach entry • depth of 0.0–1.2 metres Toddler section: beach entry depth of 0.0–0.7 metres Play section: depth of 0.7–0.9 metres Lap section: depth of 0.9–1.2 metres
Pool surface area	150 square metres
Pool volume	120 kilolitres
Maximum bather load	40 people
Initial water fill	130 kilolitres
Pool finish	Synthetic/plastic sprayed-on liner on floor and walls Tiles on the upstand, channel edges and stairs Concrete 'stone' edge
Pool plant	Sand filters: 1.7 square metres Self-priming centrifugal pumps Saltwater chlorinator
Estimated water consumption* (kilolitres per year)	
Backwash	130
Evaporation	420
Bather exit losses	40
Use of showers	350

* These values are only estimated and will vary significantly

Figure A.2 Swimming pool under construction

Figure A.3 Swimming facility under construction

Figure A.4 Beach/toddler section ready for surfacing

Figure A.5 Pool filled and site cleaned ready for handover

Figure A.6 Pool fence dividing beach/toddler section and play/lap sections

Case study 2

Type: 25 metre outdoor lap pool, plus a toddler pool with beach entry; open all year round

Location: Borroloola, Northern Territory

Site plan

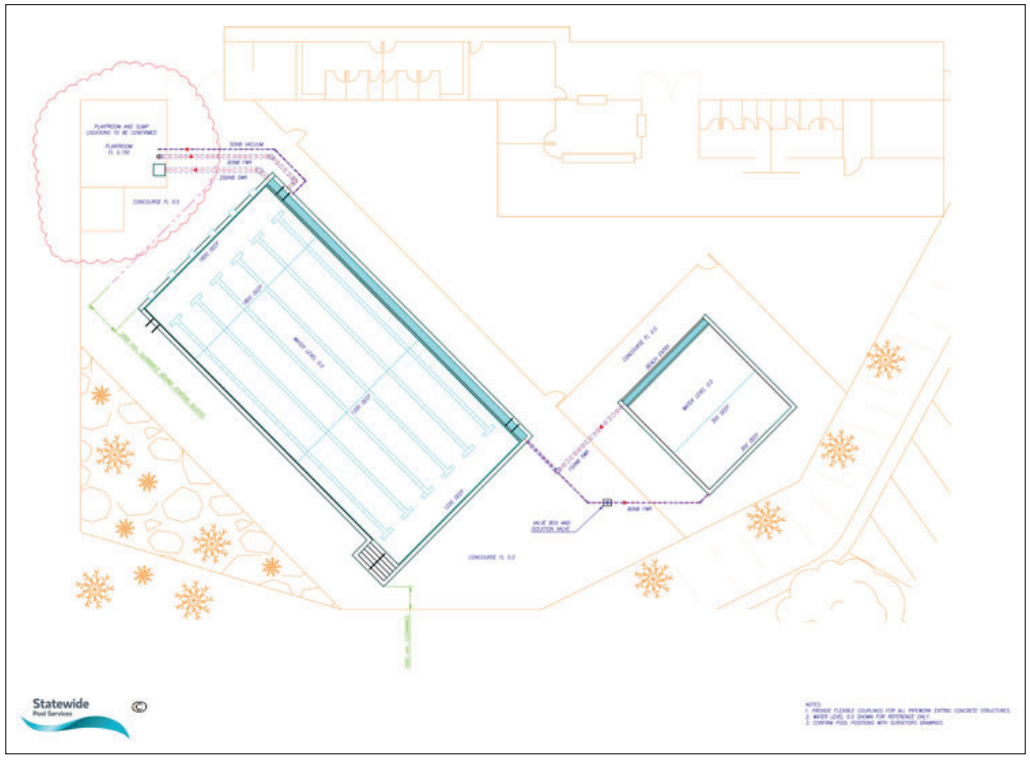


Figure A.7 Site plan of case study 2

Key data

Table A.2 Key data for case study 2

Capital cost	$2.9 million
Annual net operating cost	$250 000
Pool dimensions	Outdoor lap pool: • 25 ´ 12 metres • depth of 1.2–1.8 metres Wading pool: depth of 0.0–0.5 metres
Pools surface area	Outdoor lap pool: 300 square metres Wading pool: 16 square metres
Pool volume	Outdoor lap pool: 450 kilolitres Wading pool: 9 kilolitres
Maximum bather load	100 people (both pools combined)
Initial water fill	470 kilolitres
Pool finish	Fully tiled with concrete 'stone' edge
Pool plant	Sand filters: 4.5 square metres Self-priming centrifugal pumps Saltwater chlorinator
Estimated water consumption* (kilolitres per year)	
Backwash	600
Evaporation	800
Bather exit losses	100
Use of showers	700

* These values are only estimated and will vary significantly

Note: Adjacent soccer field ablutions incorporated into building

Figure A.8 Outdoor lap pool under construction

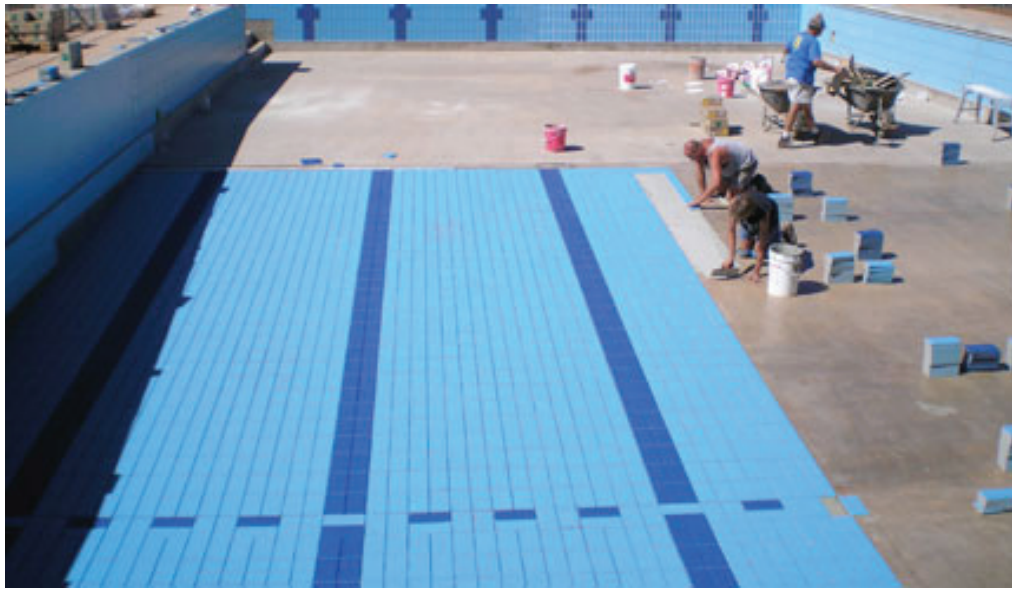


Figure A.9 Structure completed and tiling in progress

Figure A.10 Completed outdoor lap pool

Figure A.11 Entry stairs with safety rail

Figure A.12 Combined outdoor lap pool and toddler pool filtration

Figure A.13 Salt-chlorinator cells

Figure A.14 Toddler pool with shade

Case study 3

Type: 25 metre outdoor pool; seasonal opening

Location: Amata, South Australia

Site plan

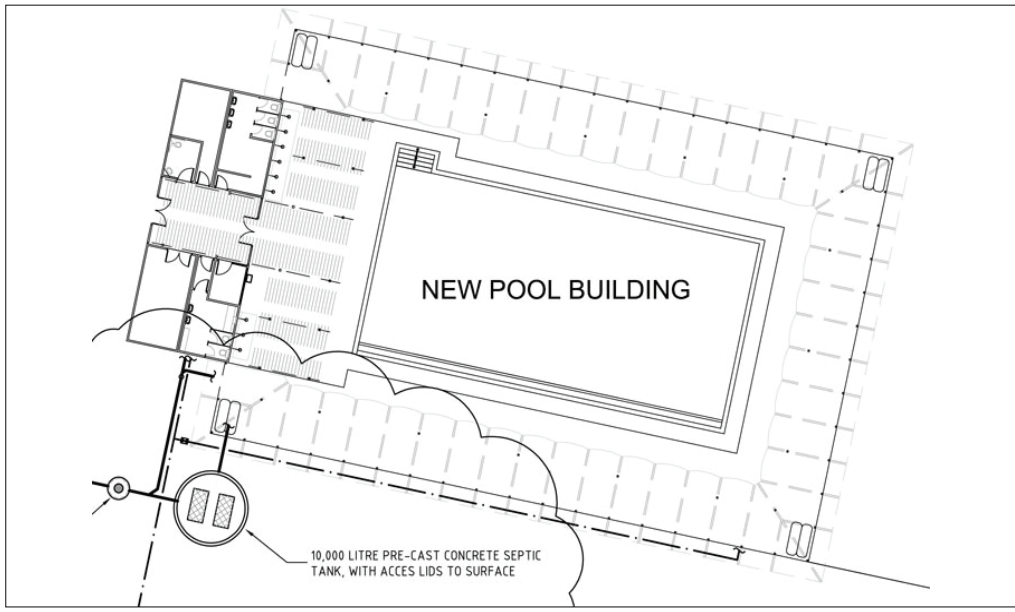


Figure A.15 Site plan for case study 3

Key data

Table A.3 Key data for case study 3

• **Capital cost**	$2.4 million
• **Annual operating cost**	$200 000
Pool dimensions	Outdoor pool: ▯ 25 ´ 12 metres ▯ depth of 1.0–1.5 metres
Pool surface area	300 square metres
Pool volume	350 kilolitres
Maximum bather load	80 people
Initial water fill	360 kilolitres
Pool finish	Pebble with concrete 'stone' edge and tiled waterline
Pool plant	Sand filter: 3 square metres Self-priming centrifugal pumps Saltwater chlorinator
Estimated water consumption* (kilolitres per year)	
Backwash	200
Evaporation	750
Bather exit losses	80
Use of showers	650

* These values are only estimated and will vary significantly

Figure A.16 Excavation of the outdoor pool begins

Figure A.17 Completed buildings, and starting the outdoor pool

Figure A.18 Filtration system showing pipework, valves and labelling

Figure A.19 Completed pool being cleaned for handover

Case study 4

Type: 25 metre outdoor pool, toddler's pool; seasonal opening

Location: Yuendumu, Northern Territory

Site plan

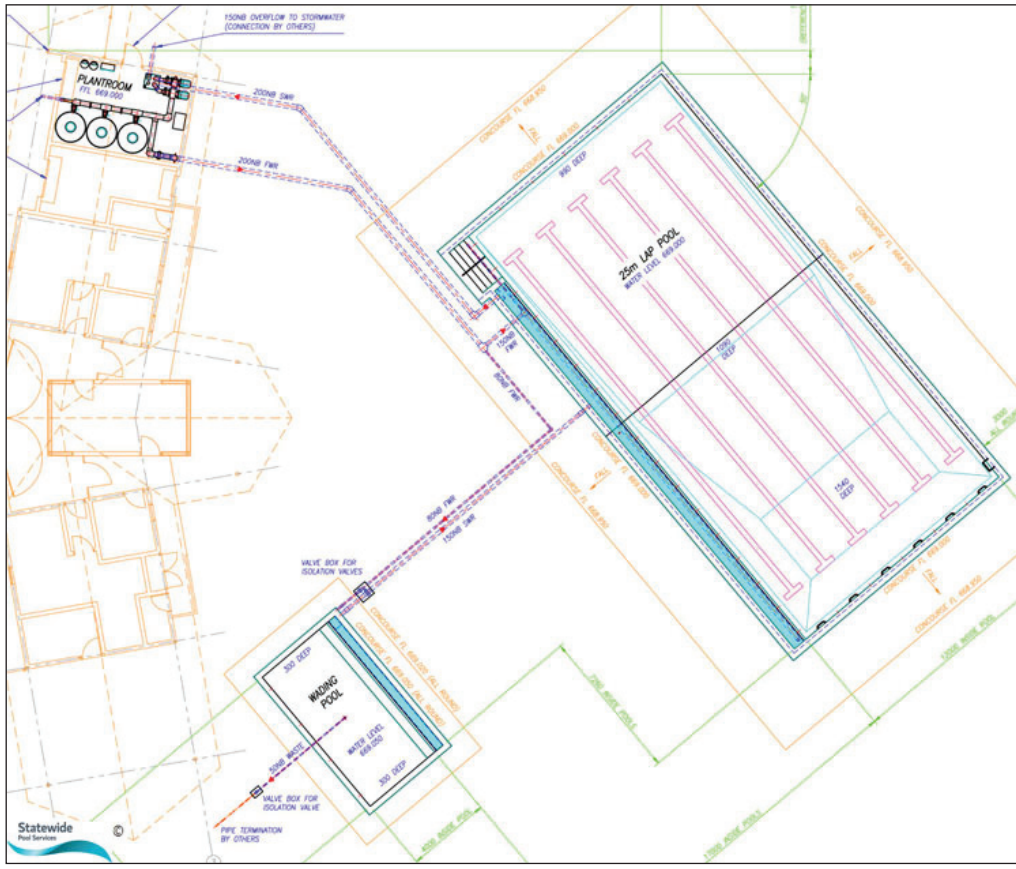


Figure A.20 Site plan for case study 4

Key data

Table A.4 Key data for case study 4

Capital cost	$2.9 million
Annual operating cost	$250 000
Pool dimensions	Outdoor pool: • 25 ´ 12 metres • depth of 1.0–1.5 metres Wading pool: depth of 0.3 metres
Pool surface area	Outdoor pool: 300 square metres Wading pool: 16 square metres
Pool volume	Outdoor pool: 330 kilolitres Wading pool: 9 kilolitres
Maximum bather load	100 people (both pools combined)
Initial water fill	470 kilolitres
Pool finish	Fully tiled with concrete 'stone' edge
Pool plant	Sand filter: 3.4 square metres Self-priming centrifugal pumps Saltwater chlorinator
Estimated water consumption* (kilolitres per year)	
Backwash	600
Evaporation	800
Bather exit losses	100
Use of showers	700

* These values are only estimated and will vary significantly

Figure A.21 Completed outdoor lap pool after a dust storm (cleanup needed before fill)

Figure A.22 Final stages of works and the toddler pool being tested

Figure A.23 Final stages of works before handover

Figure A.24 Pool, showing the perimeter fencing without a dust barrier, being prepared for handover

Figure A.25 Plant room showing (left to right): power control box, circulation pumps and filters

Appendix B Sample preplanning report summary

A swimming pool at Community X is not feasible because there is insufficient water supply, and the local water authority does not currently support the proposal. The water authority will investigate the possibility of developing an additional water source for the community and, if it is feasible, they will be able to reassess the availability of water for a swimming pool.

Needs

Although actual demand is not calculated in this report, there is substantial and majority community commitment towards having a pool in Community X, although the community support needs to be further established by more consultations and community education. The key needs identified by this preplanning report are:

- **A safe swimming environment.** Since Community X does not have a swimming pool, people – especially children – are drawn to water sources like creeks, waterholes and tanks to swim in, which are unclean and unsupervised.
- **Learn to swim.** The children of Community X and neighbouring communities have to travel enormous distances to learn to swim in a safe environment. Also, there is no opportunity for these children to enjoy intraschool and interschool swimming competitions. The small above-ground pool recently installed at the school is not suited to swim classes or competitions.
- **Recreation.** Families with children would use the swimming pool facility as a place to gather and socialise in an environment that is safe, clean and fun for children.

Pool design

The community's key needs point to a swimming pool facility that includes a variable-depth lap pool for recreation and learn-to-swim activities, plus a toddler pool for small children so that all families, with and without children, can use the facility. The toddler's pool area could also incorporate some play features that add to the range of available activities.

The size, technical specifications and cost of the pool to be built would depend on a more detailed assessment of the community's needs and the funds available. To facilitate further discussion within the community, this report discusses three case studies from other communities with an existing facility. These case studies are not design proposals. The community requires a more detailed needs assessment and further community consultations, and if this leads to a feasibility study, then the community will select a concept design.

Funding

Although the community has already contributed funds towards construction of the pool, it is not enough to fund a pool that meets all the community's key needs.

It may be possible to apply for a contribution towards capital funds through Shire Y. An application to state or territory government agencies or philanthropic organisations would be strengthened by further community contributions to the pool.

Some community corporations may be able to put aside funds over the next few years towards building and operating the pool.

There are no identified government or other sources of operational funding for the pool.

A suitable site has been identified for a swimming pool and is being incorporated by the Northern Territory Department of Lands and Planning in its new town plan for Community X.

We recommend that the pool project be progressed through a new swimming pool committee with the support of other community organisations over the next two years. During this time, Community X should concentrate on fund raising and further advocacy for the pool, both within and beyond the community.

Appendix C Water play areas

Splash park, splash deck, water playground and water play area (WPA) are all terms used to describe wet areas where water features, rather than a swimming pool, are the activity focus for children. Although a WPA becomes wet when in use, it does not hold water, and therefore does not have the same functional and risk characteristics as a swimming pool. Some communities have asked whether it would be best for them to have a WPA rather than, or in addition to, a swimming pool. The purpose of the information below is to provide some basic guidance to communities so that they can make appropriate decisions.

Although the end result is very different, the process of planning a WPA is virtually the same as for a swimming pool. These guidelines may also be used to plan WPAs in remote communities.

The processes may be similar between planning a swimming facility and planning WPAs, but there are different, yet important, benefits to the community. Swimming pools in remote communities provide children with the opportunity to learn valuable and potentially lifesaving swimming skills, but WPAs cannot provide this. Swimming pool facilities have also been linked to a variety of positive health outcomes, including improvements in general wellbeing, and reductions in eye, ear and sinus infections (NCEPH 1999). However, there are not enough WPAs in remote communities to know whether or not WPAs are linked to similar benefits.

WPAs generally cost less to build and require less supervision. However, it is important to realise that just because users cannot drown in a WPA does not mean that serious injury or death cannot occur. Therefore, supervision is always a planning consideration.

As with any community recreation facility, WPAs must be accessible, functional and well integrated into community life for any benefits to be realised. Even a single 'water mushroom' or wet slide can provide an activity focus for children, but the recreational value will increase as the number of varied water features increases. Many types of water features can be grouped to become a WPA and several companies operate within Australia to provide a full catalogue of water features. These companies can also manage the WPA project from design to completion. Given the wide range of suppliers and the very technical nature of WPAs, using the same design and construct tender process as used in these guidelines for swimming facilities is a compelling option.

There are three essential considerations for all WPAs:

- safety – users must be safe
- access – the target age groups must be able to access the WPA and those with disabilities must be considered

- quality – the equipment and materials used must be of high enough quality to perform in the community's conditions, and must perform over an expected life.

Table C.1 compares some advantages and disadvantages of WPAs to swimming facilities.

Table C.1 Advantages and disadvantages of water play areas (WPAs) compared to swimming pools

Advantages	Disadvantages
WPAs have a lower cost capital investment	WPAs cannot host learn-to-swim programs and safety programs
WPAs still require supervision, but not qualified accredited personnel	WPAs often involve less formal supervision, which can actually increase risk to users
WPAs need less water	WPAs cannot accommodate competition swimming
WPAs are interactive, and help children to learn to cooperate and socialise	WPAs are more suitable for younger people. Swimming pools are more inclusive, as people of all ages can enjoy them
WPAs have a lower operational cost	WPAs cannot offer the full immersion of a swimming pool, which has much better health outcomes (eyes and ears)
WPAs can provide cooling relief in hot weather	WPAs do not allow for accredited training and employment opportunities as a swimming pool would
	WPAs cannot accommodate elderly and infirmed people, for whom swimming pools have therapeutic benefits

Practical and technical issues

Every supplier will have a body of evidence or information – case studies, statistics, manufacturing data and compliance certification – that is intended to 'make the case' for their particular product. This information must be critically examined to determine its relevance to the community. It is easy to directly compare the same features of WPAs, and carefully evaluating tender offers is critical. For example, some water features are manufactured using coated milk steel; others use rigid plastics; still others use different grades of stainless steel. Evaluating which of these materials is most suited to the particular community environment is just one of many technical questions that must be answered when evaluating different brands, products and tenders. At this stage, communities should have engaged an expert who will be able to assist in this part of the process.

Some direct considerations around WPA design that the community will need to consider are described in the following sections. The community must remember that WPA facilities do

not just involve the water play base and surface, water treatment systems and water features themselves, but associated infrastructure such as plant and equipment enclosures, shade structures, power and sewerage, fending, pedestrian and disabled access, and car parking. The ***National Indigenous Housing Guide*** (FaHCSIA 2007) and the ***National Indigenous Infrastructure Guide*** (FaHCSIA 2010) are a valuable resource for communities in procuring these related facilities.

User age

Understanding the range of user age will enable the community to select water features that allow children to play at their own pace, and avoid congestion and potential collisions. High-energy activities, including fast water slides, tipping buckets and water cannons, are better suited to older children who are less fearful. Toddlers need gentler activities such as water spouts and small mushrooms. It is likely that, over the lifetime of the facility, a wide range of age groups will use it. Providing for a wide range of needs within a limited space and budget is always a challenge.

Format change

Because some water features can be simply unbolted and moved, it is practical to consider an arrangement where some water features will change from year to year according to evolving needs. This will also involve cost considerations.

Water supply

Many remote communities have a limited suitable water supply and this is often quoted as one of the reasons for considering a WPA. WPAs still need a significant water supply, and in some cases – depending on surface area, user numbers, water feature type, filtration plant and ambient conditions – they can actually use more water than a swimming pool. Water use will depend on many factors.

Filtration and sanitation systems

WPA water filtration and sanitation systems are very similar to swimming pool water treatment systems. The type of filtration plant used will affect water use and water quality. Even though the total water volume passing through the WPA will be less than the total volume of a swimming pool, the amount of water processed each hour may be just as great, or greater. Therefore, selection of filtration and sanitation system, chemicals to be used, the chemical metering systems and the handling and storage of chemicals are all important.

Water drainage

WPAs are usually zero depth, with water running off into drainage systems. The drainage systems are important, as pooling water can create a health hazard and a dangerous, slippery

surface.

Overspray area

It is important to have a fully drained overspray area for the WPA, which prevents soggy, dangerous perimeters when it is windy.

Surface selection

Because they have zero or little water depth, the selection of the WPA surface is critical. The base on which the water features are fixed – that is, the drained area – is usually made of concrete and covered with a synthetic rubberised material. This material is sometimes called 'soft fall' and, as the name suggests, it is there so that children do not hurt themselves when they fall. The soft fall is often multicoloured and is part of the fun theme that the entire design attempts to create. Selecting soft fall material involves a choice between softness and durability, with significant cost differences.

References

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2007). ***National Indigenous Housing Guide***, FaHCSIA, Canberra

FaHCSIA (Department of Families, Housing, Community Services and Indigenous Affairs) (2010). ***National Indigenous Infrastructure Guide***, FaHCSIA, Canberra.

NCEPH (National Centre for Epidemiology and Population Health) (1999). ***Swimming Pools in Remote Indigenous Communities,*** NCEPH, Canberra.

Appendix D Sample duty roster

Table D.1 Example of a duty roster for a small swimming pool facility

Monday–Friday

	Leisure pool	Toddlers pool
6.00 am – 8.00 am	Lifeguard 1	Lifeguard 2
8.00 am – 8.15 am	Pool manager	Lifeguard 2
8.15 am – 8.30 am	Lifeguard 1	Pool manager
8.30 am – 11.30 am	Lifeguard 1	Lifeguard 2
11.30 am – 12.30 pm	Duty manager	Lifeguard 2
12.30 pm – 1.30 pm	Lifeguard 1	Pool manager
1.30 pm – 3.00 pm	Lifeguard 1	Lifeguard 2
3.00 pm – 3.15 pm	Pool manager	Lifeguard 2
3.15 pm – 3.30 pm	Lifeguard 1	Pool manager
3.30 pm – 7.30 pm	Lifeguard 1	Lifeguard 2

Saturday

	Leisure pool	Toddlers pool
7.00 am – 9.00 am	Lifeguard 1	Lifeguard 2
9.00 am – 9.15 am	Pool manager	Lifeguard 2
9.15 am – 9.30 am	Lifeguard 1	Pool manager
9.30 am – 11.30 am	Lifeguard 1	Lifeguard 2
11.30 am – 12.30 pm	Duty manager	Lifeguard 2
12.30 pm – 1.30 pm	Lifeguard 1	Pool manager
1.30 pm – 3.00 pm	Lifeguard 1	Lifeguard 2
3.00 pm – 3.15 pm	Pool manager	Lifeguard 2
3.15 pm – 3.30 pm	Lifeguard 1	Pool manager
3.30 pm – 6.00 pm	Lifeguard 1	Lifeguard 2

Sunday and public holidays

	Leisure pool	Toddlers pool
9.00 am – 11.30 am	Lifeguard 1	Lifeguard 2
11.30 am – 12.30 pm	Duty manager	Lifeguard 2
12.30 pm – 1.30 pm	Lifeguard 1	Pool manager
1.30 pm – 3.00 pm	Lifeguard 1	Lifeguard 2
3.00 pm – 3.15 pm	Pool manager	Lifeguard 2
3.15 pm – 3.30 pm	Lifeguard 1	Pool manager
3.30 pm – 6.00 pm	Lifeguard 1	Lifeguard 2

Appendix E Sample operations manual contents

Contents

5 Emergency action plan

Emergency action (response) plan

Major aquatic emergency

Minor aquatic emergency

6 Occupational health and safety

First-aid equipment list and location

Personal protective equipment list and location

Incident reporting procedures

Hazard identification, isolation and repair

Chemical delivery, storage and handling

Material Safety Data Sheets (MSDS)

Plant inspections and frequency

7 Maintenance

Plant and equipment asset listing

Plant, building and grounds maintenance, and repair schedule

8 Pool operations and water quality

Pool specifications overview

Water testing frequency and parameters

Emergency contamination management

Chemical dosing and corrective actions

9 Programs

List of programs conducted at facility

Program safety requirements

Pool/program set-up requirements

Appendix F Sample asset register

Table F.1 Sample asset register

Item	Description	Pool	Technical data	Model	Serial no.	Manufacturer
P1	Pump 1	25 metre				
P2	Pump 2	25 metre				
P3	Pump 3	Toddler				
WFP1	Water feature pump 1	Water feature				
WFP2	Water feature pump 2	Water feature				
HP1	Solar heat pump 1	Toddler				
AB	Air blower	Toddler				
DP1	Dosing pump 1 (chlorine)	25 metre				
DP2	Dosing pump 2 (chlorine)	Toddler				
DP3	Dosing pump 3 (acid)	25 metre				
DP4	Dosing pump 4 (acid)	Toddler				
F1	Filter 1	25 metre				
F2	Filter 2	25 metre				
F3	Filter 3	25 metre				
F4	Filter 4	Toddler				
F5	Filter 5	Toddler				
AC1	Auto controller	25 metre				
AC1	Auto controller	Toddler				
WTSB	Water treatment switchboard	Combined				

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