

Queensland Public Cyclone Shelters Maintenance Guideline



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Authorisation

The Guideline has been prepared to provide information and guidance to State and local government asset owners and stakeholders on the planning and implementation of maintenance of public cyclone shelters.

The Guideline is developed and maintained by the Department of Housing and Public Works in accordance with the Disaster Management Act 2003.

The Guideline is hereby authorised by the General Manager, Asset Management Policy and Strategy, Department of Housing and Public Works.

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Date: 11 July 2018

General Manager, Asset Management Policy and Strategy

Department of Housing and Public Works





Aim

The aim of the Guideline is to ensure Queensland public cyclone shelters are maintained so as to be fit for the purpose of sheltering a large group of people during a severe tropical cyclone.

The Guideline provides the basis of determining the ongoing suitability of a cyclone shelter to remain identified as a functioning public cyclone shelter.

Acknowledgements

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Amendments

Proposals for amendment or addition to the contents of the guideline are to be forwarded to:

The Executive Director, Queensland Government Accommodation Unit
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Version control of the guideline is managed by the Queensland Government Accommodation Unit, Department of Housing and Public Works. Reissue of the guideline following amendment or review will be recorded in the table below and advice of reissues will be distributed through the disaster management network. Recipients should take all appropriate action to ensure that they are in possession of the most recent version, and that previous versions in both hard copy and electronic forms are archived accordingly. Further information can be requested by contacting the Queensland Government Accommodation Unit at Level 3, AM60 42-60 Albert Street, Brisbane (GPO Box 2457, Brisbane Qld 4001).

Version	Amendment
2.0	Various

Review date

The General Manager, Asset Management Policy and Strategy, Department of Housing and Public Works is to ensure that the guideline is reviewed at a minimum every five year or as required.





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CHAPTER 1: Introduction

The Queensland Public Cyclone Shelters Maintenance Guideline (the Guideline) are consistent with:

- the requirements of the Design Guidelines for Queensland Public Cyclone Shelters, September 2006 (the Design Guidelines) with regards to shelter maintenance planning
- the principles of the Maintenance Management Framework; - Policy for the maintenance of Queensland Government buildings (MMF).

The Guideline apply to the maintenance of all public cyclone shelters in Queensland constructed in accordance with the Design Guidelines.

The Guideline are specific to the use of public cyclone shelters for their intended use as a building being used to protect a large group of people from the impacts of a severe tropical cyclone. It is recognised however, that due to the infrequent need as a public cyclone shelter many of these buildings are used for alternative purposes, their 'normal' use (such as a school building, sports facility or community hall) on a day to day basis. Maintenance requirements which apply to the 'normal' use of these buildings is not covered in the Guideline. Organisations who are responsible for these buildings under that 'normal' use are to ensure that any such maintenance is carried out in addition to that maintenance specified in this document.

1. Features of public cyclone shelters

Queensland public cyclone shelters are purpose-built buildings designed and constructed to protect a large group of people from the impacts of a severe tropical cyclone. They typically have specific features and services in addition to those required for its normal day to day functions. These buildings are constructed to the requirements of the Design Guidelines. The Design Guidelines provide criteria to ensure the building is fit for use as a public cyclone shelter and are available on the Department of Housing and Public Works website at www.hpw.qld.gov.au.

Cyclone shelters are typically located:

- on high ground, above ocean storm tide inundation levels and river or creek flood levels
- near to the evacuating community and directly accessible from a public roadway
- away from other potential hazards, such as tall structures and trees or places storing fuel or hazardous materials.

The following key criteria from the Design Guidelines should be considered in the maintenance of Queensland public cyclone shelters.

1.1. Structure

The cyclone shelter's structure differs from normal buildings as it is designed to withstand more severe wind pressures and wind-borne debris caused by wind gusts of up to 306 km/h experienced in Category 5 (and high Category 4) cyclones.

The external fabric of the cyclone shelter (roof, walls, windows, doors and ventilation grills) are constructed to resist windborne debris. Glass windows may be protected by installation of debris screens. Where the aperture in the debris screen is larger than 8mm, the glass in the window is laminated impact resistant capable of resisting smaller debris. Only materials complying with the Design Guidelines debris and wind resistance criteria (refer to the Design Guidelines) may be used on the external fabric of the shelter building.

The doors to cyclone shelters could be fitted with barrel bolts to strengthen the door to resist wind loads. To protect external glass doors from wind borne debris, shutters could be fitted to the outside and closed during a cyclone to protect the glass.





To comply with the Building Code of Australia (BCA) (part of National Construction Code) barrel bolts and shutters to shelter doors must remain locked open during the 'normal' use of the building. The Building operator for the buildings' normal use must not have keys to the bolts and shutters in order to avoid accidental locking, which would be in contravention of fire safety regulations. The Local Disaster Management Group or operator of the building when in shelter mode is responsible for the security of the keys to the barrel bolts and shutters.

1.2. Occupancy as a public cyclone shelter

Public cyclone shelters are constructed to protect a large number of people. The cyclone shelter capacity is nominated in the Public Cyclone Shelter Operational Plan for each shelter. The occupancy level may exceed the buildings normal use occupancy. The cyclone shelter capacity is based upon the specific design capacity of the cyclone shelter.

1.3. Duration of occupancy as a public cyclone shelter

Normally, a cyclone event would require the building to be managed as a public cyclone shelter for a period of 24 to 48 hours. This time period includes opening and setup, occupation, the lock down period as the cyclone passes, exit of occupants and shut down. Occupation will potentially commence 6-12 hours before the lock-down period. Typically, the lock-down period, i.e. when windows and doors are closed to provide protection from wind gusts of 100km/h and greater, is 6-12 hours. Occasionally, the lock-down period may extend to a maximum of 18 hours.

Public cyclone shelters are not necessarily intended to be used as evacuation centres after a cyclone has passed. In relation to public cyclone shelters located on school grounds, their use as evacuation centres should be avoided wherever possible to enable school operations to return to normal.

Emergency power

An emergency generator is installed to provide power for lighting, fire warning systems and selected power outlets. A battery back-up is also installed should the generator fail for emergency lighting only.

Lighting

Lighting within the public cyclone shelter is necessary to calm shelter occupants during the cyclone and to permit safe movement within the shelter. Minimum desirable lighting levels are provided when powered by the generator. Minimum lighting levels for safe movement are provided by the battery back-up.

Ventilation

The public cyclone shelter is conventionally (mechanical and/or naturally) ventilated prior to the lock down period with windows and doors open. During the lock-down period, when wind gusts are exceeding 100 km/hr and the windows and doors are closed, the shelter is designed to be naturally ventilated. The natural ventilation systems are typically fitted with manual dampers to enable adjustment of the level of ventilation during the cyclone.

Amenities

The provision of amenities generally reflects the infrequent use as a public cyclone shelter with a large number of occupants, that people may use the amenities at any time, and that some queuing is acceptable when occupancy is high.





Kitchenette

A kitchen or kitchenette will facilitate the preparation of basic food or orderly serving of food and drinks. Where gas cooking appliances are fitted, the gas storage is located remote from the shelter and is isolated by a valve that is manually closed during the cyclone shelter mode.

Water supply

Water supply to the building must be maintained during the cyclone. Where the normal water supply may be disrupted, tank water is provided to supply the amenities for the duration of occupancy. Bottled water is provided for drinking.

Stored equipment

Chairs for eighty percent of the shelter population are stored in the building. Roll mats or inflatable air mattresses may be provided during the cyclone warning period. Mullions to strengthen double doors may also be stored in the chair stores.

Communications

Consideration should be given for access to a range of normal and emergency communication services during operation of the building in cyclone shelter mode. The buildings will typically have standard provisions for phone and data services. The phone line and handset should not require power supply. In some shelters further provision may be made for the connection to the Queensland Police Service (QPS) emergency radio network (channel U34). Additional forms of communication may be provided through normal emergency service radio networks i.e. handheld radios and or satellite based communications but these should be tested for operability under potential conditions e.g. satellite phones generally require clear view to the sky.

CHAPTER 2: Maintenance and capital renewal

2. Maintenance

Maintenance, within the context of the Guideline, is defined as work undertaken on the building to:

- reinstate the physical condition to a specified standard to comply with the Design Guidelines for Queensland Public Cyclone Shelters and building regulations
- prevent further deterioration or failure
- restore correct operation within specified parameters
- replace components at the end of their useful/economic life with modern engineering equivalents
- make temporary repairs
- assess the building for maintenance requirements.

The following are not classified as maintenance:

- improvements and upgrading to provide additional or new service capability or function
- upgrading to meet new statutory requirements
- work performed under warranty or defects period
- operational tasks to enable occupancy and use (e.g. cleaning, security, waste management and staffing)
- supply of utilities (e.g. energy, water and telecommunications).

The specified standard for public cyclone shelters is outlined in Section 4.2 Condition standard of this document.





Maintenance program managers should incorporate each of the categories of maintenance work defined below, in the maintenance management of public cyclone shelters.

2.1. Planned maintenance

Planned maintenance is the work carried out at scheduled intervals to comply with shelter guideline, statutory requirements, health and safety considerations and to preserve the asset and prolong its economic life.

Planned maintenance consists of statutory, preventive and condition-based maintenance.

Statutory maintenance

Statutory maintenance is the maintenance necessary to meet the requirements mandated in Acts, Regulations and other statutory instruments.

In terms of the use of the building as a public cyclone shelter, statutory maintenance includes maintenance necessary to meet the requirements of the Design Guidelines. This includes annual inspection and testing in October prior to the cyclone season.

Preventive maintenance

Preventive maintenance is predominantly used for the maintenance of building services but may also be applied to the building structure, building fabric and site improvements. Benefits of preventive maintenance include minimizing the likelihood of building asset failures, health and safety issues and disruptions to service delivery.

Preventive maintenance for shelter use includes services and equipment required for the cyclone shelter operation and can include services and equipment such as emergency generator, battery back-up, and natural ventilation dampers.

Condition based maintenance

Condition based maintenance is carried out because the physical condition of the building structure, building fabric, service or site improvement is below the acceptable standard. Condition based maintenance includes painting and regalvanising of external screens. Condition based maintenance occurs as a result of a condition assessment. A condition assessment is to be undertaken prior to June each year.

2.1. Unplanned maintenance

Unplanned maintenance occurs when the failure of a building component requires immediate attention during the normal use of the building or following a cyclone event. Unplanned maintenance consists of reactive or breakdown maintenance and post-event maintenance.

Breakdown maintenance

Breakdown or corrective maintenance occurs when a building component fails and requires immediate attention to continue to meet operational needs. It is usually limited to rectification for health, safety or security reasons. It may be requested by the shelter operator during the cyclone warning period.





Post-event maintenance

Post-event maintenance brings the public cyclone shelter back to an operational condition after a cyclone, other natural disaster and forced entry or vandalism. Following a cyclone, the shelter may be damaged by cyclonic wind, water or occupants.

2.2. Capital renewal

Capital renewal is the major refurbishment and replacement of elements necessary to extend the useful life of the building. Capital renewal should occur at a time to minimise the buildings life-cycle cost.

Capital renewal costs include replacement of the emergency generator, total replacement of light fittings, total replacement of batteries, total replacement of the roof sheeting and total replacement of ducts and dampers.

Capital renewal also includes upgrades or replacement to reduce operating and life cycle costs.

Capital renewal costs are to be included in the shelter maintenance plan capital renewal costs should be reported separately to maintenance costs.

2.3. Capital works

Capital works are alterations or additions to the public cyclone shelter and its services.

All capital works must comply with the Design Guidelines. Such works shall not be undertaken on State Government buildings or shelters constructed with State grant funding without the approval of the Department of Housing and Public Works.

CHAPTER 3: Maintenance planning and development

3. Maintenance strategy

The maintenance strategy for each public cyclone shelter must incorporate a balance of planned maintenance and unplanned maintenance.

Each public cyclone shelter is to be maintained to comply with:

- statutory requirements
- the requirements of the Design Guidelines
- the effective use of the building for its normal function (noting the comments in Section 1 Introduction above regarding the shelters normal operations).

3.1. Condition standard

Each public cyclone shelter shall be maintained to a standard equivalent to the Queensland Government Maintenance Management Framework (MMF) Condition Standard Rating S4. The MMF can be accessed at

<http://www.hpw.qld.gov.au/FacilitiesManagement/BuildingMaintenance/MMF/Pages/Default.aspx>

The MMF defines this standard as ‘the building to be in good condition operationally and aesthetically when benchmarked against industry standards for that class of asset’.

Table 1 below (reproduced from the MMF) should be used to determine the appropriate standard required at building element/building component level, with appropriate adjustments, to articulate the standards in terms of those elements most critical to delivery of services. These ratings are used to





communicate expectations to maintenance service providers. Providers can then determine, and report maintenance works necessary to return buildings to the desired standard.

Table 1: Condition standards

Specified standard	Rating
Building to be in the best possible condition. Only minimal deterioration will be allowed.	S5
Building to be in good condition operationally and aesthetically, benchmarked against industry standards for that class of asset.	S4
Building to be in reasonable condition, fully meeting operational requirements.	S3
Building to meet minimum operational requirements only.	S2
Building can be allowed to deteriorate, however, must be marginally maintained to meet minimum statutory requirements.	S1

3.2. Maintenance responsibilities

Queensland government departments that control or administer public cyclone shelters are responsible for ensuring that all maintenance work on public cyclone shelters is undertaken by the Department of Housing and Public Works. It should be noted however, that certain legislative schemes place responsibility for maintenance items on the operator, rather than the owner of a building, such as fire safety requirements.

Local governments/authorities or lessees shall be responsible for maintenance management of public cyclone shelters owned or managed by the local government/authority or lessees.

Private entities shall be responsible for maintenance management of public cyclone shelters owned or managed by the private entity.

The organisation or entity responsible for maintenance shall ensure that maintenance planning and delivery is undertaken.

3.3. Maintenance plan

The organisation or entity responsible for maintenance of the cyclone shelter (whether owned by the State, Local Government/authority or any other entity), shall develop a Maintenance Plan for each public cyclone shelter consistent with the guideline. The shelter maintenance plan should include:

- annual condition assessment
- scheduled maintenance works
- scheduled maintenance inspections (including the list of critical items to be inspected and tested) prior to each cyclone season
- persons responsible for the inspections
- a checklist of items required to be permanently located within the building for shelter use and for other supplies required for shelter use, a list of suppliers of provisions.

The building Maintenance Plan shall identify the parties responsible for:

- maintenance implementation
- maintaining maintenance information and systems
- updating the Maintenance Plan.





A template of a building Maintenance Plan where the normal use of the building is an indoor sports facility is included as a guide in Appendix B.

3.4. Maintenance funding

The Maintenance Plan shall identify the parties responsible for maintenance funding.

The State shall be responsible for maintenance funding of public cyclone shelters owned and managed by the State.

Local governments/authorities or lessees shall be responsible for maintenance funding of public cyclone shelters owned or managed by the local government, authorities or lessees.

The private entity shall be responsible for maintenance funding of public cyclone shelters owned and managed by the private entity.

CHAPTER 4: Maintenance implementation

4.1. Inspection and testing

The maintenance service provider engaged by the organisation or entity responsible for maintenance of the cyclone shelter shall undertake inspection and testing to comply with:

- statutory requirements for:
 - normal use including inspection and test of fire warning and response systems
 - shelter use including annual fit for purpose test and inspection prior to the cyclone season.
- preventative service requirements for
 - normal use requirements
 - shelter use including for example, emergency generator, and ventilation dampers
- condition-based maintenance including an annual condition assessment, prior to June to allow maintenance to be completed prior to the cyclone season.

Table 2 identifies the recommended inspection and testing activities for critical elements which are found in most public cyclone shelters.

Table 2: Inspection and testing activities for critical elements of public cyclone shelters

Shelter element	Activity	Frequency
Building structure – walls & roof	Inspect	A, PS
Debris screens	Inspect	A, PS
Windows & grills	Inspect	A, PS
External doors & shutters	Inspect and test	A, PS
External door locks	Inspect and test	A, PS
Lock-down systems	Test	A, PS
Fire protection systems	Inspect and test	A, PS, R
Fire extinguishers	Inspect	A, PS, R
Gas isolation valves	Inspect & test	A, PS
Switchboard	Inspect & test	A, PS, R
Emergency generator and fuel tank	Inspect, maintain and test	A, PS, R
Emergency lighting and batteries	Inspect, maintain and test	A, PS, R
Communication devices	Inspect and test	A, PS
Mechanical ventilation – fans, ducts, dampers	Inspect and test	A, PS
Natural ventilation – ducts, dampers, winders	Inspect and service	A, PS, R
CO2 sensors	Inspect and test	A, PS





Water tanks	Inspect	A, PS
Amenities	Inspect and test	A, PS
Store items	Check	A, PS

Legend:

A = annual inspection and testing, undertaken prior to June

PS = pre-season inspection and testing, undertaken in October

R = regular maintenance and inspection as recommended by the equipment manufacturer or to comply with statutory requirements.

All elements inspected and not in good condition shall be repaired or replaced.

The building structure including roof sheeting shall be inspected by a structural engineer following a cyclone (category 3 or more severe) with an inspection to occur at least every 10 years.

The maintenance service provider shall advise the Local Disaster Management Group of the date(s) of the pre-season inspection and testing to allow a LDMG representative(s) to participate in the building system tests and to provide the service maintenance provider access to the keys to the external locks and shutters which are held by the LDMG.

4.2. Condition assessment

The maintenance service provider engaged by the organisation or entity responsible for maintenance of the cyclone shelter shall undertake an annual condition assessment of the building. The MMF guideline Building Condition Assessment provides guidance on the assessment.

Use the condition index, shown in Table 3, to assess the condition of the building elements.

These condition rating indexes are to be used by the assessor to represent the general condition of the building when communicating to the building owner and others the general state of the building. The assessed condition index can then be compared with the mentioned minimum required Condition Standard Rating S4 - refer to section 4.2 Condition Standard of this document.

The minimum condition for any element of the shelter shall be rating index 4.

Table 3: Condition Index

Rating Index	Status	Definition of rating/condition of building asset
5	Excellent	no defects as new condition and appearance
4	Good	minor defects superficial wear and tear some deterioration to finishes major maintenance not required
3	Fair	average condition significant defects are evident worn finishes require maintenance services are functional but need attention deferred maintenance work exists
2	Poor	badly deteriorated potential structural problems inferior appearance major defects components fail frequently
1	Very poor	building has failed; not operational not viable; unfit for occupancy or normal use environmental/contamination/pollution issues exist





4.3. Maintenance priority ranking

The maintenance service provider engaged by the organisation or entity responsible for maintenance of the cyclone shelter shall use the maintenance priority ranking shown in Table 4 to determine the maintenance needs of the public cyclone shelters.

Table 4: Condition assessment priority ranking scale

Priority ranking	Definition
1	Works needed to: meet the requirements of the Design Guidelines for Queensland Public Cyclone Shelters meet maintenance related statutory obligation and due diligence requirements ensure the health and safety of building occupants and users prevent serious disruption of building activities and/or higher costs if not addressed within one year.
2	Works that: affect the normal operational capacity of the building are likely to lead to serious deterioration and therefore higher future repair costs if not addressed between 1 to 2 years.
3	Works that: have minimal effect on the normal operational capacity of the building but are desirable to maintain the quality of the workplace are likely to require rectification within 3 years.
4	Works that: can be safely and economically deferred beyond 3 years and reassessed at a future date

4.4. Assess maintenance demand

The organisation or entity responsible for maintenance of the cyclone shelter shall conduct a maintenance demand assessment of the total maintenance requirements of the building. The scope of maintenance work shall include:

- Planned Maintenance
 - Statutory maintenance
 - Preventive maintenance
 - Condition based maintenance
- Unplanned Maintenance
 - Corrective and breakdown maintenance
 - Post-event maintenance

The maintenance demand shall be assessed on the basis that capital renewal of elements occurs at a stage which minimises the total cost of the element. For State owned and managed public cyclone shelters, this process may include re-assessment of previous indicative priorities of recommended capital renewal work, aggregation of works, and adjustments of cost estimates (to include escalation, where appropriate, in line with the Building Price Index (BPI) available from the Department of Housing and Public Works).

Assess the maintenance and capital renewal demand over a period of not less than 30 years.

4.5. Maintenance budget

The organisation or entity responsible for maintenance of the cyclone shelter shall formulate a maintenance budget that meets the assessed maintenance demand and allocates sufficient funding to maintain the building to the required condition standard.





Maintenance to comply with statutory and shelter requirements is not discretionary and shall not be deferred.

An indicative average annual funding benchmark for public cyclone shelters is 4% of cyclone shelter replacement value (CSRV). This annual funding varies with building age and includes capital replacement.

Cost estimates for remedial work should be reviewed and updated each year as part of the inspections and testing and condition assessments process to allow for cost escalation and changed circumstances.

For more information on the preparation of a maintenance budget refer to the MMF guideline Building Maintenance Budget.

4.6. Annual maintenance work program

The organisation or entity responsible for maintenance of the cyclone shelter shall develop a maintenance works program for a four year period and update annually and document the maintenance activities for each year in the Maintenance Plan.

Maintenance activities during the cyclone season should not prevent the building from being available for use as a public cyclone shelter, with 12 hours notice.

Condition based maintenance and capital renewal should be scheduled to occur outside of the cyclone season.

The maintenance program should incorporate the maintenance work categories outlined in Table 5.

Table 5: Maintenance work classification

Category	Sub-category	Definition
Planned maintenance	Preventative service maintenance	Scheduled inspection and maintenance of elements required for the normal use of the building (e.g. air-conditioning) Scheduled inspection and maintenance of elements required for the building to be fit for purpose as a public cyclone shelter (e.g. emergency generator, emergency lighting and batteries, natural ventilation dampers etc).
	Statutory maintenance	Compulsory maintenance to meet requirements mandated in Acts, Regulations and other statutory instruments for the normal use of the building. Annual inspection and testing prior to the cyclone season to ensure the building meets the requirements of the cyclone shelter guideline.
	Condition-based maintenance	Programmed maintenance work, based on condition assessment that maintains the building to the required standard.
Unplanned maintenance	Breakdown or corrective maintenance	Restores the building to operational condition following an unforeseen failure.





Post event maintenance	<p>Brings the building back to an operational or safe condition following damage caused by fire, forced entry or vandals.</p> <p>Post-Cyclone: Restores the building to normal operational condition after cyclone damage caused by water, wind or occupants. Inspect and repair elements after a cyclone to ensure the building is fit for use as a cyclone shelter. The building structure including roof sheeting shall be inspected by a structural engineer following a category 3 or more severe cyclone.</p>
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4.7. Maintenance procurement

Procurement of maintenance services related to public cyclone shelters operated by State Government agencies during normal use is to be undertaken by the Department of Housing and Public Works in accordance with the MMF and the Guideline.

Maintenance services related to other public cyclone shelters shall be procured by a Service Level Agreement (SLA) between the owner or organisation responsible for the building and a maintenance provider. The SLA shall formally instruct the maintenance provider on the maintenance, planned and unplanned, defined in the maintenance plan including performance indicators and minimum reporting requirements.

Local governments/authorities which owns or controls a public cyclone shelter or lessees shall be responsible for procuring suitably qualified and skilled maintenance providers.

Any private entity which owns or controls a public cyclone shelter or lessees shall be responsible for procuring suitably qualified and skilled maintenance providers.

4.8. Maintenance performance

Monitor and review maintenance performance. The following aspects should be periodically reviewed by:

- Organisation or entity responsible for maintenance of the cyclone shelter
 - Condition index rating achieved
 - Achievement of planned maintenance program (time, cost and quality)
 - Expenditure compared with budget
 - Unplanned and planned maintenance as percentage of total expenditure
 - Total maintenance expenditure as a percentage of building replacement value
- Maintenance service provider
 - Efficiency and effectiveness of:
 - People
 - Processes
 - Systems
 - Management
 - Compliance with the Guideline
 - Achievement of key performance indicators in the SLA





CHAPTER 5: Maintenance information and systems

5. Retention of maintenance information

The organisation or entity responsible for maintenance of the cyclone shelter shall ensure protocols and processes are in place for the proper collection, custodianship, updating and use of information pertaining to maintenance of the building, services and site improvements including drawings, technical manuals, and data.

5.1. Commissioning and handover of building

The organisation or entity responsible for maintenance of the cyclone shelter shall ensure proper capturing of information from commissioning and handover. Handover of technical and building information (e.g. manuals, warranty information, specifications, and drawings including as constructed drawings) is necessary for maintenance, safe operation of the building and to preserve important design information in perpetuity.

The organisation or entity responsible for maintenance of the cyclone shelter must have adequate systems and process in place for the acceptance and retention of technical and building information from the building contractor. Such systems must enable ready access to the information for people responsible for operating and maintaining the facility.

5.2. Maintenance management systems

The organisation or entity responsible for maintenance of the cyclone shelter shall use an effective maintenance management system that adequately facilitates maintenance planning, implementation and reporting.

The maintenance management system should reinforce maintenance objectives and facilitate:

- Planning
- Condition assessments
- Operational maintenance work scheduling and control
- Resource allocation
- Program management
- Reporting.

5.3. Maintenance reporting

The organisation or entity responsible for maintenance of the cyclone shelter shall provide the building owner with maintenance reports which comply with the following minimum reporting requirements:

- The condition index for each of the building elements
- Financial year maintenance expenditure in the following categories
 - Planned maintenance
 - Unplanned maintenance
 - Maintenance management
- Annual maintenance expenditure as a percentage of CSRV
- Projected future maintenance over the next 4 years and elements identified for capital renewal in the next 10 years at least
- Any deferred maintenance (Note: Maintenance to comply with statutory and shelter requirements shall not be deferred)
- Any significant maintenance issues that impact on the capacity of the building as a cyclone shelter or its normal use.





The organisation or entity responsible for maintenance of the cyclone shelter shall provide the Local Disaster Management Group with a copy of the pre-season inspection and test report.

CHAPTER 6: Guideline implementation and review

The Guideline applies to all public cyclone shelters in Queensland.

As part of its role in the provision of public cyclone shelters in Queensland, the department will conduct periodic reviews of the Guideline document.

Refer to the department web site, www.hpw.qld.gov.au, for periodic updates of the Guideline.





Appendix A

Glossary

Building operator

The organisation responsible for the management and operation of the building for its normal function.

Cyclone shelter replacement value (CSRV)

The cost to replace a public cyclone shelter including construction costs, professional and construction management fees, services and furniture.

Cyclone season

The Australian tropical cyclone season typically extends from 1 November to 30 April.

Cyclone warning period

The Cyclone Warning Period is the 24hr period prior to the forecast impact of gale force winds. The Bureau of Meteorology tropical cyclone forecast track map shows two zones along the coastline. The Watch Zone where the cyclone threat is forecast as gale force winds from 24 to 48hrs, and the Warning Zone where gale force winds are forecast within 24hrs.

Department

The department being the Department of Housing and Public Works

Maintenance Management Framework – Policy for the maintenance of Queensland Government Buildings (MMF)

The Maintenance Management Framework (MMF) is the Queensland Government policy for managing building maintenance. This policy is administered by the Department of Housing and Public Works.

MMF consists of a policy document supported by a suite of guidelines and policy advice notes.

Maintenance Plan

A plan developed for each building which details all maintenance required to maintain the building to the required condition standard.

Note: Maintenance cleaning is considered part of building maintenance if its purpose is to preserve or protect the building asset, or to improve the asset's appearance. Examples include:

- high-pressure water blasting and washing down of building exteriors
- removal of algæ from paths where it presents a slip hazard
- removal of salt where accumulated on steel structure and roofing.

Maintenance Program Manager

The maintenance program manager is responsible for the maintenance planning.

Maintenance Service Provider

The maintenance service provider undertakes the maintenance on the building in accordance with the maintenance plan prepared by the Maintenance Program Manager.

Public cyclone shelter operator

The Local Disaster Management Group (LDMG) is responsible for the operation of the building as a Public Cyclone Shelter. The responsibilities of the LDMG are defined in the Public Cyclone Shelter - Operational Guideline.

Recovery centre

A suitable building selected after the event from which social, welfare and information services are provided to people who have been impacted by the event.





Shelter zone

The area above the storm tide evacuation zone which is not vulnerable to creek or river flooding, landslip or other hazard.

Service level agreement (SLA)

An agreement with a maintenance service provider which formally instructs the maintenance provider of the maintenance requirements and expectations.

Storm surge

A storm surge is an increase (or decrease) in water level associated with some significant meteorological event, such as persistent strong winds and change in atmospheric pressure, or tropical cyclone. Its typical effect is to raise the level of the tide above the predicted level. In some situations, such as when winds blow offshore, the actual tide level can be lower than that predicted. The magnitude of the storm surge is dependent on the severity and duration of the event and the seabed topography at the site. In Queensland, most large surges are caused by tropical cyclones.

Storm tide

A storm tide is the combination of a storm surge and the normal astronomical tide, and wave setup.





Appendix B

Queensland Public Cyclone Shelters Maintenance Plan - Template



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1 Planning context – Building profile, status and operating needs

This public cyclone shelter has dual functional purposes:

- to provide shelter during a severe tropical cyclone
- to provide support to an operational need (i.e. sport facility, community centre, etc) during normal usage of the building.

<Insert a description of the building addressing the following matters:





Heading	Example
Description	<ul style="list-style-type: none"> • <insert building description e.g. Block S #### SHS
Location	<ul style="list-style-type: none"> • <insert address>
Construction completed	<ul style="list-style-type: none"> • November 2012
Building condition profile	<ul style="list-style-type: none"> • <Insert words about building's assessment and the requirements of the Design Guidelines for Queensland Public Cyclone Shelters and relevant building regulations for this type of building.>
Building structure and finishes	<ul style="list-style-type: none"> • External fabric <describe the wind, wind borne debris, and water ingress resistance requirements> • Roof - <describe the roofing material and support structure, the debris resistance, wind resistance and resistance to water ingress>. • Walls – <describe the construction e.g. tilt-up concrete panels xx thick> • Debris screens – <describe the screen and debris impact resistance>. • Windows and grills – <description of glazing, debris impact resistance, window system and resistance to water ingress>. • External finishes - < describe the finishes to roof, walls, screens etc) • External doors - <describe the doors, hardware and additional locks> • Internal fabric – <describe the floor, wall and ceiling> • Internal finishes - <describe the finishes to floor, wall and ceiling>
Essential equipment	<ul style="list-style-type: none"> • Fire safety systems to detect and/or extinguish fire (i.e. CO₂ sensors and hydrants and other fire equipment) • Mechanical ventilation • Natural ventilation dampers and manual winders • Emergency generator and fuel tank • Emergency lighting and batteries • Lock-down systems • Water tanks (to supply water for ablutions only) • Communication devices: telephones, data, UHF radio (if applicable) and public address systems
Amenities	<ul style="list-style-type: none"> • List the number of female, male and wheelchair accessible toilets, hand basins and showers. • Describe the water supply system for amenities operation, including supply should mains supply fail.
Operational needs during use as a public cyclone shelter	<ul style="list-style-type: none"> • The <insert name> <i>Public Cyclone Shelter Operational Plan</i> defines the procedures for the operation of the building as a public cyclone shelter. Provide a brief summary of these operational requirements including: Stored supplies (chairs); Lock down (doors and shutters); Fire detection and management; Emergency power supply; Natural ventilation management; Water supply – amenities and drinking; Gas isolation (if applicable).
Operational needs during normal use of the building	<ul style="list-style-type: none"> • <Insert words about the need for the building to meet standards/design requirements for normal usage, for example an indoor sport building, community hall, etc. >
<p><i>Note: Any redevelopment to this building (including kitchen fit-out, amenities upgrades, flooring resurfacing, etc) must meet the requirements of <i>Design Guidelines for Queensland Public Cyclone Shelters</i> and building regulations</i></p>	





2 Condition standard and condition index

In accordance with the *Queensland Public Cyclone Shelters Maintenance Guideline*, the desired condition standard of the public cyclone shelter at overall building level is S4 (i.e. the public cyclone shelter is to be in good condition operationally and aesthetically, benchmarked against industry standards for this class of asset). At building element group level, the required condition index to achieve the overall condition standard is included in Table 1.

The criticality of the building asset to protect life in event of a cyclone and the complexity of its elements, will dictate how ratings are assigned. These ratings are used to communicate expectations to maintenance service providers. Providers can then determine, and report maintenance works necessary to return the building to the desired standard.

Table 1- Desired condition index of critical building elements

Shelter element	Specified standards (examples)	Index
Building structure –	Building structure, walls, and roof structure, to be in good condition, with only minor deterioration of surface finish.	4
Roof sheeting	Roof sheeting, flashing and fixings in good condition with only superficial deterioration (e.g. scratches, stains, loss of gloss finish)	4
Building wall finishes	Building wall finishes to be in good condition, with only minor defects and deterioration to finishes	4
Debris screens	Debris screens to be in good condition, with only minor defects and deterioration to finishes	4
Windows and grills	Windows & grills to be in good condition with only superficial wear & tear, minor deterioration to surface finish	4
External doors and shutters	External doors and shutters to be in good condition with only minor deterioration of the surface finish.	4
External door locks	External door locks to be in good condition with only superficial wear & tear, minor deterioration to surface finish	4
Lock-down systems	Lock-down systems to be in good condition free of operational defects,	4
Fire protection systems	Fire protection systems to be in good condition free of operational defects,	4
Fire extinguishers	Fire extinguishers to be in good condition, performs reliably, tested and tagged, only minor surface deterioration	4
Switchboard	Switchboard to be in good condition, free of operational defects, very minor deterioration to surface finishes	4
Emergency generator and fuel tank	Emergency generator and fuel tank to be in good condition free of operational defects, very minor deterioration to surface finishes,	4





	logbook/service dockets indicate maintenance tests are being carried out.	
Emergency lighting and batteries	Emergency lighting & batteries to be in good condition with no functional defects, very minor deterioration to surface finishes, logbook indicates maintenance tests are being carried out	4
Communication devices	Communication devices to be in good condition, free of operational defects, performs reliably, minor signs of deterioration to surface finish	4
Mechanical ventilation	Mechanical ventilation fans and ducts to be in good condition free of operational defects, minor deterioration to insulation & surface finishes	4
Winders and dampers	Manual winders and dampers to be in good condition free of operational defects, very minor deterioration to surface finishes	4
CO ₂ sensors	CO ₂ sensors to be in good condition, performs reliably	4
Water tanks	Water tanks to be in good condition and perform reliably, water within is clear, odourless and free of contaminants	4
Amenities	Amenities to be in good condition and performs reliably, no noticeable operational defects (e.g. leaks), minor surface deterioration	4





3 Schedule of maintenance inspections

Table 2 provides the plan for scheduled maintenance inspections (including the list of critical items to be inspected) annually before June and in October prior to each cyclone season, and the persons responsible for the inspections.

Table 2- Schedule of maintenance inspections

Shelter element (example, amend as applicable)	Prior to each cyclone season	During cyclone warning period
	Person responsible/date (month/year)	Person responsible/date (month/year)
Building structure -walls and roof		
Debris screens		
Windows and grilles		
External doors and shutters		
External door locks		
Lock-down systems		
Fire protection systems		
Fire extinguishers		
Switchboard		
Emergency generator		
Generator Fuel tank		
Emergency lighting and batteries		
Communication devices		
Mechanical ventilation		
Manual winders and dampers		
CO ₂ sensors		
Water tanks		
Amenities		

Table 3 is a checklist of stored equipment required under the *Queensland Public Cyclone Shelters Maintenance Guidelines* to be permanently located within the shelter and a list of suppliers of provisions for any additional supplies necessary. This information needs to be validated prior to an impending cyclone event.



**Table 3 - Checklist of stored equipment**

Stored equipment	Suppliers	<i>During cyclone warning period</i>
<inset number> Chairs		Persons responsible day/month/year
<inset number> Door mullions & bolts		

4 Maintenance and capital renewal work program

4.1 Annual maintenance work program

<Insert a schedule of work and the approach for delivery and control of work, covering 3 years planning horizons.>

4.2 Capital renewal work program

Capital renewal is the major refurbishment and replacement of elements necessary to extend the useful life of the building. Capital renewal should occur at a time to minimise the buildings life-cycle cost.

The capital renewal work restores the asset to its original condition, capacity or function. It also includes upgrades or replacement to reduce operating and life cycle costs.

<Insert forecast program of replacements (what, when, budget); and control of capital renewal work, covering the life of the building.>

4.3 Capital works

Capital works are alterations, extensions or improvements to the public cyclone shelter and its services.

Capital works are not included in the maintenance budget.

5 Budget (Projections and financial strategy)

In accordance with the *Queensland Public Cyclone Shelters Maintenance Guideline*, the indicative average annual funding benchmark for public cyclone shelters should be 4% of the public cyclone shelter asset replacement value (PCSARV). This annual funding varies with building age and includes capital renewal.

5.1 Annual maintenance work program budget

It is estimated that an annual maintenance budget of \$xxxx should enable the building to be maintained to the condition standard ratings identified and documented in the maintenance policy (and described in section 2 - Condition standard and condition index of this document template). The maintenance program for previous financial year is also provided, as is the total estimated budgets (based on very early estimates of maintenance costs) for the subsequent three years.





The maintenance cost components are explained in the **Attachment 1**.

Table 4 - Annual maintenance work program budget

	Previous financial year (\$)	Current financial year (\$)	Next financial year (\$)	Current +2 financial year (\$)	Current +3 financial year (\$)
Annual maintenance work program					

<Insert words to describe the funding arrangement. The strategy for funding strategy and financial sources should be outlined for both internal and external sources.>

5.2 Capital renewal work program budget

<Insert words to outline that a recommended budget of \$xxx for the capital renewal work program mentioned above should enable the building to be upgraded resulting in:

- an extension of its useful life
- a reduction in future operating costs

Insert words to describe the funding arrangement for the regular capital renewal work program. The strategy for funding strategy and financial sources should be outlined for both internal and external sources.>





6 Procurement of maintenance service providers

<Insert words to describe the strategy for procurement of maintenance service delivery providers for maintenance work and maintenance inspections.>

6.1 Service level agreements (SLA)/Contracts

<Insert words to describe any SLA/contracts to be used.>

6.2 Maintenance performance

This section should address the key performance indicators (KPIs) as defined in the *Queensland Public Cyclone Shelters Maintenance Guideline* in the area of:

- Maintenance program management - KPIs may include for example: expenditure against budget, achievement of planned maintenance program in terms of time, cost and quality, unplanned and planned maintenance as percentages of total expenditure.
- Maintenance service provider - KPIs may include for example: achievement of key performance indicators in the SLA/contract
- Maintenance outcomes - KPIs may include for example total maintenance expenditure as a percentage of public cyclone shelter asset replacement value (PCARV), building occupant satisfaction focusing on the building's dual function – i.e. cyclone shelter and normal service delivery.

6.3 Maintenance information

This section should address the activities and responsibilities required to ensure maintenance information is accurate and available to facilitate management of inspections and maintenance scheduling, management of programs and reporting, and asset management process enhancements.

7 Management strategy

7.1 Maintenance management responsibilities

This section should address responsibilities for management of maintenance program and reporting.

7.2 Capital renewal management responsibilities

This section should address responsibilities for management of capital renewal program and reporting.

8 Action plan

This section should draw on all of the preceding key elements and conclude with a list of key actions, responsibilities and implementation timeframes. The summary action plan will provide the basis for any future reviews and adjustments of the plan.

9 Review of Public Cyclone Shelters Maintenance Plan

This section should address:

- the review intervals, which should be aligned with the annual State and/or local government budget timeframes and agency/corporate planning cycles
- arrangements for receiving and recording feedback between reviews.





Attachment 1

Maintenance budget composition

The composition of a maintenance budget includes the following cost components:

- condition assessment costs
- statutory maintenance costs
- preventative maintenance costs
- condition-based maintenance costs
- unplanned maintenance costs
- maintenance work program management costs

Cost component	Definition
Inspection assessment cost	This is the cost of undertaking inspection assessments in accordance with the <i>Queensland Public Cyclone Shelters Maintenance Guideline</i> .
Statutory maintenance cost	This is the cost associated with undertaking maintenance to meet mandatory requirements of various regulations such as the servicing of fire protection systems.
Preventative maintenance cost	This is the cost associated with the periodic servicing of plant and equipment and preventative repairs to other building components to ensure reliable operation, comply with "duty of care" responsibilities and general good maintenance practice to preserve assets in a condition appropriate for service delivery.
Condition-based maintenance cost	Condition-based maintenance is maintenance undertaken as a result of deteriorated condition identified through inspection assessments. In this regard, funding of this component is variable and less predictable.
Unplanned maintenance cost	Unplanned maintenance is reactive work undertaken as a result of breakdowns and routine failure of building components and services. Funding of this component of maintenance would fluctuate in varying degrees between agencies. However, historical data should provide guidance in terms of annual estimates of funding required.
Maintenance work program management cost ¹	This is the cost incurred by building owner (or appointed building manager) in managing maintenance and includes the costs of management personnel, maintenance management systems, financial administration and other overhead costs. Activities to be costed include: general management; administration; maintenance planning; program formulation; program management; and contract management (if maintenance is outsourced).

¹ However, the magnitude of this cost component should be relative to the total maintenance expenditure for the building. Building managers must ensure that there are appropriate mechanisms in place to achieve sustained reductions of management costs by using appropriate administrative and decision-making processes and systems for planning and monitoring the maintenance delivery.

