

# environmental **HEALTH** HANDBOOK

A PRACTICAL MANUAL  
**FOR REMOTE COMMUNITIES**



MENZIES SCHOOL OF HEALTH RESEARCH  
NORTHERN TERRITORY AUSTRALIA



## WATER

### Case study – Household Water Use

The following table is based on the work of Paul Pholeros and Nganampa Health Council in the Anangu Pitjantjatjara Lands, and shows the estimated minimum and maximum water use required per house for improved health.

#### WATER USE PER HOUSE REQUIRED FOR HEALTH

	Litres/ day		Kilolitres/ year*	
	MIN	MAX	MIN	MAX
<b>Washing people</b>				
shower	150	400	54.8	146
basin or laundry tub	25	50	9.1	18.3
<b>Washing clothes &amp; bedding</b>				
washing machine	90	450	32.9	164.3
<b>Removing waste</b>				
flush toilet	30	140	11	51.1
<b>Improving nutrition</b>				
preparing food, kitchen sink	86	286	30.3	104.4
<b>Temperature control</b>				
evaporative cooling**	262	455	47.7	82.8
<b>Temperature control, improving nutrition, dust control</b>				
shading and food plants**	200	2000	36.4	364
<b>TOTALS PER HOUSE</b>	<b>840</b>	<b>3781</b>	<b>222</b>	<b>931</b>

\* A KILOLITRE IS 1000 LITRES. \*\* YEARLY TOTAL BASED ON 6 MONTHS OF USE DURING HOTTER WEATHER. SOURCE: 'ENERGY AND WATER REQUIRED FOR HEALTH IN HOUSING ON THE AP LANDS' (1997) BY PAUL PHOLEROS.

### Case Study – Individual Water Use

'Housing for Health' showed the average water consumption of individuals in five houses in Pipalyatjara in the AP Lands over the period June-December 1992 was 120 litres/person/day. The number of persons per household ranged from 0-32 persons (average 9.5), as determined by five separate house surveys over this period. A later study showed the average water consumption of individuals in three houses in Pipalyatjara over the period November 1995 to May 1996 was 212 litres/person/day. The population of these three houses ranged from 0-15 persons (average 10.6), as determined by six separate house surveys over this period. Water usage was thus about double the estimated absolute minimum requirement but



## WATER

only two thirds of a desirable level that might be associated with a reasonable lifestyle, according to Australian water supply guidelines for small communities of less than 1,000 persons.

SOURCE: 'HOUSING FOR HEALTH' (1993) BY P. PHOLEROS, S. RAINOW & P. TORZILLO.

'SAFE DISPOSAL OF WASTEWATER IN REMOTE ABORIGINAL COMMUNITIES' (1997) BY M. KHALIFE, H. DHARMAPPA & M. SVAKUMAR.

**A baseline of 'healthy water use' per person in the community may lie somewhere between 150-250 litres/person/day.**

### Water Quality – An Unpolluted Water Supply

What is water quality? How is water quality measured? How often should water quality be measured? Water quality can be affected by contamination with micro-organisms, chemicals and mineral salts or by the physical characteristics of the source of the water including the acidity and alkalinity (pH), suspended material (turbidity) and temperature, smell, colour and taste.

### Possible contaminants and Physical Characteristics of the Supply

#### Micro-organisms

Ill health is most likely to be caused by water contaminated with disease-causing micro-organisms. The microbiological safety of a water supply is usually determined by testing water samples for the presence of two indicator organisms – thermotolerant coliforms and total coliforms. These are bacteria that occur in faeces. They are a good indicator of water polluted with faeces and therefore possibly contaminated with disease-causing micro-organisms. A water supply is generally regarded as safe if these indicator bacteria are absent and the water supply is well managed - including filtration (where needed) and effective disinfection - and where regular sanitary surveys are undertaken.

#### Sanitary surveys include:

- checking for common sources of sewage or animal pollution;
- ensuring lids are on water tanks (to exclude people and animals);
- checking septic tanks are a safe distance from water sources;
- mending of bore casings and sealing old bores;
- fencing water supplies (to minimise the risk of animal pollution);
- checking the system of pipes used to reticulate the water;
- ensuring reservoirs and tanks are clean and covered; and
- storing water in clean containers.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## HOUSING AND LIVING AREAS

### Contacts and Further Information and Glossary

#### Publications

Nganampa Health Council, South  
Australian Health Commission, Aboriginal  
Health Organisation of SA. (1987).  
*Uwankara Palyanyku Kanyintjaku (UPK)*  
An Environmental and Public Health Review  
within the Anangu Pitjantjatjara Lands.

Healthabitat CAT, Pormpuraaw Housing for  
Health, 1997

#### Glossary (Key Words)

##### Builder

A person or company with a registered, and  
recognised, license to build buildings. Always  
ask for evidence of this license, and check it  
with the State Building Authority. The Builder  
will coordinate the whole project, they are  
responsible for doing the works in  
accordance with the drawings and contract  
and for checking that sub-contractors do the  
work properly too.

##### Building Consultant

A person or company who provides advice  
on building projects and can act on behalf of  
the client when dealing with builders and  
contractors. Sometimes a Building  
Consultant can be an additional and  
unnecessary cost for a small project.

##### Construction

Another name for building, it usually means  
the whole process of making a building.

##### Contract Documents

The drawings, specification, building  
contract and other legal documents that  
show what the builder is going to build, how  
much they have agreed to build it for, when  
it will be finished by and any special clauses  
they have agreed to.

##### Contractor

A person or company who provides a  
particular service during building. A  
contractor is not responsible for the whole  
project, and will not take responsibility for  
the work of others. Also called a sub-  
contractor.

#### Glossary (Key Words) continued

##### Design

The process of working out what the building  
will look like and what it will be built from.  
This process should involve consultation with  
the people who will use the building.

##### Design Consultant

A person or company who does the design  
process with the community. The Design  
Consultant should also do, or coordinate, the  
documentation of the building. Some Design  
Consultants can provide services during  
construction, like a Building Consultant.  
Design Consultants could include Architects  
or building designers. They should be able  
to show you evidence of their qualifications  
and experience.

##### Documentation

The process of drawing the building design  
so that Builders know what to build.  
Documentation might include writing a  
specification that describes the materials to  
be used and appropriate standards.

##### Living Environment

Houses and areas around houses that  
people use for daily living.

##### Maintenance

The process of checking, servicing, repairing  
and cleaning things in houses to keep them  
working effectively and avoid breakages.

##### Nutrition

The impact of food on health.

##### Sub-contractor

– see contractor

##### Tender

A process to get prices to do a building job.  
Usually a set of drawings, a specification and  
other documents (all called the Tender  
Documents) are given to a few Builders. They  
give you a price to build the building. Often  
one of the lower prices are chosen, however  
quality of work will be considered too.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGNING THE HOUSE AND LIVING AREAS

Su Groome & Paul Pholeros

### Introduction

In this chapter the important issues that must be considered when designing houses and living areas are discussed in terms of the following principles of safe and healthy living:

- will your house be safe?
- can you remove wastewater safely from the living area?
- is there power, water, wastewater disposal and plenty of space available at the site chosen for the new house?
- will the outside living area be safe and healthy?
- will your house be comfortable to live in?
- what will it cost to live in the house?

### Will Your House Be SAFE?

#### The Problem

Poor design, construction and maintenance can result in unsafe houses which threaten people's lives and health.

Electricity and gas, fire, glass, some building materials and a lack of security can threaten the safety of people and sometimes even their lives. To ensure that your new houses are safe, you should ask your design consultant to consider the following factors during design and construction of the house.

#### Electrical safety:

- make sure that people, especially kids, cannot be electrocuted – locate power points at least 1200mm above the floor, use water/dust proof power points in wet areas (like the bathroom) and on verandahs or outside walls, put safety switches on the power circuits;
- locate the fuse box in a safe position;
- fit the house with safety switches (RCDs);
- the consultant must ensure that the house is electrically safe before it is occupied by having it fully tested to comply with AS3000 or State power authority requirements.

#### Gas safety:

- gas bottles must be installed according to appropriate building codes and standards (WTI);



## DESIGNING THE HOUSE AND LIVING AREAS

- they must be securely fixed to the wall, not too close to windows or corners of the houses and have proper connections to the house;
- the consultant must guarantee that all gas lines and appliances are pressure tested to ensure their safety before someone moves in.

### Fire and fire escape:

- talk with the design consultant about the use of non-flammable materials in places where fires may start to reduce the possibility of house fires;
- ensure that people will be able to get out of ALL parts of the house quickly in the event of a fire. It may be necessary to provide alternative exits;
- make sure that the door-locks and security screens on houses will not trap people in the event of fire.

### Glass:

- if your community wants to use Lexan or other polycarbonate products in windows instead of glass, you will need to let the design consultant know.

### Security:

- if security is a priority for your community, you should discuss relevant design issues with the consultant, including yard fences, doors, windows, locks and cupboards;
- if a Council or Corporation is renting houses to people in the community, it is obliged to ensure that the houses are secure, by at least providing locks on the exterior doors.

## Can You Remove Waste Safely from the House?

### The Problem

Wastewater from the toilet, shower, basin, laundry and kitchen sink contains germs that are harmful to your health. When waste systems fail there is a high chance of poor health in and around the house.

Much of the waste system of a house is underground and is not easy to inspect or fix. It is essential that the initial construction is of the best quality and inspection of the work is carried out to check that all standards are met. This also needs to incorporate good design of toilets and floor drains. The following design ideas attempt to reduce known waste system problems.

In the wet areas (toilet, shower, bath, laundry and kitchen):

- separate all wet areas from the main house and floor level so that waste water does not run into the main living areas of the house;

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGNING THE HOUSE AND LIVING AREAS

- wet areas should be set down a minimum of 100mm lower than the main floor level of the house (see AP Design Guide for details). For high set houses they could be set down or separated by a slatted deck;
- use simple falls to drains and make sure the floor does fall to the drain;
- preferably use falls of at least 1:50 and run them in one direction to a single large drain. AVOID falls from three or more directions to a floor waste, because these often result in ponding of wastewater on the floor;
- reduce the number of in-slab drains where possible;
- all in-slab drains must have a minimum diameter of 100mm;
- include floor waste drains to all wet areas to assist simple cleaning of these areas. Ask the consultant to confirm there are floor waste drains in the toilet, laundry and kitchen areas and check these on the drawings.

Ask the consultant to use fail safe drains in all wet areas, which means drains that are designed to:

- consider the above principles;
- minimise the chances of blockages occurring; and
- include overflow points so if drains are blocked water does not enter the house.

Outside the wet areas and in the house yard:

- include maintenance access points for the toilet, all drains and the septic tank and soakage trenches (if required) – ensure these are installed at regular intervals and at every change in direction and intersection;
- discuss the real house population with the consultant – this includes all adults and kids that regularly stay at your house (even people who are just there a few nights a week); give the consultant an idea of the largest number of people who stay at your house during the year and how long they might stay for; check that the septic tank has been sized to allow for this real population, not just the number of bedrooms;
- make sure the septic tank, all underground pipework and trenches are protected from damage by vehicles and lawnmowers, construction of fences and landscaping.

### **Is there Power, Water, Wastewater Disposal and Plenty of Space Available at the Site Chosen for the New House?**

It is very important that the consultant discusses the siting of the house with the future residents and the whole community. They will need to identify which blocks of land are serviced by power, water, roads and sewerage (if your community has sewerage). It will be cheaper if new houses are built on a serviced block but sometimes this will not suit the community.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGNING THE HOUSE AND LIVING AREAS

### The Problem

- If new houses are built on the wrong block of land, it may not be possible to connect the houses to water, power or waste services – all of which are essential for the health of the house residents.
- If new houses are built too close to the neighbours you may not have room to sit outside or use the yard area around the house.
- If the new house faces the wrong way it may get too much hot sun and dust in summer or cold winds in winter.
- Careful siting of the house within the community and within the block of land is essential to make the house and surrounding yard healthier.

If people want to build new houses somewhere else you will need to:

- ask the consultant to tell you how much it will cost to provide power, water, sewerage and roads to the new housing blocks;
- work out if you can afford those costs from your existing budget, or find out if you can apply to the government to get some new blocks serviced.

Remember that these costs can be very high and might mean less houses for the community.

If you decide that you can afford to make new housing blocks in the community you will need to check that:

- you have the approval of potential Native Title Holders to build in that area (ask your elders or Land Council to assist);
- the development will not disturb any culturally significant places or plants;
- the housing blocks do not flood;
- the roads between the new living area and community do not flood.

It is important to think about the **climatic conditions** when siting houses. If houses are sited correctly they could be cooler in summer and warmer in winter. This means talking to the Design Consultant about:

- which way the good winds come from in summer;
- which way the bad winds (like winter winds, storms and dust) come from;
- how doors, windows and verandahs can be orientated to provide protection from the bad winds while getting cooling breezes in summer and sun into the house in winter;
- which way different rooms should face in relation to the sun, wind and views;
- which places outside the house will need room for sitting, camping, shade structures, motor cars and/or gardens.

Think about any social issues relating to siting the new houses, such as:

- how close to the street houses should be built;

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGNING THE HOUSE AND LIVING AREAS

- how close should the house be to neighbours and whether they will share yard areas;
- will rooms and verandahs overlook the neighbours or the street;
- whether there are any factors such as avoidance relationships or other cultural matters that affect the siting of houses.

### Will the Outside Living Area be Safe and Healthy?

#### The Problem

House budgets do not usually include any money for the yard area around the house, despite the clear preference of many people to spend time outside the four walls of the house and to use the area around the house for day-to-day living.

In many communities people like to spend time outside their houses in their yards. This might be because the house is too hot, too cold or too dark. Or it might be because the yard is a better place to watch what is happening and talk to other people. Some people prefer to cook outside on a fire and, when there are visitors, people sometimes camp outside the house.

But usually the money for houses stops at the front verandah. Your community can decide to include other things in the housing budget to develop the yard area and make it a better and healthier place to spend time. If you decide that yard areas are important for your community, it would be very valuable for you to talk to the Design Consultant about some of the following things:

#### Fences:

Do you need fences? What should they look like? How big should the fenced area be? How many gates will there be and where should they go? Do you need to be able to see through them?

#### Outside kitchen:

Do people want an outside kitchen as well as the inside kitchen? What should that include – a drum oven, a fireplace, a sink, a power point, a bench, shelves, a roof?

#### Water:

How many outside taps are there and where are they? Are the taps protected from damage by cars and kids? Should the house have a rainwater tank? Are there drains to stop the water from the gutters and taps making puddles and muddy areas around the house?

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGNING THE HOUSE AND LIVING AREAS

### Wastewater:

Where will the septic tanks and soakage trenches (if required) go? Have they been sited to make sure that the breeze does not carry any smells into the house? Will any overflow run into the places where people sit or camp? Can the trenches and septic tank be protected from cars? Is there still access for regular pumping out and maintenance?

1.1

1.2

1.3

1.4

### Sitting and camping spaces:

Is there enough room in the garden (away from the septic tank) for people to sit comfortably during the day and camp at night? Do these places get sun, shade and breeze at different times during the year?

### Plants and gardens:

Should money be included in the budget for landscaping? Is this just for buying plants or for planting them as well? Should the budget include an irrigation system? Are there existing trees to retain around the house?

2.1

2.2

2.3

2.4

### Cars:

Will cars go in the fenced/yard area? Do you need a car gate? Do you need carports and driveways? How can you keep cars away from the septic tank and trenches?

It is possible that some of these things can be done by the community through CDEP or even the tenant but you might need to include some money for materials in the house budget.

## Will Your House be Comfortable to Live In?

### 3.1

#### The Problem

- Houses may look good in drawings or models but when people move in they may find the house too hot or cold and need a lot of heating and air-conditioning which is expensive to buy and run.
- Simple things like hooks, shelves, door stops and towel rails may be missing, making it difficult to live in the house.

3.2

3.3

3.4

3.5

3.6

By choosing the right materials and appliances and making sure your house has the things you need in it, your Design Consultant can help to make sure your house is more comfortable and cheaper to live in. It is important that you talk to the consultant during the design process about what things you need in your house, about materials and finishes which will be used in your house and about things that





## DESIGNING THE HOUSE AND LIVING AREAS

you know have worked well or that have not worked in other houses in your community.

Some of the things that you will need to think about are discussed in other parts of this chapter and the chapters that follow. Other things you might want to check are:

- do you need fans and heaters, and in which rooms?
- how many people will sleep in the house, and in which rooms. Where will visitors sleep? Are the verandahs wide enough for people to sleep on them?
- what sort of finishes will be used in the house: including floor coverings, paint colours, doors, windows and cupboards?
- how you want to arrange rooms in the house. Should the bedrooms open off a living room or some sort of corridor? Should your kitchen be part of the living room or be a separate room? Where should the bathroom go?

There is a checklist in Chapter 3.6 that you can use when talking to your consultant to make sure you talk about all the things you need to. There is also a column on the check list you can use when checking the drawings to ensure the designer included all the features you wanted for the building. You might also like to use the check list in the AP Design Guide.

### What Will it Cost to Live in the House?

#### The Problem

- If householders can't afford to pay the bills for water, gas and electricity, their houses will be of little benefit to them.
- With good design, houses will use less water, electricity and gas than poorly designed houses.

It is critical to include the cost of running and living in the house when assessing design features. Sometimes things that might save money during construction will end up costing a lot more every day for people living in the house.

The Design Consultant has an important job and must assist you to get the balance right between houses that are cheaper to build and houses that people can afford to live in and gain a health benefit. If the consultant chooses materials and appliances that are cheaper to buy or not suited to your needs they will probably cost more to operate and not work as effectively.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGNING THE HOUSE AND LIVING AREAS

The consultant can help you by looking at what it will cost for each householder (family) to live in the house and providing you with a summary of the costs. This should include:

- the number of people likely to be sharing the house, ranging from the minimum and maximum population (which the community should give the consultant);
- an estimate of the average household income (which the community should give the consultant);
- the cost of electricity (provided by the community) and the weekly operating costs of all electrical appliances in the house;
- the cost of gas (provided by the community) and weekly operating costs of all gas appliances;
- water and wastewater costs, if any;
- the cost of different options for hot water heating;
- options for general heating and cooling of the house and costs;
- costs associated with storing (refrigeration) and cooking (stove) food;
- purchase costs of all appliances.

The consultant should provide you with options for the facilities and services in the house so that you can compare the purchase costs against running costs for all options.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



### Contacts and Further Information

#### Publications

Lloyd, C.R. and L Wilson (2000). Centre for Appropriate Technology. Ref. CAT 00/10  
*Hot Water Usage in Remote Indigenous Communities*

Lloyd, C. R. (1997). Centre for Appropriate Technology. Ref. CAT 97/3  
*Washing machine use in remote Aboriginal Communities*

Nganampa Health Council and the South Australian Health Commission (1987).  
*Uwankara Palyanku Kanyintjaku – An Environmental and Public Health Review within the Anangu Pitjantjatjara Lands.*

Pholeros, Paul and Nganampa Health Council (1997).  
*Energy and Water Use Required for Health in Anangu Housing on the Anangu Pitjantjatjara Lands;*

Tietz, C. (1994). Nganampa Health Council  
*The Washing Machine Report*

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





Christian Tietz

### Introduction

An important requirement for healthy living is a kitchen which gives residents the ability to hygienically store, prepare and cook food. Food preparation, storage and cooking areas should also be easy to clean, otherwise maintaining hygienic conditions will become a burdensome or impossible task. A kitchen which does not function properly leads to poor nutrition, discomfort, stress and ill health for the inhabitants.

Currently it is impossible to store, cook and prepare food and store and clean utensils in an hygienic and healthy manner in many houses in Indigenous communities.

### The Problem

- the quality of installation and the type of surface materials used for benches for chopping and preparing food;
- the design, type of materials and manufacturing of cupboards and storage areas;
- the performance of stoves, fridges, freezers and other appliances;
- the installation and proper specification of the electrical circuits for appliances;
- keeping taps and drains in a reliable working condition.

The combination of inadequate design, poor choice of materials, purchase of unsuitable appliances and fixtures and poor installation, leads to a kitchen environment which is difficult or impossible to maintain in a hygienic state.

The number of people occupying houses in Indigenous communities is often much higher than in the average suburban house and crowding is a common condition with sometimes as many as 30 people using one house. With higher populations ordinary 'suburban' standards, which can result in serious problems due to greater wear on moving parts such as hinges, taps, door handles and locks. Fixtures, fittings and appliances used in conventional suburban houses fail more quickly because they have not been designed for conditions of much higher use. It is critical to establish the likely peak population using the house and to design the kitchen with this in mind.

With more intensive use the details of the kitchen become much more important as the impact of failing components is suddenly magnified and problems or weak points show up much more quickly. Health risks can also

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

**3.2**

3.3

3.4

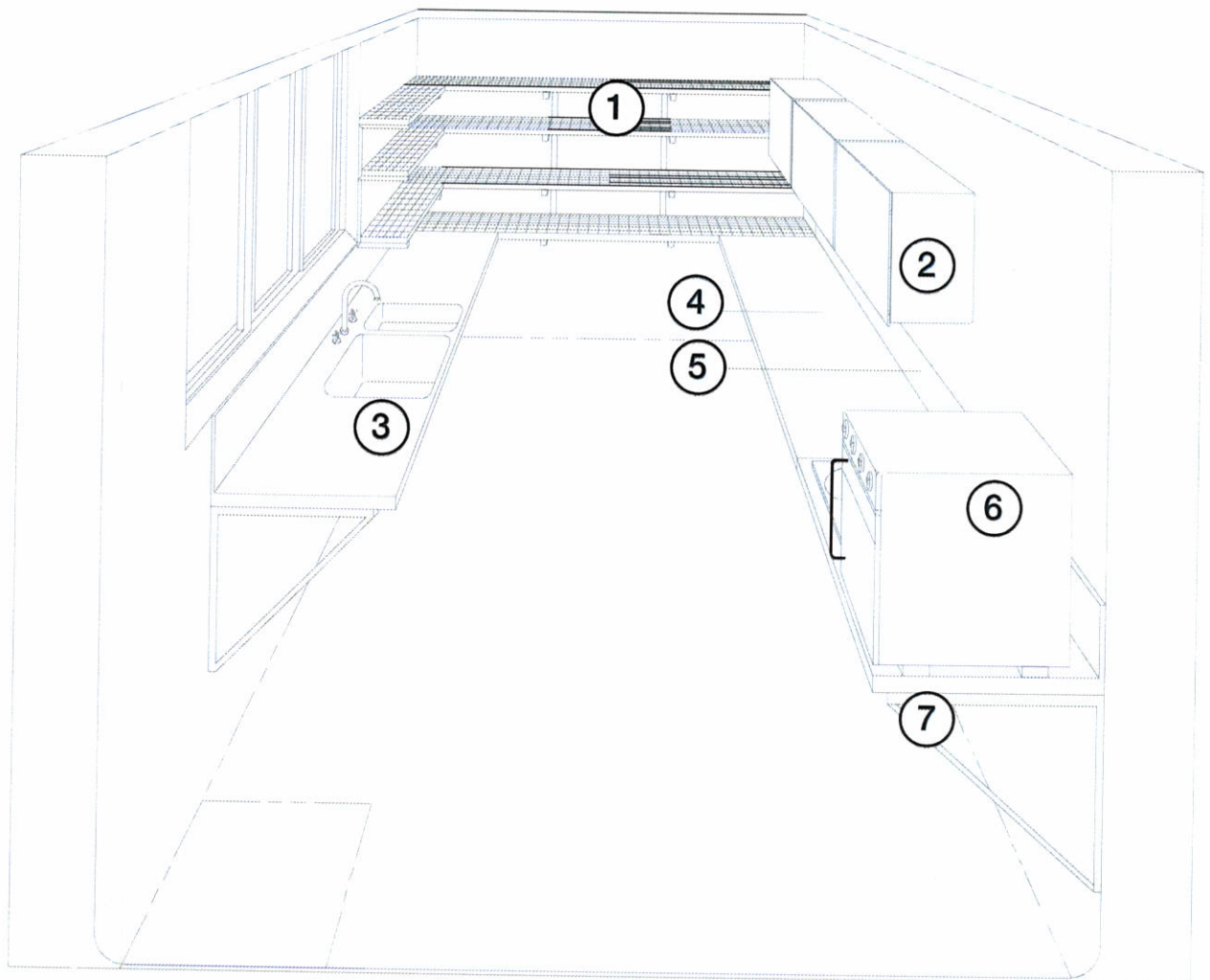
3.5

3.6



## KITCHEN DESIGN AND MAINTENANCE

### Suggested Kitchen Design



- 1 Wire Shelving
- 2 Moulded Cupboards
- 3 Stainless Steel Sink with Integral Splashback
- 4 Stainless Steel Preparation Bench
- 5 Integral Splashback
- 6 Stove/Oven unit
- 7 Wall Mounting Bracket



increase with higher house populations. Slow draining or blocked kitchen sinks can contain unhealthy bacteria. Fridges that are too small or don't work properly can spoil food, waste money and cause food poisoning. Rough, hard to clean bench surfaces can contain particles from food preparation (raw meat etc.) which attract pests and harbour bacteria that contaminate fresh food.

Poor kitchen design and component selection, poor quality installation and inadequate maintenance are major problems. Some kitchens are planned and constructed so badly that they are almost impossible to keep clean and pest-free. Refer to Checklists in Chapter 3.6 for further information.

This chapter promotes ways of designing and building kitchens to make them easy to clean and maintain in a hygienic state. Usually there will be cheaper materials or installation methods than those recommended, however the cheaper alternatives are unlikely to be robust or encourage healthy living. The recommended options are not necessarily harder or more expensive to implement. In remote locations where house populations are high and maintenance is expensive, irregular or non-existent, it can be far cheaper in the long run to spend more initially. The health of the residents depends on getting it right. When the ongoing costs of maintenance and poor health are considered, cheaper options are definitely more costly overall than choosing a better solution in the first place.

This chapter is based on experience in central Australian desert communities designing for organisations such as the Centre for Appropriate Technology and Nganampa Health Council. Therefore care should be taken when extrapolating to other regions. Most of the principles, however, are universal and apply anywhere.

### Food Preparation

When deciding on the type of bench-top to install, key considerations are the type of implements used, which foods are commonly prepared and the numbers of people living in the house. Some utensils used in preparing food for larger numbers of people might damage a conventional bench-top finish much easier, allowing water to penetrate and causing the deterioration of the bench. The front edge can delaminate and peel off revealing the chipboard underneath. A deteriorating bench-top can quickly provide a great breeding ground for bacteria and a feeding ground for all sorts of pests.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## KITCHEN DESIGN AND MAINTENANCE

### Bench Material

The various types of bench-tops are listed with their particular advantages and disadvantages.

#### **Stainless steel:**

HIGHLY RECOMMENDED

Health departments in every State and Territory require stainless steel to be used in every commercial kitchen.

#### **HD3, Corian, Marblo:**

RECOMMENDED

These materials are non-reactive, solid boards with high resin content made by Laminex, Dupont and Marblo.

#### **Compressed Fibrous Cement sheets (CFC):**

RECOMMENDED BUT ONLY IF

built on block work with proper support and rendered very well without any cracks and gaps.

#### **Stone, marble or granite:**

NOT RECOMMENDED

These are luxury materials which are good but depend on thickness, support and on good quality joining and fixing, some problems similar to laminex.

#### **Tiles:**

NOT RECOMMENDED

tiles are hard to clean since scraps get trapped in the space between. Tiles can crack and come loose from the support structure or if the grout deteriorates water and food particles will enter into cracks and encourage pests.

#### **Laminex:**

NOT RECOMMENDED

good for flat areas, but NOT when joined, delaminates at the front when water, moisture gets into the edge, the front strip will peel off. A bull nose and curved over Laminex will reduce this problem, but there is still a join to the splashback and to adjoining panels remain, which will eventually deteriorate.

#### **Laminated timber, particle board, plywood:**

NOT RECOMMENDED AT ALL!

These are the most commonly used materials, so what is wrong with them?

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



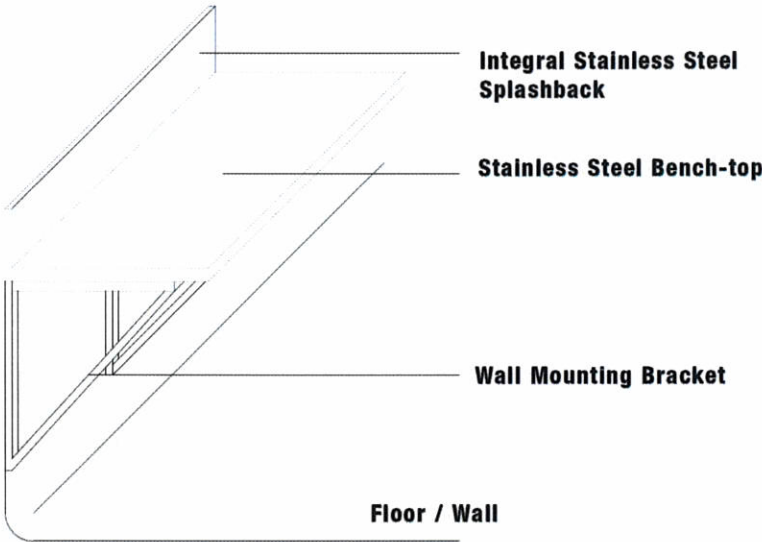
The surface of timber bench-top can never be completely sealed and therefore moisture and food particles get caught in it. The resulting cracks, even if quite small initially, are perfect for bacteria, ants and cockroaches. Cockroaches feed on small amounts of food and leave egg sacks in cracks. Polyurethane is commonly used to seal wooden bench-tops but only encases the top, once cracked it will peel easily like skin after sunburn.

**Bench Construction**

The bench should have solid structural support, a welded steel frame for example. Do not build cupboards underneath. The bench needs to be a size of 1.2m x 0.7m minimum and 0.9 – 0.95 m above the floor, with a 50 mm front edge. Where the bench meets the wall there should be an integral (ie. part of the bench, no join, same continuous material) splashback of 200mm minimum. This is extremely important as a measure to stop water and food scraps running down the back of the wall. The splashback should be sealed at the top, where it joins the wall, expertly with silicon or similar.

If the bench is made from stainless steel then an upturn or spill guard all round of 15mm can stop any liquids and scraps from falling on the floor. The bench top must drain into the sink, it has to be constructed with a slight incline towards the sink. This needs to be mentioned when ordering the bench-top and checked when it is delivered, otherwise water will pool and create unhygienic conditions.

**Suggested Preparation Bench Design**



1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

**3.2**

3.3

3.4

3.5

3.6



## KITCHEN DESIGN AND MAINTENANCE

### Can you Wash Food, Hands and Utensils?

#### Kitchen Sink

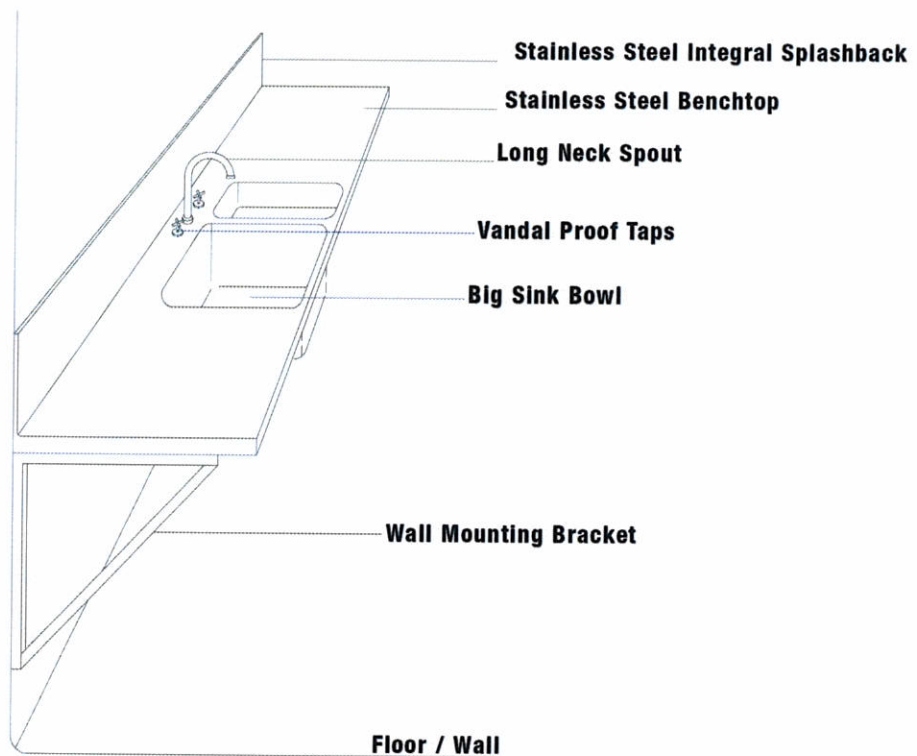
It is very important to have a working sink in the kitchen. It's not only used to wash up the dishes but it will also be used for filling big containers, billy cans and cleaning big pots. Blocked drains are a common problem and a sink blocked and full of stagnant dirty water is a health hazard.

#### Sink and Taps

A commercial type sink-bowl is the preferred type of sink. It is larger and deeper than a conventional household sink. It allows for easy and effective washing of more and bigger items, as often required when cooking for larger numbers of people. It also allows for filling of larger items with water. A double sink suitable for a 600-800mm wide bench is a good alternative.

Vandal-proof taps such as the Windsor range perform better in areas of high regular use and avoid common problems such as handles or knobs coming off. A regular maintenance programme should be implemented which will check for leaking taps etc.

#### Suggested Kitchen Sink Design



1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





The sink should have a 50mm waste-drain (plughole and pipe) with an attached plug. A sink without plug uses a lot of water, and the use of any other material (eg. newspaper) to plug up the hole is likely to block the drain as well. Correct installation of the waste is essential. The community store should always provide a good supply of suitable plugs. The Centre for Appropriate Technology sell an un-removeable plug which can easily be retrofitted.

### Sink Installation

Stainless steel bench tops have the advantage of being able to have the sink welded in, the best possible solution! If the sink is mounted into a separate bench it should be installed at about the same height ie. 900 – 950mm above floor level. The join of sink to bench should be completely watertight.

### Can You Store Food and Utensils Safely?

#### Food Storage – Non-refrigerated

All goods should be stored away from walls and off the ground. This will allow for more effective ventilation and thorough cleaning and inspection. Foods should be stored in tight sealing containers.

#### Cupboards

The best place for cupboards is mounted on the wall above the bench – no cupboard space should be available below bench level. Below bench cupboards are hard for older or bigger people to access and easy for kids, dogs and rodents to get into.

The ideal cupboard should be a moulded unit with integral lock and translucent doors. Conventional cupboard materials (such as chipboard or laminates) provide cracks at the joins as a result of not being hung correctly, moving with age and use, change of temperature and moisture in the air or knocks and bumps during transport to their destination. These cracks are ideal places for nesting space for cockroaches nesting and harbouring their eggs. The doors should be translucent so that light can enter the cupboard. Cockroaches are nocturnal and like it dark; having light inside will reduce their desire to live there. The door should ideally seal tightly, like a car door or fridge door. This will reduce dust and access by insects and pests. Attention should be paid to the cupboard door hinges and hinge mounting.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

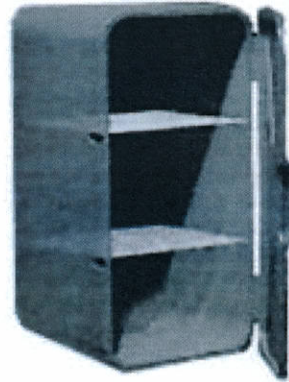
3.5

3.6



## KITCHEN DESIGN AND MAINTENANCE

This is important to ensure reliable performance and sturdiness. Studies have shown that even the hinges can provide a suitable environment for pests.



**moulded cupboard**

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

**3.2**

3.3

3.4

3.5

3.6

The cupboard should also be lockable, either with a provision for a padlock or more discreetly a cylinder door lock flush with surface. This will keep foods out of reach and sight of unwanted parties. Spare keys and a key cutting machine should be available in the community store.

### **Cleaning:**

To clean a cupboard easily it is preferable not to have right angle corners inside, rounded intersections are best. A moulded cupboard is ideal. If the cupboard is made from the usual laminated chipboard then all gaps could be sealed with silicone or similar material to reduce cockroach infestation. Where the panels meet there is likely to be some small crack that needs to be sealed. Special attention should be given to the cracks on top of the cupboard joints.

Another problem is food spills on top of cupboards. This can lead to spillage down the wall behind the cupboard. If the cupboard is moulded than this can be considered in the design of the unit.

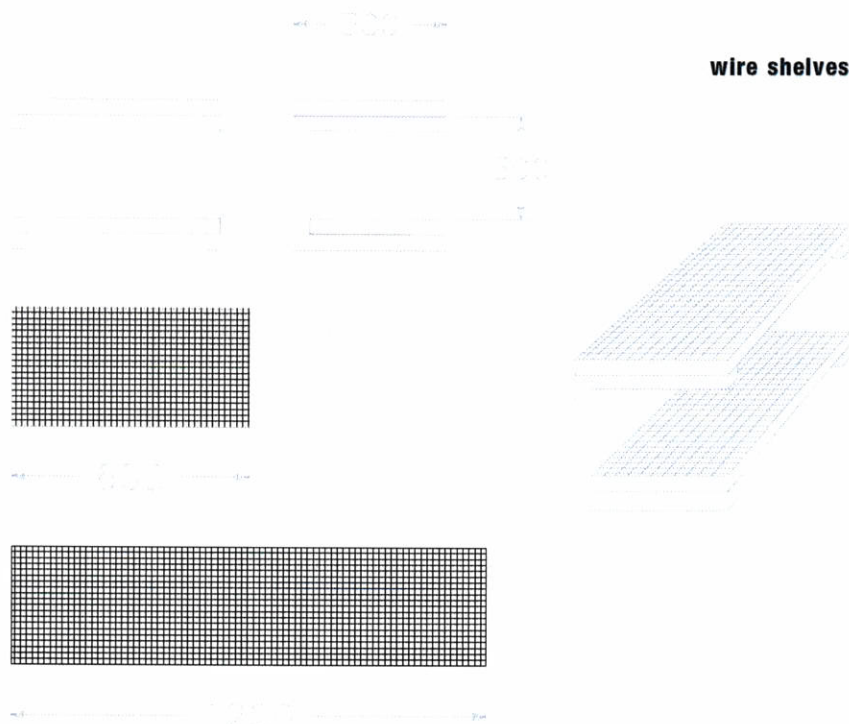
### **Ventilation:**

If the door seal is good, the cupboards should be ventilated with a small number of holes covered with very fine metal mesh. If the climatic conditions are very humid it is advisable to have the cupboard well ventilated yet screened with mesh. An added advantage is that cockroaches do not like air movement and are therefore less likely to live inside.



## Utensil Storage

Utensils should be stored in a well ventilated place; out of reach of dogs and kids. Options could be a hanging rail with hooks mounted on the wall or hung from the ceiling. Utensils can be hung from a rail or rack with butchers hooks or similar. Vinyl coated wire shelving can be used for storing pots and pans inside cupboards.



1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6

## Can You Keep Food Cold?

### Cold Storage

Fridges are not only used to keep food cool – they are also used to keep food safe. If there is not enough cupboard space, or if there are too many pests, the fridge provides a secure storage area.

If all the fridges are the same brand it might be possible to organise a routine maintenance programme by the supplier. Door seals and door closing should be checked for wear and tear to ensure a tight seal. This could dramatically affect your power consumption and efficiency of the fridge.





## KITCHEN DESIGN AND MAINTENANCE

### Fridges

Must have highest possible energy star rating. Fridges require regular servicing, preferably a maintenance check every six months. The temperature should be at least 4°C for the main compartment and -10°C or below for the freezer.

**Power consumption** is a very important consideration and can vary from manufacturer to manufacturer and model to model. The insulation and the state of repair of the fridge will influence its power consumption. The star rating provided by the manufacturer gives you a good indication of the efficiency and environmental performance of the fridge. The more stars the less power is consumed!

The fridge should be of a simple sturdy design. The door compartments can be too specific in their arrangement of trays and shelves. Plastic shelving can break easily and soon be of no use. Look for a fridge with very simple or no door compartments. Consider upside down type with the freezer on the bottom and the fridge at the top. Separate fridge and freezer doors are good, if an all in one unit is chosen. Freezer doors inside the main cooling compartment tend to ice up and then break easily, making the fridge less efficient.

Good insulation is essential. Upright freezers can be converted into sturdy and better insulated fridges with a simple change of the thermostat. A technician from town (eg. Alice Springs) can do this for about \$100 but contact the fridge/freezer manufacturer to recommend their local service person. Upright freezers converted to fridges are more robust because they usually have clear or wire shelving rather than fragile door compartments.

If defrosting is not usually carried out the ice takes up storage space and makes the appliance less efficient. **Frost free** models have an added advantage of no radiator panel at the back. This means less dust and dirt will accumulate and fewer pests will make it their home. Frost free models are available for both freezers and fridges, separate or combined.

The fridge should use a separate electrical circuit to reduce the chances of tripping the circuit breaker and therefore reduce the chances of food getting spoilt. It is also important for renewable energy systems.

The standard and commonly available power points and light switches are made of materials that will not last in dusty or humid environments. These normal switches and GPO's will wear quite quickly and corrode or short circuit. An industrial range of electrical fittings including dust and spray water proof switches are more suitable for remote environments.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



The fridge needs to be positioned well away from walls with about 200mm clearance all round. This will help reduce the good (warm and humid) breeding environment available for pests.

### Can You Cook Food?

#### Stoves And Cook tops (Electric, Solid Fuel, Gas)

Three options are presented with a quick statement of their suitability. Where solar or wind energy systems are installed reference should be made to chapter 2.2 Energy.

##### Electric

As most people have electricity connected to their house, the choice of an electric stove/oven seems appropriate for cooking inside.

##### Gas

Gas is excellent for cooking and shows a flame when operated thus giving a clear visual signal as to what to expect, ie. heat. Gas however, if not supplied by reticulation, has some problems associated with it. Issues include where to get a refill and how to safely connect it up. There is a lot of stored energy in a gas bottle not unlike a bomb, so correct installation and positioning is very important.

##### Solid Fuel

Ideal for cooking on the verandah, in the yard and maybe inside in winter in the desert region but during summer too hot to have in the house. Inside the house wood storage becomes an issue as well. Wood is, however, free and that is a significant factor. With a wooden stove only simple cooking utensils are needed to cook large amounts of food, minimal cleaning is required.

#### Electric Cook Top

points to consider

- **size of elements**  
large size as people use even large flour drums as cooking containers.
- **type of elements**  
solid cast iron elements last longer and are easy to clean.
- **number of elements**  
two large and one small since, more often than not, large meals are prepared.
- **positioning of knobs**  
preferred to be fixed to spindle so they can't be removed and get lost.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## KITCHEN DESIGN AND MAINTENANCE

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6

- **internal wiring**

special attention should be given to the way the wires are fixed to the element. In some cases the spade connector can expand after the stove has been on for several hours. Due to this expansion it can slip off from the hot plate connector rendering it useless. Soldered connectors or screw mounted connections are preferred.

- **separate unit for oven/griller**

ideally the cook top is separate from the oven griller. This makes it more independent and allows more options for placement (see wall mounted oven).

### Oven/griller:

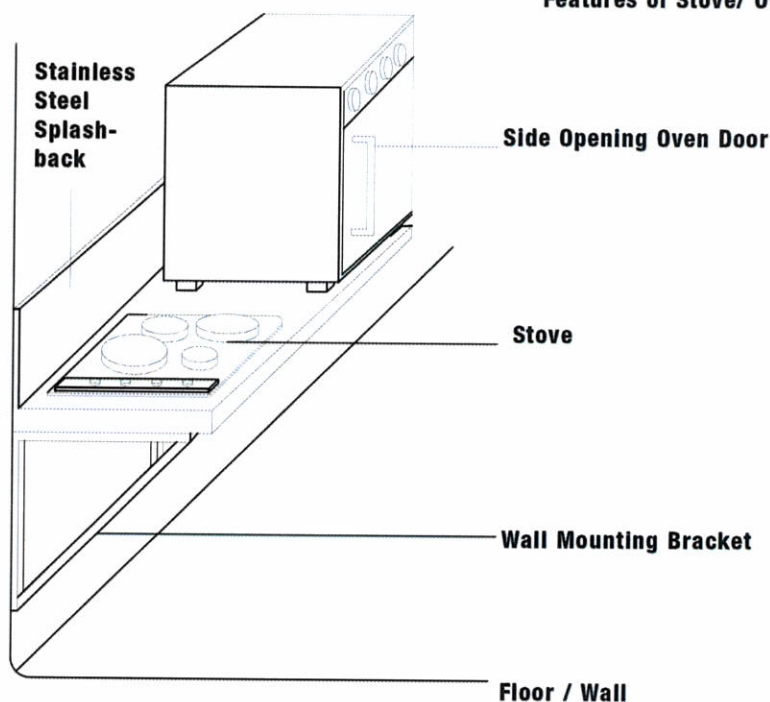
- **wall mounted**

better access for older and bigger users. Easier to see in, lightbulbs often fail due to the irregular generator power supply and that can make the oven very dark to look in when below the bench.

- **door opening direction**

The door handle is higher up and harder to reach for kids - this might help to prolong door life as swinging or standing on it is more difficult. If possible, get a wall mounted oven with an out and upwards sliding door motion, rather than a pull down door. Pull down oven doors might be used as a tray and could be reinforced by a wire or chain stay.

### Features of Stove/ Oven Unit







- **door hinge type**

A solid door hinge is recommended. Usually ovens come with a removable door. This does not work very well and the hinge should be tested well and possibly reinforced with a strong piano hinge and supported with wire or cable stays.

### Timer

- **why a timer?**

Timers are a good way of making sure that not too much energy gets wasted accidentally by kids turning the stove on and running away, or people forgetting to turn it off. This can happen in winter when stoves are sometimes used to heat houses.

- **kind of timer**

A one hour timer can be connected to the cook top in such a way as to switch the stove off one hour after being turned on. The timer should be connected to all the knobs. A strong and solid push button (from the clipsal industrial range for example) can be used to reset the timer and to obtain another hour of operation.

### Rodent proofing

It is very easy for mice to enter the stove / oven and make a good nest.

- **to prevent**

install a fine STAINLESS STEEL flyscreen metal mesh over any opening.

### Gas Cook Tops

#### Flame failure valve, gas fuse:

When using gas cook tops ensure that these are fitted with Flame Failure Valves. These stop the flow of gas if no flame is present. This device is most likely not fitted to single burners or twin burners gas burners available in surplus stores and elsewhere.

- Connecting bottles. If bottled gas is used in your community and no centralised supply and installation provided, it is essential to provide at least a workshop on how to connect up these bottles in the proper way. Provide advice on which tools to use and emphasise the tight fit required to ensure no gas leaks.
- Leaking gas costs money since the supply does not last as long. It is extremely dangerous when open flames are present and open fires are common on remote communities.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## KITCHEN DESIGN AND MAINTENANCE

1.1

1.2

1.3

1.4

### Solid Fuel

- Verandah cooking: CAT produces a Drum Oven that uses solid fuel and can cook food for large groups. It is efficient and provides an integral preparation area away from dogs and flies. A smaller modular version is also available which offers a cook top as well as an oven. The smaller version is for cooking while sitting on the ground. The larger version is used while standing. Both come with an integral flue.
- Simple cooking utensils are needed, dishes and big baking trays to cook large amounts of food.

### Advantages

- fuel efficient, no cleaning required, dog proof, potential storage container, can be lockable.

2.1

2.2

2.3

2.4

### Can You Easily Clean Surfaces and Kitchen to Discourage Bacteria, Insects and Vermin?

If your house has a bright environment, there are no cracks and there is no food available for the cockroaches, they will not want to live in the house. Cockroaches are phototaxis and repelled by light – they are active at night and hide throughout the day in dark cupboards, nooks and crannies. They are also thigmotactic and like to have all their body surfaces in contact with another surface. Filling the dark cracks (even the very small cracks) with silicone, using translucent materials for cupboard doors and not providing dark corners behind fridges and stoves will remove many of the places

where cockroaches like to live. Cockroaches are omnivorous and will eat any human, plant or animal food. If you do not want any cockroaches – do not leave any food out.

3.1

3.2

3.3

3.4

3.5

3.6

### Cockroach Prevention and Cleaning

**ONE = MANY!** Cockroaches are gregarious and like to eat in groups and then return to their home – a bit like a party! Moist warm and semi-dark environments are often found around electrical motors and electrical equipment such as fridges, washing machines, stoves/ovens and water heaters. These sites provide the best places for cockroaches and other pests to build their dream nests.



### Cleaning

It is very important to be able to clean with a minimum of effort. Regular cleaning will be more likely to happen if the areas which are hard or time-consuming to clean are minimised.

Good design and the right materials will provide an 'easy to clean' environment.

Remote community stores are often the only source for personal health hardware such as: soap, shampoo, towels, detergent, cleaning agents, scourers, mop, plugs, hose to tap connectors and many more – toilet paper, light bulbs, essential oils. Ensure that the store carries all of these recommended goods, (see Chapter 1.2 Community stores) .

### Clean with essential oils

Add eucalypt oil or tea tree oil to the cleaning detergent. Ants and cockroaches leave pheromone tracks which aid them to find their way back to the same place the next day. Pheromone tracks can be removed through cleaning with products that contain essential oils.

### Floor

If the floor is not easy to clean it will be an ideal place for bacteria and pest to live. A smooth floor surface that is water resistant and can be hosed out is ideal. If the floor is concrete it could have a smooth steel trowel finish with coving at the wall. The floor should be graded towards the floor waste without any dips in which the water can sit and not drain away. Water should be able to drain away through a 100mm floor waste with a grease trap outside.

Electrical outlets should be not be at floor level to be out of reach of kicks, bumps and small children.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## KITCHEN DESIGN AND MAINTENANCE

### Contacts and Further Information

#### Organisations

The following organisations can provide information and advice regarding the design, construction and maintenance of kitchens.

##### **Nganampa Health Council Inc.**

3 Wilkinson Street,  
Alice Springs NT 0871  
Phone: (08) 8950 5472

##### **National Technology Resource Centre (NTRC) Part of CAT Inc.**

Toll Free number: 1800 817 707

- Provides free information for remote communities on technical matters.

##### **Centre for Appropriate Technology Inc. (CAT Inc.)**

34 – 36 Priest Street  
Alice Springs NT 0871  
Phone: 1800 8177 07 or 08 8951 4311

- Sells and manufactures drum ovens, and other outdoor cooking equipment.

##### **Standards Australia**

Alice Springs NT 0871  
Phone: (08) 8981 9666

- Australian Standards Association provides standards for kitchen assembly.

##### **The Building Centre**

Phone: (02) 9319 3050

- Bookshop, library, research, has a section for kitchens and design,

**Environmental Health Officer working with your local area health service provider.**

#### Publications

**Nganampa Health Council, Alice Springs, (1987)**

*UPK Report*

**Health Habitat (1993)**

*Housing for Health*

ISBN: 0 646 17334 0

**Department of Family and Community Services (1999)**

*The National Indigenous HOUSING GUIDE*

ISBN: 0642 39979 4

**National Technology Resource Centre (NTRC), (1997)**

*"Stove Report"*

**NTRC / CAT (Publisher)**

*Our Place Magazine*

ISBN: 1325 – 7684

For the installation requirements of stoves see the report available from the NTRC (see contacts)

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



Stephan Rainow

## Introduction

In this chapter, the important issues that need to be addressed when designing the wet areas within a house are discussed. This particularly relates to the design of the shower and laundry facilities. Of the healthy living practices listed in the introduction to section three this chapter specifically addresses:

1. Ability to wash people, especially children (shower).
2. Ability to wash clothes and bedding (laundry).
3. Ability to safely remove wastewater.

This will require close attention to the design, construction, supervision of construction and ongoing maintenance to ensure wet areas continue functioning for as long as possible.

The most important health outcomes to result from an improvement in the wet areas of houses is a reduction in the occurrence of infectious diseases.

These include:

- diarrhoeal disease;
- skin Infection;
- respiratory disease;
- pneumonia;
- trachoma.

As noted in the introduction to Part 3, there are a range of problems which affect the availability and functioning of wet area facilities. This chapter will look at the common problems and their solutions in the shower and laundry area. These include fittings and fixtures, hot water units, washing machines and drainage.

## Can People Wash Their Children and Themselves?

### The Problem

The availability and regular use of hot showers in communities is limited and many surveys have shown that there is a high failure rate in the use of shower cubicles.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGN OF WET AREAS

### The Shower

The reasons for this failure usually include:

- lack of privacy of shower cubicle;
- lack of hot water;
- tap handles falling off;
- lack of towel racks, clothes hooks and soap and shampoo holders;
- problems with the shower rose eg. wall mounted and too low;
- poor ventilation;
- blocked drains; and
- poor choice of electrical fittings and fixtures.

The design will be greatly improved if there is adequate privacy, the wet areas do not affect the rest of the house and the shower is comfortable to use (see the section in this chapter on the design requirements of the shower and laundry areas).

### Comfort and Hygiene:

Make sure that the shower cubicle is big enough, easy to clean and that the water drains away quickly rather than pooling on the floor. The features listed below should all be present and working:

- cold and hot water;
- cold and hot taps;
- shower rose;
- functioning drainage;
- a lockable door;
- a light;
- towel rack/clothes hooks;
- soap / shampoo holder;
- adequate ventilation;

### Hot Water System

A good supply of hot water is critical if the health benefits of a well designed shower wet area are to be achieved. To begin with there needs to be sufficient space for a hot water unit if it is mounted internally. Common problems with the provision of hot water include:

- high energy costs eg. up to 60% of total house energy cost;
- inadequate amounts of hot water particularly in the mornings and evenings – the peak demand periods;
- high maintenance requirements;
- poor initial choice of hot water units;
- poor installation – for example, incorrect orientation of mounted solar units.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGN OF WET AREAS

Hot water units need to be able to produce about 400 litres of hot water at 60°C over a 24 hour period. There are four main types of systems – electric, solar, gas and heat exchange. Each type has its own requirements and these are listed below.

### For an electric hot water system:

- check element size and type – to reduce energy usage and cost when using 'salty' or bore water, fit only 2.4 kilo watt elements not 3.6 Kw and use low density incoloy elements;
- fit a sacrificial anode suitable for your water quality – water that has high total dissolved solids (TDS) will require a different anode from that required by a lower level of TDS in the water;
- set thermostat at 60°C – if the thermostat is set higher then the salts in the water will settle out on the element a lot more quickly;
- check the recharge time – smaller quick recovery systems should recharge after 20 minutes if maintained properly but at peak demand periods this time interval may be too slow; larger units that do not operate on a quick recovery basis (eg. 250 – 300 litre types) can lose all their hot water in one long shower and other people in the house will then have to wait a long time before hot water is again available.

### For a solar hot water system:

#### check that:

- the solar panels are correctly orientated and mounted at the right angle – they should be facing in a northerly direction;
- the charging of the unit with the heat exchange fluid is occurring effectively;
- if a house collects rainwater for drinking purposes then it is essential to make sure that the heat exchange fluid (glycol) does not escape from the solar hot water system and contaminate the rainwater supply.

### Gas hot water system:

#### must be:

- positioned in the right place;
- safely installed.

### Heat exchange hot water system:

#### needs to be:

- correctly installed;
- located in the best position;
- have a safe electrical connection with a dedicated electrical circuit.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGN OF WET AREAS

### Maintenance of hot water systems:

Routine maintenance carried out twice a year on the hot water service should be adequate to keep them going.

### Example of maintenance routine:

- for electrical hot water units fit the sacrificial anode that is suited to your water quality. If you have high salts in the water fit a 2.4 Watt low density incoloy element it should last longer;
- set the thermostat at 60°C;
- check H/W circuit to switchboard;
- check element - replace where necessary;
- check anode - replace;
- check thermostat - replace;
- flush out unit;
- check relief valves and all other related valves and plumbing.

Most of the maintenance jobs can be carried out by Environmental Health Workers and housing maintenance teams. These jobs include:

- refit/replace tap handles;
- replace shower roses;
- service tapware;
- refit/replace floor waste grates;
- refit/replace clothes hooks, towel racks, soap/shampoo shelves; and
- minor works on cladding, doors, door handles, privacy locks.

### Can People Wash Their Clothes and Bedding?

With regular and effective washing of clothing and bedding, both adults and children will have a reduced exposure to faeces, secretions and the scabies mites. This in turn will reduce disease in the community, especially skin infections and diarrhoea.

#### The Problem

There is often an absence of ongoing access to laundries and washing machines that provide adequate facilities and are maintained and functioning.

#### The Laundry

A Laundry needs to be easy to clean and to have good drainage with no ponding. Specifically, a laundry needs to have:

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGN OF WET AREAS

- a wall mounted tub big enough to bathe a child;
  - cold and hot water;
  - cold and hot taps;
  - separate taps for the washing machine;
  - separate drainage outlets for the washing machine;
  - a heavy duty working washing machine (can it wash a blanket?);
  - functioning drainage;
  - shelving;
  - lights;
  - dustproof and waterproof power points and switches;
  - adequate ventilation;
  - security - the room should be lockable to secure the washing machine.
- But even if these facilities and components are all present in the laundry, they are of no use unless they are maintained in working order at all times.

The **location** and **ventilation** of the laundry requires careful consideration. Think about the sun and the wind – the laundry needs to be comfortable to work in. Try to keep the cold winds and the hot sun out and allow for a sunny area to dry the clothes in. The room needs to be well enough ventilated to allow adequate air flow but not so much that it becomes too cold in winter.

### Tips for Washing

- shake out clothes and bedding before washing;
- use only a handful of washing powder for one load;
- run the washing machine without any clothes or soap powder once a week to clean out the pump.

### Washing Machines – Choosing the right one:

Washing machines should be regarded as essential health hardware because of their very important role in reducing the level of infectious diseases. They are generally a prized possessions because people understand their value in controlling the spread of disease.

Unfortunately most houses do not have functioning washing machines and if they do, the high cost of a new washing machine means that smaller secondhand machines are purchased. These are not big enough to wash blankets and sometimes have faulty electrical components. Monitoring of the use of washing machines in two communities has shown that they are used extensively and a home catering for a lot of people will need a heavy duty machine. These commercial grade washing machines could be supplied by the public housing programme and it would be preferable if

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## DESIGN OF WET AREAS

they are all of the same brand and model. This will reduce the problems likely to be encountered in the twice yearly maintenance regime which is required for the machines.

When purchasing the machines make sure the supplier will also install them. This will ensure that:

1. The installation is done to the manufacturers specifications and should result in reduced maintenance. Installation should include an angle iron bracket to fix the machine in a level position - hoses properly fitted with no leaks, there is an independent waste outlet for the washing machine.
2. It will demonstrate whether the supplier is prepared to provide a back up service including regular twice yearly maintenance runs to the community.

Remember that a commercial grade machine will need an area of about 800 x 800mm to fit in the laundry.

When you want to buy a washing machine, check for the following features:

- Ability to wash large heavy blankets - 7-8 kg capacity;
- robust hard wearing model and brand;
- easy to use;
- single on/off switch with heavy duty push button – or one that can be easily modified to this;
- single phase;
- single cycle;
- cold water only with no heater;
- energy and water efficient;
- standard tap fittings for connections;
- a dump valve;
- detergent feed;
- low spin;
- water pressure 20 to 120 psi;
- reasonable access to spare parts/repairs.

More information is available in the *Washing Machine Report* (see Contacts and Further Information).

The installation, operation and maintenance schedule for washing machines should include all the following requirements:

### 1. Installation:

- check that the machine is level;
- check the hot and cold water connections;
- check for water leaks.



### 2. Operation:

- check agitator for excessive play;
- check for correct fill time (5 – 7 minutes);
- check operation of water select switch;
- check correct water level;
- check timer and start button /coin slide;
- check indicator lamps;
- check lid unbalance switch;
- check correct wash cycle.

### 3. General maintenance:

- take off hoses and clean strainers;
- remove front panel and clean internally;
- check for general wear and tear;
- check gear box assembly;
- check bracket/clutch assembly;
- check drive belt for correct tension;
- lubricate idler pulley;
- check pump drive belt;
- check pump for leaks;
- check spring tension;
- refit front panel.

(COURTESY: DIETER HENTSCHEL, ECS MAINTENANCE MANUAL).

The use of particular types of washing machine has been surveyed in two communities with 10 houses being monitored. The results of this survey clearly demonstrate the need for large capacity, heavy duty machines.

**Make and Model:** Speed Queen, Top Loader;  
**SQEA2011 8kg load.**

**Usage:** An average of 2.8 hours/day  
This is equivalent to: **3 cycles/day or 1095 cycles/year.**

### Laundry and Shower Design

#### Building material:

Because the shower and laundry are wet areas building materials must be chosen for their resistance to water damage and ease of cleaning. Masonry walls provide a solid base for tiling, will not rust in corrosive or aggressive water and help retain stable temperatures.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

**3.3**

3.4

3.5

3.6



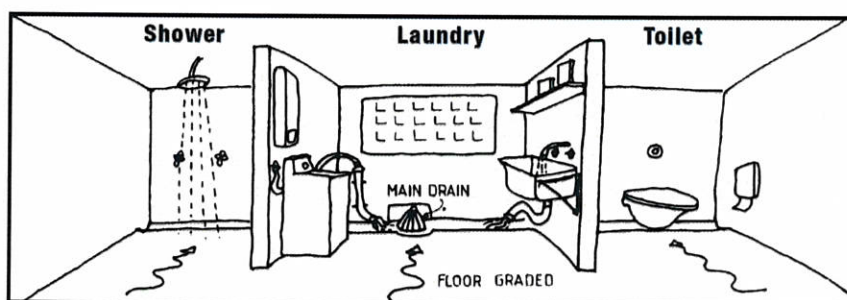
## DESIGN OF WET AREAS

### Privacy:

The design of the house should separate the toilet, shower and laundry, allowing people to use the shower, toilet and to wash clothes at the same time while maintaining full privacy.

### Separate Rooms

When there are large numbers of people using the house, separate areas within the shower laundry toilet complex will allow all of them to be used at the same time.



### Separation of wet areas:

The separation of the shower and laundry area from the rest of the house can be achieved by:

- moving the shower and laundry to the edge of the house or verandah with a verandah or walkway between it and the living area;
- building a 'set down' so that the shower and laundry floor is below the level of the floor of the main house – if the drains become block then the wastewater will not flow into the rest of the house. The UPK recommends a 100mm set down.

### Space and security:

Remember there must be enough space for the hot water system (if an internally mounted unit) and the larger commercial grade washing machines. The laundry should also be lockable to secure the washing machine.

### Plumbing and electrical hardware:

When installing plumbing and electrical components you must follow all the regulations referred to in the Chapter 2.2 Energy & 2.3 Sewage.

### Plumbing:

Plumbing should:

- avoid exposed pipework;



## DESIGN OF WET AREAS



- use the anti-vandal type of tap handles rather than the ones that fall off;
- avoid wall mounted shower roses as they are generally too low and have too many moveable parts which require more maintenance;
- use ceiling mounted shower roses;
- avoid water saving shower roses in areas where water has a high salt content;
- where water is aggressive use robust breach pieces.

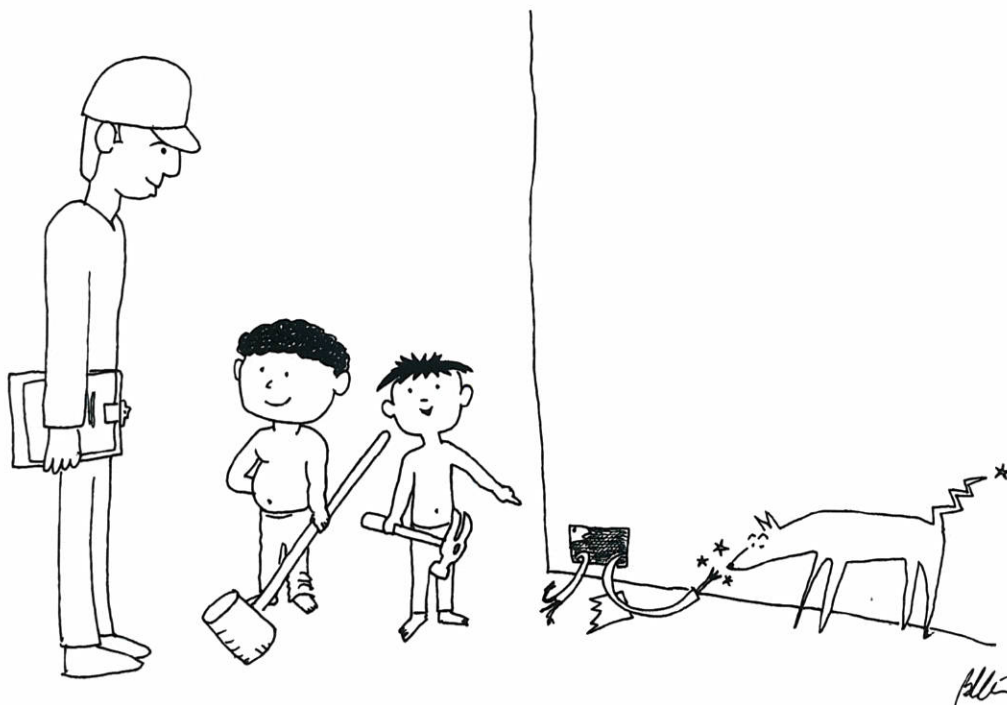
### Drains:

You need to:

- ensure floors are well graded with a 1 in 40 fall – 75mm over 3m;
- main floor waste drain should be 100mm minimum and connected directly to a 100mm pipe;
- be able to put a 100mm drain plunger straight into the drain.

### Electrical fittings and fixtures:

The UPK recommends that dustproof and waterproof electrical switches and power points and I/P rated (moisture resistant) light fittings be used. These need to be mounted a minimum of 1200mm above the floor for safety reasons (for example, so that small children cannot poke things into the powerpoint).



**Power points should be located 1200mm above the floor for safety reasons**

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



## DESIGN OF WET AREAS

### Can Wastewater be Safely Removed?

Effective and efficient removal of wastewater is important in the reduction of acute and chronic diarrhoeal disease, skin infections, hepatitis and polio.

#### Problems with wet area drainage:

- frequent blockages of small waste grates and traps;
- slab waste pipes are difficult to unblock;
- poor floor grades;
- flooding of the main body of the house with wastewater from the wet area;
- use of dry waste systems in laundry floors.

#### Good design can eliminate many of these problems by:

- avoiding inslab drainage;
- using 100mm sewer pipe;
- using 100 – 150mm floor waste grates;
- proper grading of the floor and the installation of failsafe drainage points  
This allows wastewater from blocked pipes to be evacuated from the wet area itself and not back up into the main body of the house;
- supervision and testing of all sewer pipe work to ensure proper function of the drains;
- ongoing cyclical maintenance of the total drainage system including all internal and external drainage points;
- installation to ground level of all inspection openings for ease of access for maintenance.

#### Reuse of grey water:

It has often been suggested that grey water can be reused on trees and gardens. A study conducted in one community showed no significant difference between the level of faecal coliforms in the grey water when compared with the black water from the toilet. For this reason, reuse of grey water should not be encouraged especially if it is simply irrigated onto the ground surface. The use of effluent on controlled camp site (see Chapter 1.3) could be considered however permission may be required from local or State health authorities for reuse of grey water.

#### Septic tank maintenance:

Communities need to be properly equipped to pump out septic tanks regularly and to rod sewer lines. Basic equipment includes a septic tank pump out truck or trailer and an electric snake to unblock pipes. (Refer to

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6



### Contacts and Further Information

#### Contacts

State or local health department  
Environmental Health Officers.

#### Publications

Australian Standards AS3500  
*Plumbing and Drainage Code*

Lloyd, C.R. and L Wilson (2000).  
*Hot Water Usage in Remote Indigenous Communities*

Ref. CAT 00/10  
Centre for Appropriate Technology.

Lloyd, C. R. (1997).  
*Washing machine use in remote Aboriginal Communities*

Ref. CAT 97/3  
Centre for Appropriate Technology.

Nganampa Health Council and the South  
Australian Health Commission (1987).  
*Uwankara Palyanku Kanyintjaku – An  
Environmental and Public Health Review  
within the Anangu Pitjantjatjara Lands*

Pholeros, Paul and Nganampa Health  
Council (1991).  
*AP Design Guide B – Building for Health  
on the AP Lands*

Pholeros, Paul and Nganampa Health  
Council (1997).  
*Energy and Water Use Required for  
Health in Anangu Housing on the Anangu  
Pitjantjatjara Lands*

Tietz, C. (1994).  
*Washing Machine Report*  
Nganampa Health Council.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

**3.3**

3.4

3.5

3.6





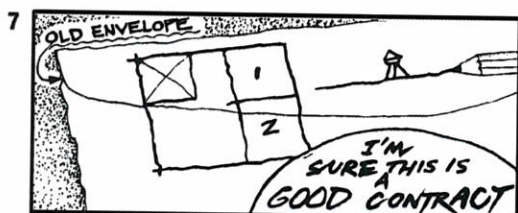
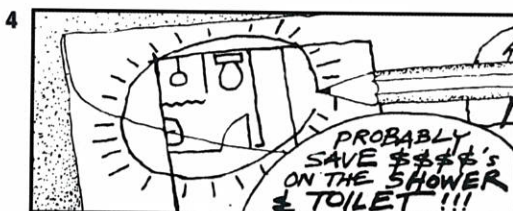
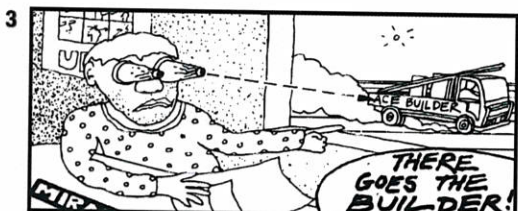
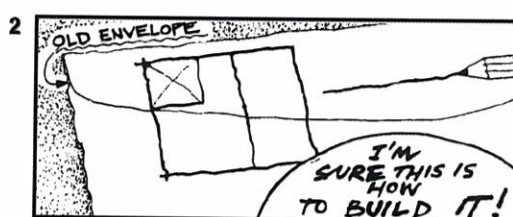
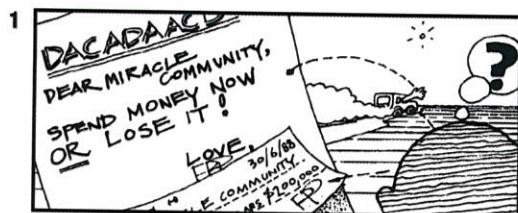
## MANAGING THE CONSTRUCTION PROCESS

Su Groome & Paul Pholeros

### Introduction

In this chapter the problems associated with construction of buildings in the community are discussed. The key questions to be answered are:

- how will you choose a consultant and what can you expect for your money?
- how will you know what is going to be built?
- how do you know if the builder is doing a good job?
- the rights and responsibilities of contracts?





## MANAGING THE CONSTRUCTION PROCESS

### How Will You Choose a Consultant and What Can You Expect for Your Money?

#### The Problem

Not all Design Consultants will give you the same service or the right service for your community. How do you know which one to employ and that they will do a good job?

If you are asking several consultants to provide a quote for work in your community, you will need to be able to compare their quotes and the services they are offering.

Begin by having a clear idea of the work you want done by working through the questions in Chapters 3.1, 3.2 and 3.3. Make a list of the things you expect the consultants to do and give them that list before they give you a quote for the job.

Consultants should provide you with detailed information about the services and work they will provide for the price when they quote for a job. This should include:

- their past experience, including contact details for people or communities they have worked for and examples of the work;
- which methods they will use to design the house and consult with the community;
- a guarantee that they will provide all the services you have asked for;
- how they will make sure that people understand what is to be built and where it will be built;
- what supervision will be provided during the building of the house;
- the quoted cost for this work which must be the full total including any extras such as travel, accommodation, printing, phone calls etc. This should be itemised.

You can check on the quality of a consultants work by contacting people or communities they have worked for before and asking:

- whether they were happy with the work and would employ those consultants again;
- the good points and bad points about the project;
- whether the house was built on time and budget;
- whether the people living in the houses are happy with them.

It might be helpful to use this information to make a checklist which can be compared the consultants. A sample checklist is included on checklist A in Chapter 3.6.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## MANAGING THE CONSTRUCTION PROCESS

The consultant must be required to sign a contract with the community. There are some standard contracts available from the Royal Australian Institute of Architects, the Building Designers Association or Master Builders in your State. You should attach to the contract the information about what they said they would do for the community and how much it would cost to undertake the contract.

### How Do You Know What is Going to Be Built?

#### The Problem

House drawings can be difficult to understand. It is important that the consultant explains the drawings to you, especially what will be built and where it will go.

When employing a Design Consultant, you will need to discuss with them how they plan to work with your community to design the houses and communicate their work with the people involved. Some of the things that you need to think about are:

- do you want the consultant to design a building specifically for your community or should they bring some standard plans that people can choose from;
- who the consultant should talk to when designing the house – the Community Council or the people moving into the house or both;
- whether they should take people to look at other houses to get ideas, make a model of the building(s) or present computer drawings;
- whether you will choose someone in the community to approve the drawings and the budget and how they will know if it is right;
- whether the consultants will need to be able to speak your community language or whether a translator will be needed for meetings and who will pay for that service;
- whether they will peg out the houses on the land with community representatives and future residents;
- whether they need to mark any trees or sites that must not be disturbed during the building process.

You also need to decide how many visits you would expect the consultant to make to your community while they are designing the house, how long they should stay and where they would stay. Travel and accommodation costs should be included in the quote for the work.

The Design Consultant must agree to give you copies of all the drawings and building contracts. They must also explain to you exactly what will be

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## MANAGING THE CONSTRUCTION PROCESS

built and where it will be built before calling for building tenders. To help you to check that everything you want and need is included in the plans, ask them to fill out the AP Design Guide checklist or you could make another one for your community. Sample checklists are included in Chapter 3.6.

1.1

1.2

1.3

1.4

### How Do You Know if the Builder is Doing a Good Job?

#### The Problem

Building a house is a difficult job and it is easy to make mistakes. Without inspections during ALL building works, things will be built badly. This means they will cost the community extra money to fix and will need extra maintenance.

Inspections of building work in rural and remote communities are difficult to coordinate because of the long distances that are often involved. You should aim to have several levels of inspection of the building works as a back-ups.

2.1

2.2

2.3

2.4

One of the most important roles of the consultant is to check the work of the Builder regularly during construction. There are some other inspections may be required such as inspections by power, water and health authorities.

These agencies do not check that the Builder is doing what you want, they only make sure that the work is legal. Your consultant needs to check that the builder is doing the work you require.

3.1

3.2

3.3

3.4

3.5

3.6

You will need to make sure that the consultant has allowed for regular visits to inspect the building work in their quote and find out how many they have allowed.

You could ask for a minimum of five site inspection visits to check:

- ALL in-ground drainage;
- before pouring any concrete slabs;
- before any wall or roof framing is covered with sheeting;
- immediately before the residents move into the building; and
- 12 months after occupation of the building to check for defects liabilities.

It is particularly important that the consultant checks any works that will be covered up, such as drainage pipes and sewerage tanks, before it is covered up. The consultant can also be asked to include a clause in the



## MANAGING THE CONSTRUCTION PROCESS

building contract in which payment to the Builders will be withheld if these works are not inspected. The consultant should give you a written report of the inspections and a list of the things they have asked the Builder to fix.

In addition to the Building Consultants inspections you should incorporate as many inspections as possible for ALL projects in your community. This will ensure that a high standard work is carried out. This can also mean that if the consultant misses an inspection, someone else will check the work.

These other inspections could involve:

- local community inspectors - Environmental Health Workers, Essential Services Officers, local trades people such as licensed plumbers, electricians and carpenters;
- regional inspectors - any Aboriginal organisation with resources to inspect works such as an Environmental Health Officer within an ATSI controlled health service;
- Government inspectors - health department Environmental Health Officers, housing department inspectors, State services providers for power, water and waste inspections, planning department or local government inspectors.

### Contracts – What Are Your Rights and Responsibilities?

#### The Problem

Contracts are a way of agreeing how, where and when the money will be spent and who will do what and when. It is a good idea to have signed contracts for all work BEFORE problems occur.

But, good contracts will never make up for inexperienced consultants, poor drawings, poor specifications, projects that builders have not costed correctly or no inspections.

We mentioned earlier that it is a good idea to have a signed contract with your consultant once you have agreed on the job and how much it will cost. A contract cannot guarantee that everyone will do the right thing but it can be a good back-up and can save some fights about what was agreed to at a later time.

You will also need to sign a building contract with the Builder. The Design Consultant should advise you of the best building contract for job and can witness the signing of the contract by both you and the Builder.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6





## MANAGING THE CONSTRUCTION PROCESS

ALL contracts should include:

- building details (drawings and specifications);
- a detailed site plan showing where the building will be;
- a completion date (contract time);
- total costs (the final price tendered by the Builder);
- evidence that the contractors have all the insurances they need (public liability, workers compensation and loss or damage during construction);
- a payment schedule which includes:
  - progress payments for the Builder with an agreed timing for payment; and
  - money kept to make sure the Builder finishes the job and comes back at the end of the project to fix any problems (retention money);
- the number and timing of compulsory inspections to be made including an assessment of the quality of the work on the project before payment is approved.

The drawings, specifications and engineers drawings (contract documents) explain what the Builder has agreed to do for your community. The builder has a responsibility to build the building as detailed in the drawings, to a good standard of workmanship, on time and on budget. When they are finished everything in the house should work well, be safe to use and it should be clean when the house is handed over to the community.

The community has some responsibilities to ensure the Builder can complete the work well. They include:

- making sure the builders can work on the site;
- making sure that no-one damages the building during construction;
- once the work has been inspected and the work is accepted the Builder must be paid promptly.

If you decide to change things in the new house after the building has started, it could end up costing you a lot of money. Generally it is a good idea to make the changes during the design and not ask the Builder to change anything. If you think something has to be changed, talk to the Building Consultant. The consultant can ask the Builder to give you a written quote for the cost of making the changes. If you decide to proceed, the consultant should advise the builder in writing.

1.1

1.2

1.3

1.4

2.1

2.2

2.3

2.4

3.1

3.2

3.3

3.4

3.5

3.6