



OFFICE OF THE INSPECTOR
OF CUSTODIAL SERVICES

Thermal conditions of prison cells

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1 Inspector's overview

Thermal conditions in cells: time for action at high risk sites

Mr Ward's death

The 2008 heat-related death of Aboriginal elder Mr Ward in a prisoner transport vehicle highlighted the safety risks that can arise from extreme temperatures. The Coroner described Mr Ward's death as a 'terrible death' which was 'wholly unnecessary and avoidable'.¹ He pointed out that my predecessor's warnings in relation to the transport of people in custody had been ignored and that 'it was only following the death and the attendant glare of publicity that the Department [of Corrective Services] took positive steps'² to improve the situation.

This shocking event, and the systemic failings that it revealed, rocked the justice system to its core. It prompted the Department to completely overhaul prisoner transport in Western Australia, and also to spearhead the development of national standards for prisoner transport. Western Australia acquired a new fleet of air-conditioned vehicles with electronic temperature alarms, there was increased use of alternative methods of travel and there were widespread reforms to standards and procedures.

Why this review?

In consequence of Mr Ward's death, the *Inspector of Custodial Services Act 2003* was amended to allow this Office to conduct reviews of specific aspects of custodial services, especially those relating to safety, welfare and decency of treatment. Given the genesis of these review powers, thermal conditions in cells was an obvious choice for a review.

I have long been concerned that the development of local and national standards for transport did not trigger a sharper focus on climate control in prisons. These concerns escalated in 2013, when we conducted an inspection of Roebourne Regional Prison (Roebourne). The Department rejected a recommendation to install 'suitable climatic controls to reduce air temperatures and to increase cool air circulation in prisoners' cells'. This was the very same recommendation that it had supported in 2010, but on which it had never taken remedial action. The Department also stated in 2013-2014 that climate control in its facilities was of 'low relative priority' and air-conditioning was an 'issue for the future'.³

The Department provided no evidence to justify such a dismissive and non-committal stance, or its own change of position. It had not conducted any systematic research into cell temperatures and its position also appeared to be at odds with what was happening

¹ Hope AN, *Record of an Investigation into Death, Ref 9/09*, Inquest into the death of Mr Ward, Coroner's Court of WA (12 June 2009) 5.

² Hope AN, *Record of an Investigation into Death, Ref 9/09*, Inquest into the death of Mr Ward, Coroner's Court of WA (12 June 2009) 105.

³ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

elsewhere in the system. The new Eastern Goldfields Prison set the standard that cell temperatures should be in the range of 18-30°C. West Kimberley Regional Prison's climate control system has been set at 26°C. Air-conditioning has also been installed in some parts of Roebourne and, in the aftermath of the January 2013 riot, at Banksia Hill Detention Centre.

It is obvious from basic meteorological data that Roebourne can be ferociously hot, it is obvious that it is not getting any cooler, and it is obvious that cell temperatures can be far in excess of the Department's upper standard for Eastern Goldfields Prison of 30°C.

Often when the temperature of prison cells is discussed, comparisons are made to living conditions in the community and the observation that many people live without air-conditioning. However, the majority of Roebourne's prisoners are locked overnight in cells that are not air-conditioned and that do not have showers, and the Department itself has said that temperatures in the prison can reach 50°C.⁴ It is not possible for prisoners to seek a cooler environment and they have very limited ability to modify their behaviour to mitigate extreme temperatures. Prisoners also have a higher rate of chronic health conditions and prescribed medication use that increases susceptibility to temperature extremes as compared to those living in the community.

It is therefore illogical, erroneous and risky to suggest that prisoners should not be in appropriately climate controlled environments. When discussing this report with the Department, it was also said that, after receiving our report, the matter was discussed with some individual staff at Roebourne who said they did not find the heat as bad as they had expected when they first moved there. Again, this is an erroneous comparison: the staff areas at Roebourne prison are air-conditioned, staff are not confined in crowded cells at night, and their homes (usually government-provided) have air-conditioning. Over the years, many staff, as well as prisoners, have also raised heat-related risks with us.

What we found

Although Roebourne was the primary trigger for this review, we have also been concerned about a number of other sites. And while our greatest concern is heat, cold temperatures also pose risks. For example the level of condensation, especially in shared cells, can be so high that it leads to mould on walls and even on bedding.

We engaged experienced researchers from Curtin University to help us to chart the thermal conditions in cells and to evaluate the potential for temperature related ill-health. Temperature and humidity monitors were placed in cells at four prisons (Roebourne, Karnet, Bandyup and Albany) during a week in either the summer or winter. Although it is unlikely that we captured the upper and lower extremes of temperature and humidity, the results were concerning, and corroborated our concerns.

⁴ Department of Justice, 'WA Prisons Role and Function Profile' (May 2003).

Roebourne

Roebourne is located in one of the harshest climatic parts of Western Australia, and is constructed from inappropriate building materials that absorb heat during the day and radiate it at night. Metal cyclone shutters in the cells further radiate heat and create air flow problems. Most cells at Roebourne are not air-conditioned, and we have repeatedly expressed concerns about the ‘intolerable and inhumane’⁵ conditions.

The temperatures we recorded at Roebourne were not simply uncomfortable; they demonstrated a significant threat to prisoner health. The non-air-conditioned cells rarely recorded temperatures below 30°C and attained temperatures close to 40°C. The average night-time temperature in non-air-conditioned cells at Roebourne was 33°C, with temperatures consistently exceeding 35°C in the few hours prior to midnight, a time when prisoners would be attempting to sleep.

Prisoner transport vehicles elicit an alarm when temperatures exceed 33°C, but there is no such monitoring or alarm for the prisoners at Roebourne who are unremittingly exposed to such conditions during the warmer months. Our inspection reports have also noted that even simple mitigation measures (such as allowing prisoners to eat their meals and spend more time in air-conditioned areas such as the dining room in the hottest months) have not been actioned.

Karnet

Concerning temperatures were also recorded at Karnet Prison Farm in the summer. While average temperatures did not reach the extremes of Roebourne, considerable temperature differences were observed between brick constructed cells and the prefabricated transportable ‘donga’ accommodation. In the middle of the day the donga cells were up to 6°C hotter than brick constructed cells, attaining maximum temperatures close to 39°C. While dongas have been used by the Department as a quick and cost-effective solution to the expanding prisoner population, these results demonstrated that they are ineffective at mitigating temperatures.

Bandyup and Albany

Bandyup Women’s Prison and Albany Regional Prison were assessed in the winter. The temperature recordings indicated that winter temperatures did not present the same acute risk to prisoner health. However, winter temperatures were undoubtedly uncomfortable, and in some cases resulted in hygiene, safety and security issues.

In Bandyup’s decrepit Unit 1, the cold conditions were compounded by poor ventilation and high humidity. Cell observation windows have been observed to steam up and prevent prison officers from performing observation checks.⁶ Prisoners in other accommodation units also reported difficulties keeping warm, with prisoners in self-care accommodation leaving ovens on at maximum temperatures during the day in an

⁵ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 70 (February 2011).

⁶ OICS, *Report of an announced inspection of Bandyup Women’s Prison*, Report No. 73 (August 2011).

effort to warm their house. This Office is aware of two oven doors exploding in the winter of 2014 due to this practice.

General conclusions

Some older Departmental facilities are ill-equipped to tolerate the temperature conditions of today and are unlikely to cope with any increase in temperature extremes due to climate change.

The conditions experienced at older facilities such as Roebourne and Bandyup present a stark contrast to newer facilities such as West Kimberley Regional Prison, which commendably has been designed in a manner that is appropriate for the climate and ensures the maintenance of acceptable temperatures. As a result, a two-tiered system of accommodation quality exists in Western Australia, where some locations present a higher risk to prisoner health than others due to their inadequate temperature mitigation.

Cell temperatures are influenced by a variety of cell design and construction factors of varying effectiveness and cost, such as shading, cell occupancy and air-conditioning. Air-conditioning is the most effective measure to maintain temperatures. Among the publicly run facilities, only Banksia Hill Detention Centre and West Kimberley Regional Prison have air-conditioning to all cells. However, a Heating, Ventilation and Cooling (HVC) system provides climate control to all cells in the privately run Acacia Prison while the majority of cells in the privately run Wandoo Reintegration Facility are air-conditioned.

Policies and procedures are also lacking. For example, there is no formal identification of prisoners who are heat sensitive, such as those receiving medications that can increase vulnerability to heat stroke. In the absence of policy, prisoner management decisions are made locally. There is some merit in allowing local responses to local problems, and staff deserve credit for their management of prisoners in difficult conditions with limited resources. However, the lack of policies (such as using common air-conditioned zones at times of excessive heat) means that too much can depend on local whim or will.

More generally, the lack of policies and standards undermines the Department's duty of care to provide a safe environment for prisoners. It is acknowledged that it is difficult to develop temperature standards given the lack of international or Australian guidelines. Nonetheless, temperature standards need to be developed in consultation with local prisoners, staff and relevant experts so that appropriate climate control requirements can be determined *and enforced* for each facility.

Moving forward

Discussions with the Commissioner have proved productive and the Department has committed in follow up correspondence to a combination of measures to progress the

recommendations. At Roebourne in particular, immediate measures such as shade structures, misting fans and measures to improve airflow and ventilation will be implemented.

However, the Department has no consistent statewide standard for the installation of air-conditioning and has not committed to installing air-conditioning at Roebourne or other 'hot-spots' such as the Karnet dongas. While it is acknowledged that air-conditioning is a costly form of temperature control, especially if buildings require extensive retrofitting, the financial cost of any heat-related death or serious injury would also be very high.

I do not resile from the view that air-conditioning should be installed in prison facilities where acceptable temperatures cannot be maintained using cheaper methods. We will continue to monitor thermal conditions at prisons where extreme temperatures exist, and both the implementation and impact of the Department's proposed remedial measures. As I have said before, and as the Ward case showed, if the State is to adequately meet its duty of care, 'adequate climate control is a necessity not an option.'⁷

This report also revealed that the Department lacks the evidence base which it needs to understand its risks and to assess the optimal remedial measures. I hope that this review will lead to regular and routine monitoring of thermal conditions, and the development of criteria based on factors such as temperature, humidity, vapour pressure and air movement. Where conditions fall outside the acceptable criteria, policies and procedures should be developed to alleviate risk to both prisoners and the State.

Western Australia was a national leader in developing policies and standards for thermal conditions in custody vehicles. This is an opportunity for the Department to take the national lead again.

Neil Morgan

18 September 2015

⁷ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 70 (February 2011) v; *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014) viii.

2 Recommendations

		Refer to paragraphs
1	Document acceptable temperature ranges for each prison.	3.14 – 3.15
2	Implement mechanisms for assessing cell temperatures in every prison, at least during the hottest and coldest months.	7.6 – 7.10
3	Develop and implement a state plan for addressing the risk of temperature extremes across the custodial estate.	7.11 – 7.12
4	Provide air-conditioning in all prison cells where acceptable temperatures cannot be maintained using cheaper methods.	5.3 – 5.9
5	Include heat-related illness as part of the risk assessment when assigning people to cells, ensuring people at high risk of heat-related illness are placed in cells with air-conditioning.	5.3 – 5.9
6	Improve shading and install air-conditioning in Roebourne Regional Prison within the next 12 months to mitigate the significant risk of heat-related illness.	5.16 – 5.17
7	Cease the practice of using dongas as accommodation for prisoners unless acceptable temperatures can be maintained.	5.18 – 5.24
8	Develop guidelines on actions to be undertaken in response to extreme temperatures.	6.1 – 6.5
9	Address the inequity in fan provision for prisoners.	6.12 – 6.16

3 Background

- 3.1 The Department of Corrective Services (the Department) is committed to placing the highest priority on 'SSSR' – security, safety of staff, safety of prisoners and rehabilitation. The 2008 heat-related death of Mr Ward in a prisoner transport vehicle highlighted the safety risks that can arise from extreme temperatures. It resulted in a damning Coroner's report, two prosecutions and a number of legal actions and compensation arrangements. Fortunately, it also prompted a thorough overhaul of transport arrangements. This review examines the Department's approach to another area of heat-related risk, temperature control in prisons.
- 3.2 Extreme temperatures can be harmful to the human body. Humans generally maintain a body temperature of approximately 37°C, with the temperature maintained in hot conditions by mechanisms such as sweating and by adapting behaviour.⁸ If temperature and hydration levels are not maintained at satisfactory levels a number of heat-related illnesses can occur. These illnesses range on a continuum from heat oedema (temporary swelling of the extremities), heat syncope (dizziness and fainting), heat exhaustion (weakness, nausea, and headache) to heat stroke.⁹
- 3.3 When an individual has heat stroke their body's mechanisms for maintaining temperature break down, leading to an uncontrolled rise in the body's core temperature. Multi-organ failure can result, with heat stroke having an average mortality rate of 50 per cent.¹⁰ Extreme heat can also result in illness or death by exacerbating pre-existing chronic conditions such as heart, respiratory, and renal diseases. These indirect consequences of heat are rarely identified or reported.¹¹
- 3.4 The Western Australian Department of Health (WA Health) lists certain factors that increase vulnerability to heat-related illnesses. These include:¹²
- Being over 65 years old;
 - Taking certain medications;
 - Having a chronic illness such as a heart condition, diabetes, respiratory disease, renal disease, or a mental illnesses;
 - Being unable to adapt behaviour in order to regulate temperatures ; and

⁸ Health Canada. *Extreme heat events guidelines: Technical guide for health care workers*. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch (2011).

⁹ *ibid.*

¹⁰ Martin-Latry, K. et al. 'Psychotropic drug use and risk of heat-related hospitalisation'. *European Psychiatry* (2007); 22 (6):335-8.

¹¹ Health Canada. *Extreme heat events guidelines: Technical guide for health care workers*. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch (2011).

¹² Western Australian Department of Health, *State emergency plan for heatwave October 2012*, Disaster Preparedness Management Unit (December 2012).

- Being impacted by environmental factors (e.g. living in a remote area, suboptimal housing conditions, working in a hot environment).

3.5 While heat events are a more pertinent concern in the Western Australian context, cold weather can also be harmful. In response to cold temperatures, the human body employs compensatory actions such as shivering, constricting blood vessels, and increasing respiration and heart rate.¹³ If the body's temperature decreases by too much, unconsciousness will result and the heart stops.¹⁴ Sub-zero temperatures are not required for hypothermia to occur – if ambient temperatures are lower than the body's internal temperature of 37°C and behavioural or physiological adaptations do not occur, hypothermia is possible.¹⁵ People at-risk of cold related illnesses are similar to that of heat-related illnesses.

Prisoners: an at-risk group

3.6 It is critical that acceptable temperatures are maintained in a custodial environment. Prisoners are an 'at-risk' group for temperature related illnesses¹⁶ due in part to their poorer health outcomes:

- One-third of prisoners report having a chronic health condition;¹⁷
- 59 per cent of adult prisoners and 65 per cent of juvenile detainees are affected by mental illness;¹⁸ and
- A substantial proportion of the prison population are on prescribed medications that increase susceptibility to temperature extremes.¹⁹

3.7 Compounding these health vulnerabilities is a prisoner's impaired capacity to make behavioural adaptations to mitigate the temperature conditions they face. Outside prison, someone experiencing hot temperatures may seek a cooler environment (e.g. air-conditioned shopping centre), wet their body and clothes with water, and move away from structures that radiate heat. These actions may not be possible for those restricted to a prison cell.²⁰

3.8 For example, at Roebourne Regional Prison temperatures can reach 50°C.²¹ The majority of prisoners are locked overnight in cells that are not air-conditioned

¹³ Worksafe Victoria. *Safe operation of cold storage facilities*. Edition No. 1 (2008).

¹⁴ Better Health Channel, *Fact sheet: Hypothermia*, State Government of Victoria (July 2014). <<http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Hypothermia?open>>

¹⁵ *ibid*

¹⁶ Grant, E, A, Hansen and T. Williamson (2012) 'Design issues for prisoner health: Thermal conditions in Australian custodial environments' *World Health Design* 5 (3) pp. 80 – 85.

¹⁷ Australian Institute of Health and Welfare. *The health of Australia's prisoners 2012*. Cat. no. PHE 170. (2013).

¹⁸ Mental Health Commission, Western Australia. *Internal Modelling: 2014*. Western Australia: Government of Western Australia (2014).

¹⁹ The Department provided the following patient numbers per medication: Anticholinergics = 428, antipsychotics(not including depot medication) = 820, diuretics = 30, antihypertensives = 319. These patient numbers do not refer to distinct patients as that information was unavailable. Some patients may be on combination doses of the same medication type which will inflate these numbers.

²⁰ Vassallo, R. *Report on the Risks of Heat-Related Illness and Access to Medical Care for Death Row Inmates Confined to Unit 32, Mississippi State Penitentiary, Parchman, Mississippi* (September 2002).

²¹ Department of Justice, 'WA Prisons Role and Function Profile' (May 2003).

and that do not have showers. It is not possible for prisoners to seek a cooler environment. Prisoners get through the night by drinking from water bottles chilled prior to lockup, sleeping on the floor, and splashing themselves with water from sinks. Through the day, towels are draped over windows to reduce sunlight entering the room, though this has the disadvantage of inhibiting any beneficial breezes that may be present. These behavioural adaptations reduce risk to a far lesser extent than what is possible in the wider community.

- 3.9 Creative behavioural adaptations have also been observed in winter as heaters are not a uniform feature of prisoner accommodation and additional clothing and bedding may be subject to limitations in availability. In the 2001 unannounced inspection of Eastern Goldfields Regional Prison it was noted that prisoners attempted to prevent draughts of cold air by covering cracks in the wall with paper mache bonded with their own saliva.²² At other prisons the use of paper to cover up ventilation vents has been commonly observed, restricting the flow of fresh air into the cell. At Bandyup Women's Prison, prisoners in the self-care accommodation reported leaving ovens on at maximum temperatures during the day in an effort to warm their house. This Office is aware of two oven doors exploding in the winter of 2014 due to this practice.
- 3.10 Prisoner efforts to achieve comfortable temperatures within the limitations of the prison environment can therefore be creative but are unlikely to be fully effective, and can increase other risks such as restricted air flow. For prisoners who are too old, unwell, or mentally ill to undertake these behavioural adaptations, the prison environment poses an acute risk of temperature related ill-health.

Temperature effects in prison

- 3.11 The grim consequences of extreme temperatures in prison have been widely reported in the United States of America (U.S.). Since 2007, at least 14 prisoners in the Texas State Prison System have died from extreme heat exposure.²³ These prisoners had health conditions or were taking medications that increased their susceptibility to temperature related illnesses. While the facilities had fans and ventilation systems, these measures were ineffective in preventing these prisoner deaths. Other heat-related deaths have been reported in New York,²⁴ Virginia,²⁵ and Arizona.²⁶ Deaths due to cold are rarer, but have also been reported.²⁷

²² OICS. *Report of an unannounced inspection of Eastern Goldfields Regional Prison*. Report No. 4 (November 2001).

²³ Human Rights Clinic, *Deadly heat in Texas Prisons*, The University of Texas School of Law (April 2014).

²⁴ Pearson J, 'Death in hot jail cell highlights national issue', *The Huffington Post* (17 May 2014)

²⁵ Williams R, '\$10M suit targets Richmond Jail over heat death', *Richmond Times-Dispatch* (June 17 2012).

²⁶ Newton C, 'Details emerge in Goodyear inmate's heat related death', *The Arizona Republic* (24 September 2009).

²⁷ Starks C, 'Inmate died of hypothermia', *Chicago Tribune* (31 March 2004).

- 3.12 There is little research into prison thermal conditions and the extent of heat-related illnesses in Australian prisons is not known.²⁸ The most notable Western Australian heat-related death in custody was that of the Aboriginal Elder Mr Ward, who died of heatstroke in an excessively hot prison van.²⁹ The death of Mr Ward resulted in numerous changes to the way prisoner transports occur and increased the powers of the Inspector of Custodial Services, to allow for reviews to be undertaken of specific aspects of custodial services, such as this review.
- 3.13 It is difficult to determine how many prisoners have experienced temperature related ill-effects within Western Australian prisons. The Department stated that minimal incidences of heat-related conditions such as heat rash, heat exhaustion and heat stroke were recorded in their electronic health records database. Health staff contacted at Casuarina Prison, Roebourne Regional Prison, and Karnet Prison Farm also had no recollection of heat stroke occurring and noted that temperature related illnesses were typically rare and mild. Illnesses directly attributed to heat appear to be rare; however, it is not possible to determine how frequently temperatures have exacerbated pre-existing chronic health conditions.

The current review

- 3.14 Temperature concerns have been frequently raised in inspection reports by this Office. Numerous inspections of Roebourne Regional Prison have made recommendations to improve climate control.³⁰ Similar concerns have been raised in inspections of Karnet Prison Farm, Bandyup Women's Prison and Banksia Hill Detention Centre.³¹
- 3.15 Despite these consistent concerns the Department still does not routinely measure cell temperatures and therefore has no indication of the severity of the issue, nor any plans to mitigate the risk. The Department similarly lacks standards on what constitutes an acceptable range of temperatures within its facilities. It is acknowledged that it is difficult to develop temperature standards given the lack of international or Australian guidelines and the high likelihood of differences in what is considered comfortable in the state's north and south. Nonetheless, temperature standards need to be developed in consultation with local prisoners, staff and relevant experts in order for climate control requirements to be determined for each facility (see Recommendation 1).

²⁸ Grant, E, A, Hansen and T. Williamson (2012) 'Design issues for prisoner health: Thermal conditions in Australian custodial environments' *World Health Design* 5 (3) pp. 80 – 85.

²⁹ Hope AN, *Record of an Investigation into Death, Ref 9/09*, Inquest into the death of Mr Ward, Coroner's Court of WA (12 June 2009).

³⁰ OICS. *Report of an announced inspection of Roebourne Regional Prison*. Report No. 14 (April 2003); OICS. *Report of an announced inspection of Roebourne Regional Prison*. Report No. 24 (October 2004); OICS. *Report of an announced inspection of Roebourne Regional Prison*. Report No. 48 (March 2008); OICS. *Report of an announced inspection of Roebourne Regional Prison*. Report No. 70 (April 2011).

³¹ OICS, *Report of an announced inspection of Bandyup Women's Prison*, Report No. 73 (August 2011); OICS. *Report of an announced inspection of Banksia Hill Juvenile Detention Centre*. Report No. 76 (March 2012); OICS, *Report of an announced inspection of Karnet Prison Farm*, Report No. 84 (June 2013);

- 3.16 Given the potential risk of temperature related ill-health in Western Australian prisons, this Office engaged researchers from Curtin University to assess the thermal conditions of prison cells. Heat and humidity sensors were placed in six cells within each of the following prisons during either summer or winter:
- Karnet Prison Farm (summer);
 - Roebourne Regional Prison (summer);
 - Bandyup Women’s Prison (winter); and
 - Albany Regional Prison (winter).
- 3.17 Sensors were also placed at Casuarina Prison during spring to test our data collection methodology and equipment.
- 3.18 The thermal conditions of prison cells were assessed in two ways. Firstly, cells were compared in terms of the proportion of time temperatures were between 18 – 30°C. This temperature range was a requirement for the design brief of the Eastern Goldfields Regional Prison redevelopment and was used as an ‘acceptable temperature range’ in the absence of standards developed by the Department. In other words, this report assesses existing facilities against the Department’s own design specifications for its latest facility.
- 3.19 Cells were also compared in terms of the risk they presented to prisoners. Risk was assessed by calculating the proportion of time cell temperatures corresponded with each category of the ‘heat index’ used by the United States National Weather Service.³² The heat index categorises ‘apparent temperatures’ based on the likelihood of heat-related illnesses with prolonged exposure or strenuous activity. Apparent temperatures reflect the perceived temperature of cell occupants, taking into account both temperature and humidity.³³

³² National Weather Service n.d. *Beat the Heat Weather Ready Nation Campaign*, NWS, Maryland, viewed 01 September 2014, <http://www.nws.noaa.gov/os/heat/index.shtml>.

³³ This report uses the non-radiant method of apparent temperature calculation employed by the Australian Bureau of Meteorology. See Australian Bureau of Meteorology (n.d.) *About the Formula for Apparent Temperature*, viewed 4 February 2014, http://www.bom.gov.au/info/thermal_stress/#atapproximation

Table 1
*Heat Index Categories*³⁴

Category	Apparent temperature (°C)	Effect on the body
Caution	>27-32	Fatigue possible with prolonged exposure and/or physical activity.
Extreme Caution	>32-41	Heat cramps, heat exhaustion and heat stroke possible with prolonged exposure and/or physical activity.
Danger	>41-54	Heat cramps or heat exhaustion likely and heat stroke possible with prolonged exposure and/or physical activity.
Extreme Danger	>54	Heat stroke highly likely.

3.20 The risk presented by prison cells is expected to increase over time. Climate change is projected to result in higher temperatures and more extreme weather events across Australia.³⁵ Prisoner accommodation therefore not only needs to tolerate the already harsh temperature conditions of today, but also withstand the predicted temperature extremes of the future.

³⁴ The 'heat index' estimates the risk presented by the environment but it should be noted that a number of other factors including acclimatisation, clothing, fitness levels, and physical health contribute to the overall risk to any individual. The heat index may therefore conservatively estimate risk for some prisoners.

³⁵ Australian Bureau of Meteorology and CSIRO, *State of the climate 2014* (March 2014).

4 Summer and winter extremes

- 4.1 Unacceptable temperatures (i.e. temperatures outside the range 18-30°C) were recorded at the tested prisons in both winter and summer. In winter, the temperatures could be unreasonably uncomfortable and, combined with high humidity, caused hygiene, safety, and security issues. In summer, the situation, especially at Roebourne, was dangerous and potentially life threatening.
- 4.2 While measurements were taken in the summer and winter, they will not necessarily have recorded temperatures on the hottest and coldest days of the year. As such the results do not represent the extremes of either season. Recordings taken regularly or over longer periods could well show the situation is worse at times.

Summer at Karnet and Roebourne

- 4.3 The temperatures recorded at the selected prisons in summer posed a significant threat to the wellbeing of prisoners. Most cells exceeded the 18-30°C acceptable temperature range for a substantial proportion of the time and some cells never recorded temperatures within this range during the entire measurement period. The risk categories of 'danger' and 'extreme caution' were attained in some cells, indicating an increased likelihood of heat-related illnesses such as heat stroke with prolonged exposure or physical activity.

Karnet Prison Farm

- 4.1 At Karnet Prison Farm (Karnet), temperatures in some cells exceeded outside temperatures during the day and demonstrated wild variation. The recordings corroborate frequent complaints about heat which have been reported to this Office.³⁶
- 4.2 Karnet is a minimum-security prison located near Serpentine, approximately 80 km south of Perth. Karnet has considerable variability in its accommodation; ranging from the old and decrepit³⁷ to the new and cheaply constructed.³⁸ Complaints about temperature have been received in relation to both old and new units. None of the accommodation has air-conditioning.
- 4.3 Cell temperatures at Karnet were assessed from 17 – 24 January 2014. During the week, the weather station device recorded local temperatures between 16.7°C and 39.8°C. Two cells reached above these maximum temperatures. Most cells were outside the acceptable temperature range for a third of the recording period.

³⁶ OICS, *Report of an announced inspection of Karnet Prison Farm*, Report No. 84 (June 2013).

³⁷ Karnet was established in 1963 and some of the original accommodation units are still in use. These were considered dilapidated, sub-standard, and in need of replacement at the time of this Office's 2001 inspection of the facility.

³⁸ New units at Karnet are transportable modular buildings (dongas), constructed with steel sheeting.

Table 2

Summarised cell temperature data at Karnet Prison Farm

Cell no.	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records outside acceptable temperature range
1	21.1	31.1	27.1	10.0	10.8%
2	21.3	32.6	27.8	11.3	28.7%
3	20.6	40.0	28.5	19.4	36.1%
4	19.5	39.4	28.7	19.9	38.9%
5	20.8	41.1	28.8	20.3	39.2%
6	20.4	35.8	28.0	15.4	33.9%

4.4 Over half the time from 17 to 24 January, temperatures in cells in Karnet were in the ‘caution’ and ‘extreme caution’ categories of the heat index. One cell fell into the ‘danger’ category for a short period. A danger category indicates that heat cramps and heat exhaustion are likely and heat stroke is possible with prolonged exposure or physical activity.

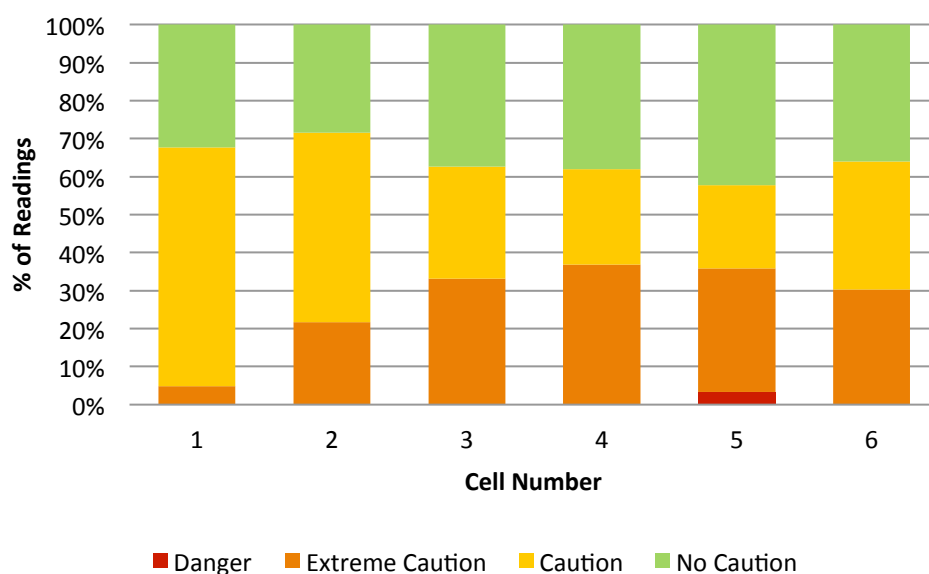


Figure 1

Heat Index categories for Karnet Prison Farm.

Roebourne Regional Prison

4.5 Temperatures recorded at Roebourne Regional Prison (Roebourne) indicated significant risk for heat-related illnesses and death. All cells without air-conditioning experienced conditions that place them in the ‘danger’ category of

the heat index, and even those with air-conditioning reached the extreme caution category during the measuring period.

- 4.6 Roebourne Regional Prison is the hottest prison in Australia.³⁹ Average maximum temperatures range between 43.9°C and 45.4°C in the summer months, with temperatures known to exceed 50°C.⁴⁰ Humidity is also a factor, with January and February having an average relative humidity of 40 per cent and 44 per cent respectively.⁴¹
- 4.7 Numerous inspections of Roebourne have made recommendations concerning climate control, with the Inspector describing Roebourne as ‘intolerable and inhumane’ in a 2008 inspection of the facility.⁴² During the 2013 inspection of Roebourne only a small number of cells in the maximum-security wing and the enhanced privilege wing had air-conditioning.⁴³ The Department has not committed to any additional temperature mitigation measures in the main prison since the provision of extra shade sails and desk fans in 2009. However, the new Roebourne Work Camp, located outside the main entrance to the prison, is air-conditioned.
- 4.8 This Office was particularly concerned by the Department’s response to the report of the 2013 inspection of Roebourne. This report repeated the same recommendation that had been made in earlier reports, that air-conditioning or some other form of climatic control should be installed in the units to reduce air temperatures and to increase cool air circulation. In 2010, the Department had supported this recommendation in principle. However, in mid-2013 it described air-conditioning as an ‘issue for the future’ and in early 2014 it said that ‘climate control across all facilities was ... of low relative priority.’⁴⁴
- 4.9 Other than extreme ambient temperatures, Roebourne has a number of other risk factors that exacerbate the effect of high temperatures. The brick construction of accommodation units absorb heat during the day and radiate it at night, with metal cyclone shutters further radiating heat in the afternoon. Unlike Karnet Prison Farm, unemployment and underemployment feature heavily at Roebourne and so a greater proportion of prisoners spend their day in their cell.⁴⁵
- 4.10 It is often suggested that because people placed in Roebourne are predominately from the Pilbara region they are acclimatised to the hotter conditions and

³⁹ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

⁴⁰ Department of Justice, *‘WA Prisons Role and Function Profile’* (May 2003);

⁴¹ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

⁴² OICS, *Report of an announced inspection of Roebourne Regional Prison*. Report No. 14 (April 2003); OICS, *Report of an announced inspection of Roebourne Regional Prison*. Report No. 24 (October 2004); OICS, *Report of an announced inspection of Roebourne Regional Prison*. Report No. 48 (May 2008); OICS, *Report of an announced inspection of Roebourne Regional Prison*. Report No. 70 (April 2011); OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

⁴³ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

⁴⁴ See [7.7] below.

⁴⁵ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

therefore tolerate the extreme temperatures. This thinking fails to account for the health profile of people from the Pilbara region, which may offset any benefits of acclimatisation. Pilbara residents, and particularly Aboriginal Pilbara residents, are more likely to be hospitalised compared to the state average and are more likely to report a chronic health condition.⁴⁶ These chronic conditions increase vulnerability to temperature related ill-effects. Aboriginal people from the Pilbara region constitute 73 per cent of Roebourne’s prisoner population.

- 4.11 There is also no guarantee that prisoners accommodated at Roebourne will be people who are acclimatised to the local conditions. Overcrowding is common in Western Australian prisons, particularly in the women’s estate. One of the results of higher prisoner numbers is that people are disbursed wider across the system, which can happen for management purposes or simply because there is not enough room at a particular facility. Prisoners not from the Pilbara constitute 18 per cent of Roebourne’s population.
- 4.12 Cell temperatures at Roebourne were assessed from the 24 February to 5 March 2014. During this week, the weather station device recorded a local temperature range of 26.2° C to 41.1°C.

Table 3

Summarised cell temperature data at Roebourne Regional Prison

Cell no.	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records outside acceptable temperature range
1	30.3	38.3	34.0	8.0	100%
2	29.8	39.9	34.1	10.1	99.2%
3	23.9	28.6	25.7	4.7	0%
4	29.2	39.7	33.8	10.5	93.0%
5	26.6	34.4	29.9	7.8	44.4%
6	29.6	38.7	33.7	9.1	97.6%

- 4.13 One cell with air-conditioning stayed within the acceptable temperature range. The other cell with air-conditioning was within these limits over half the time. The large variation in results is likely to be due to the difference in type of air-conditioning, with the more effective air-conditioning attained through a ducted system versus a wall-mounted reverse cycle system. The results may also be partially attributable to differences in occupancy, with the poorer performing cell having up to three occupants during the recording period compared to a single occupant in the better performing cell.
- 4.14 The four cells without air-conditioning were almost always outside the acceptable temperature range. While the high temperatures recorded in the cells

⁴⁶ Western Australian Country Health Service, ‘Pilbara Health Profile’ (April 2012).

are startling, the fact that the temperature in these cells never fell below 29 degrees is even more concerning. If the minimum (or overnight) temperature remains high, the subsequent maximum will occur earlier in the day and remain near that high temperature for a longer period. A higher minimum temperature also restricts the amount of recovery that can occur, due to less opportunity to discharge heat.⁴⁷ High overnight temperatures prolong the prisoner’s exposure to high temperatures, which increases the risk of harm.

4.15 When humidity was taken into account, the maximum apparent temperatures of cells without air-conditioning were between 44 – 46 °C. All cells without air-conditioning were either classified as ‘extreme caution’ or ‘danger’ for the entire measurement duration.

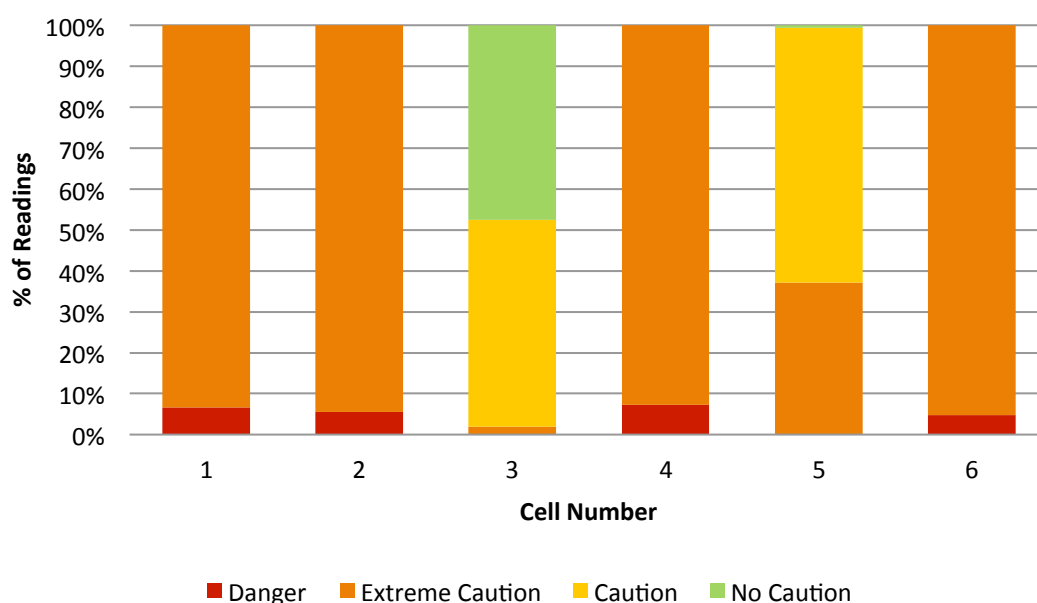


Figure 2

Heat Index categories for Roebourne Regional Prison.

4.16 The ‘extreme caution’ and ‘danger’ classifications refer to heat-related illnesses (including heat stroke) potentially occurring with prolonged exposure. The exposure to these conditions was prolonged, given prisoners were subject to these temperatures for the entire nine days in which temperatures were recorded, and no doubt for even longer before and after the recording period. There is a significant risk for temperature related illnesses and death at Roebourne. Of most concern is that these temperatures only reflect the week of measurement and do not reflect the hottest potential temperatures at Roebourne.⁴⁸ Ways in which temperature can be moderated are discussed in the next section.

⁴⁷ <<http://www.bom.gov.au/australia/heatwave/about.shtml?>>

⁴⁸ Some prisoners remarked that temperatures were far hotter a few weeks prior to the placement of temperature measurement devices.

Winter at Bandyup and Albany

- 4.17 Recordings in winter showed that temperatures inside cells were generally warmer than the temperature outside the cells. However, while providing prisoners with some protection from the elements these cells did not maintain temperatures that were within acceptable ranges.
- 4.18 It is not possible to estimate risk in winter due to the absence of a relevant 'cold index', however, the cell conditions were often undoubtedly uncomfortable and in some cases caused hygiene, safety, and security issues.

Bandyup Women's Prison

- 4.19 Most cells at Bandyup recorded temperatures outside the 18 – 30°C acceptable temperature range for the majority of the measurement period. Often the cold conditions were compounded by poor ventilation and high humidity which not only made it unreasonably uncomfortable for the occupants, but resulted in safety and security issues with observation windows steaming up, preventing prison officers from performing observation checks.⁴⁹
- 4.20 Bandyup Women's Prison (Bandyup) is located in the Swan Valley in the Perth metropolitan area. Over 60 per cent of all women in custody in Western Australia reside in Bandyup. The infrastructure of Bandyup reflects additions over multiple decades, with vast disparities in the quality of accommodation. At one end of the spectrum is the 40 year old Unit One, a unit in a state of disrepair that has been assessed by an environmental health expert as unhygienic and uncondusive to the health of prisoners.⁵⁰ At the time of measuring, chronic overcrowding had resulted in doubling up in Unit One leaving women sleeping on mattresses on the floor. Since then, an additional bed has been installed in these units to allow for double-bunking. The new top bed crosses over the window of the unit. It is unknown what effect this will have on the temperature in these cells.
- 4.21 Unit Five represents the other end of Bandyup's accommodation quality spectrum. It consists of ten, four bedroom community-style self-care houses designated for prisoners who have demonstrated good behaviour.
- 4.22 Measures were taken in several types of accommodation including both Unit One and Unit Five from 10-17 July 2014. The average maximum temperature recorded by the weather station device during the week was 18.3 °C.⁵¹ The nearest Bureau of Meteorology (BOM) weather station recorded an average minimum of 6.6°C during the week.

⁴⁹ OICS, *Report of an announced inspection of Bandyup Women's Prison*, Report no. 73 (August 2011).

⁵⁰ Hands-On Infection Control, *'Bandyup Women's Prison announced inspection visit 18 March 2014 – Care and well-being'* (April 2014).

⁵¹ A minimum temperature was not able to be ascertained with the weather station as the device did not record temperatures below 10 °C.

4.23 All except one set of recordings showed temperatures outside the acceptable temperature range for over half the time. Two units remained outside the acceptable temperature range for almost the entire recording period, only briefly registering acceptable temperatures.⁵²

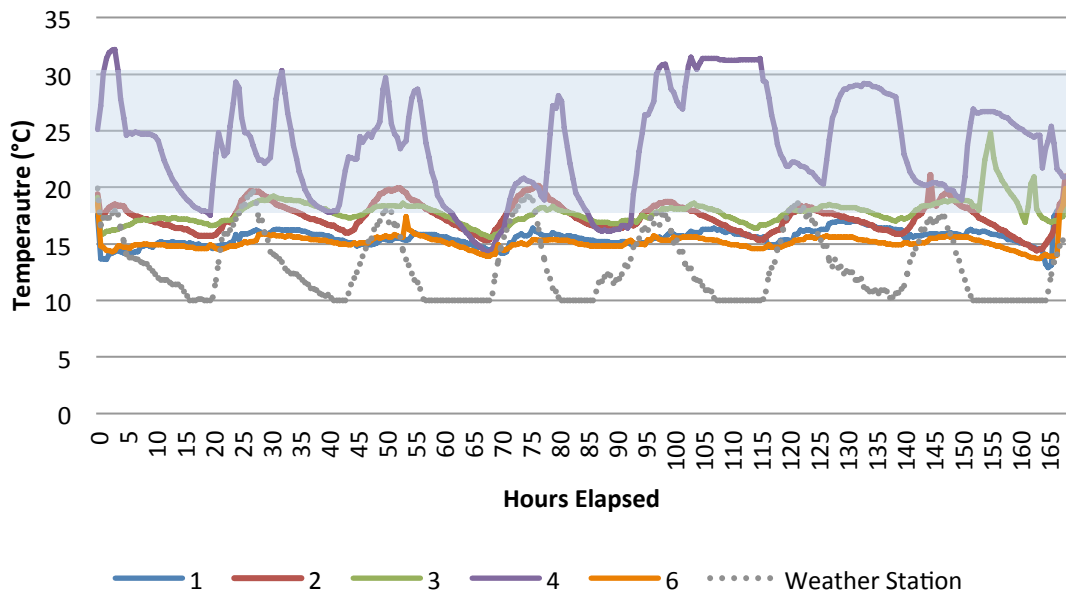


Figure 3

Temperature measurement results at Bandyup Women's Prison⁵³

4.24 The anomaly (cell four in Figure 3) occurred in a unit equipped with an evaporative air-conditioner and a heater. Unfortunately, while more acceptable temperatures were experienced in this unit, prisoners have stated that the head-level placement of wall heaters results in prisoners on the top bunk being excessively warm while prisoners on the bottom bunk feel cold.⁵⁴ The results corroborate these complaints⁵⁵ as over 10 per cent of the recording period showed temperatures above the acceptable temperature range. The spikes in temperature occurred at all times of the night and day and on some occasions persisted for many hours. The heater and evaporative air-conditioners in this unit have since been replaced with split-system air-conditioners.

4.25 High humidity levels were present in several cells with readings of up to 93 per cent humidity. Close to half of all recordings (47%) in Unit One exceeded 70 per cent humidity. These conditions promote the growth of bacteria and mould,

⁵² Temperature recordings across all cells converged at the end of the recording period. This is likely due to the temperature measurement devices continuing to record after removal from cells. Some data at the end of the recording period was deleted to limit the impact of this anomaly however it could not be determined exactly when devices were removed from cells. It is possible that the acceptable temperatures observed in these units were simply due to the devices recording for a brief period after being removed from cells.

⁵³ The area shaded light blue represents the acceptable temperature range of 18 - 30°C. Please note that the weather station did not record temperatures below 10°C.

⁵⁴ Hands-On Infection Control, 'Bandyup Women's Prison health focussed liaison visit 6 August 2012' (August 2012).

⁵⁵ All recording devices were placed at head level.

increase dust mite activity (affecting people with asthma), and increase odours due to fungal growth.⁵⁶

- 4.26 While the high humidity levels were problematic in winter this also has obvious implications for summer months. Given the results found in Roebourne, particularly the added safety concerns when high humidity levels were present in combination with high heat, it is possible that Bandyup may present similar risks to its occupants in summer.

Albany Regional Prison

- 4.27 The results from Albany Regional Prison were more positive than those at Bandyup, although the conditions at Albany were milder during the recording period than what was experienced at Bandyup. Half the cells recorded temperatures within the acceptable range during the entire measuring period despite the cool temperatures outside the cells.
- 4.28 Albany Regional Prison is a maximum-security prison located at the southern tip of Western Australia. Previous inspections of Albany have consistently praised it as a high performing prison. Despite the cold temperatures experienced in Albany, very few temperature complaints have been reported. It is difficult to determine why few temperature complaints have been received from Albany prisoners given it has an ageing infrastructure and there is a lack of heating in its units. Inspections of Albany have noted that staff have a pragmatic ‘can-do’ attitude⁵⁷ and it is possible that this positive culture extends to prisoners which may lead to more flexibility in enabling behaviour modifications to adjust to the temperature. While complaints have not historically featured at Albany, when asked, some prisoners did describe very cold temperatures being experienced in their cell.

⁵⁶ Zaslow S & Genter M, ‘*Mold, dust mites, fungi, spores, and pollen: Bioaerosols in the human environment*’, North Carolina State University Cooperative Extension (June 1995).

⁵⁷ OICS, *Report of an announced inspection of Albany Regional Prison*, Report No. 78 (June 2012).

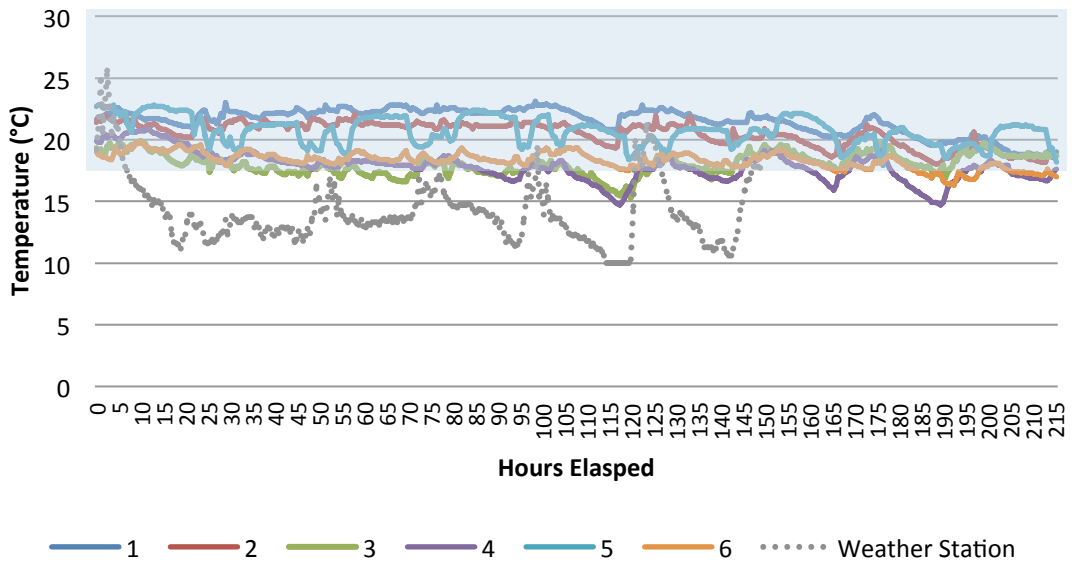


Figure 4

Temperature measurement results at Albany Regional Prison⁵⁸

4.29 Even though the results were far better than the results at Bandyup, they still showed unacceptable temperatures in two cells for over half the recording period. Another cell experienced unacceptable temperatures for a quarter of the measuring period. This indicates action is still needed to address temperature moderation in Albany even though it performed better than the other facilities.

⁵⁸ The area shaded light blue represents the acceptable temperature range of 18 - 30°C. Please note that the weather station did not record temperatures below 10°C.

5 Mechanisms for influencing cell temperatures

- 5.1 It is within the Department's power to ensure that prison cells maintain acceptable temperatures. Cell temperatures were found to be influenced by a variety of cell design and construction factors of varying effectiveness and cost.
- 5.2 Air-conditioning was the most effective temperature mitigation measure. Other factors such as building material, shading, occupancy and roof ventilation (e.g. whirly birds) were found to influence temperatures by a lesser amount. It is possible a particular combination of these other factors could bring temperatures into an acceptable range in some locations. However, a thorough assessment of the effectiveness of various combinations of these factors was beyond the scope of this review. The Department needs to develop mechanisms for measuring temperatures and, from there, determine the most effective and efficient approach to maintain acceptable cell temperatures.

Air-conditioning

- 5.3 Air-conditioning⁵⁹ had the largest impact on cell temperatures, reflecting its status as the strongest protective factor against heat-related illnesses.⁶⁰ Air-conditioning has been found to reduce heat-related illnesses by up to 80 per cent⁶¹ and research in the U.S. has associated increasing use of air-conditioning in recent decades with a dramatic decline in heat-related deaths among vulnerable groups.⁶² Even spending a few hours of a day in an air-conditioned environment reduces the likelihood of heatstroke.⁶³ In heat wave prevention plans in both the U.S. and Australia, the importance of having accessible air-conditioned environments is emphasised.⁶⁴ Air-conditioning is the norm in prisons in many U.S. states that experience similar temperature conditions to Western Australia.⁶⁵
- 5.4 The impact of air-conditioning was demonstrated at Roebourne where it was found that air-conditioned cells attained considerably lower average temperatures, lower maximum temperatures and had less variation in temperature compared to non-air-conditioned cells. The risk of heat-related

⁵⁹ In this report, the term 'air-conditioning' broadly refers to devices that provide a cooling effect to the air. This comprises a number of different systems including wall-mounted reverse cycle air-conditioners, evaporative air-conditioners, ducted air-conditioners and Heating, Ventilation, and Cooling (HVC) systems. The Department provided a list of all air-conditioned and heated units in its prisons (see Appendix B).

⁶⁰ <http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp>

⁶¹ Semenza, J. C., Rubin, C. H., Falter, K. H. et al. 'Heat-Related Deaths during the July 1995 Heat Wave in Chicago' (1996) 335 *The New England Journal of Medicine* 84.

⁶² Barreca A, Clay K, Deschenes, O, Greenstone M & Shapiro J, 'Adapting to climate change: The remarkable decline in the U.S temperature-mortality relationship over the 20th century, Working Paper 12-29 *Massachusetts Institute of Technology Department of Economics Working Paper Series* (December 2012).

⁶³ Human Rights Clinic, *Deadly heat in Texas Prisons*, The University of Texas School of Law (April 2014).

⁶⁴ <http://emergency.cdc.gov/disasters/extremeheat/heat_guide.asp>; Victorian Department of Health, *Heatwave plan for Victoria: Protecting health and reducing harm from heatwaves* (2011).

⁶⁵ Human Rights Clinic, *Deadly heat in Texas Prisons*, The University of Texas School of Law (April 2014).

illness was substantially reduced in Roebourne for people in air-conditioned cells.

Table 4

Temperatures of air-conditioned and non-air-conditioned cells at Roebourne Regional Prison.

Cell type	Average temperature (°C)	Avg. maximum temperature (°C)	% readings 'extreme caution'	% readings 'danger'
Air-conditioned cells ⁶⁶	27.8	31.5	19.5%	0.0%
Non-air-conditioned cells	33.9	39.3	94.0%	6.0%
<i>Difference</i>	+6.1	+7.8	+74.5%	+6.0%

- 5.5 Despite the effectiveness of air-conditioning in reducing the likelihood of temperature related ill-health it is not generally provided in public Western Australian prisons. All cells in the privately run Acacia Prison (Acacia) are air-conditioned and nearly all cells⁶⁷ in the privately run Wandoo Reintegration Facility (Wandoo) are air-conditioned.
- 5.6 Only 14 per cent of prisoners in publicly run facilities are in an air-conditioned cell. Banksia Hill Detention Centre (Banksia Hill), which was air-conditioned after the January 2013 riot, and the recently built West Kimberley Regional Prison (West Kimberley) are the only facilities to have air-conditioning provided to all cells.

⁶⁶ There was also a large difference between the two air-conditioned cells. The 'mother and child' cell demonstrated a maximum temperature of 34.4°C while the 'enhanced privileges cell' attained a maximum temperature of 28.6°C. The enhanced privileges cell had a single occupant and had cold air piped in through a ceiling vent. The mother and child cell had up to three occupants during the week and had a wall-mounted reverse cycle air-conditioner.

⁶⁷ All areas save the J Block B wing are air-conditioned. This constitutes 94% of prisoners at the facility being in an air-conditioned cell as of 1/7/2015 (see Table 5).

Table 5*Proportion of prison population in an air-conditioned cell⁶⁸*

Facility	% of prisoners in an air-conditioned cell⁶⁹
Acacia Prison	100.0%
Albany Regional Prison	0.0%
Bandyup Women's Prison	32.4%
Banksia Hill Detention Centre	100%
Boronia Pre-release Centre	16.1%
Bunbury Regional Prison	0%
Casuarina Prison	0.0%
Eastern Goldfields Regional Prison	49.4% ⁷⁰
Greenough Regional Prison	14.7%
Hakea Prison	1.2%
Karnet Prison Farm	0.0%
Pardelup Prison Farm	12.7%
Roebourne Regional Prison	17.3%
Wandoo Reintegration Facility	94.1%
West Kimberley Regional Prison	97.2% ⁷¹
Wooroloo Prison Farm	6.0%
Total	36.7%

5.7 The provision of air-conditioning is inconsistent and poorly correlated with risk. It is appropriate that air-conditioning is provided in certain accommodation units likely to house vulnerable prisoners, including the Acacia assisted care unit, the Hakea crisis care unit and the mother and child houses at both Bandyup and Boronia. However, there are numerous examples of similarly vulnerable populations who are not provided air-conditioning:

- Air-conditioning is provided in the Hakea crisis care unit cells but not in the crisis care accommodation in Casuarina or Bandyup;
- Air-conditioning is provided in the Dowerin and Walpole work camps but not in the Warburton Work Camp, despite Warburton Work Camp experiencing more extreme temperatures;
- Air-conditioning is provided in the Roebourne Work Camp but not the main Roebourne Prison, despite prisoners in the Roebourne Work Camp spending

⁶⁸ Prisoner data retrieved on 1/7/2015. Refer to Appendix B for the Department's list of units with air-conditioning.

⁶⁹ Banksia Hill Detention Centre, Wandoo Reintegration Facility and the Walpole Work Camp have air-conditioning in common areas that disperse air into cells. These cells were counted as air-conditioned.

⁷⁰ The re-developed Eastern Goldfields Regional Prison, which is due to be open in late 2015, will have air-conditioning provided to all cells.

⁷¹ West Kimberley Regional Prison is completely air-conditioned however Broome Regional Prison is currently considered an annex of West Kimberley Regional Prison and is not completely air-conditioned.

less time in their cells and having increased freedom to leave their cells at night;

- Air-conditioning is provided to the young, typically healthy population of Wandoo but not to the older and less healthy population of Karnet;⁷²
- Air-conditioning is provided in West Kimberley but not in Roebourne, despite Roebourne having a similar climate and housing a population with similarly poor health outcomes;⁷³
- Air-conditioning is provided in the Acacia assisted care unit but not the Casuarina infirmary.

5.8 It is highly likely that vulnerable prisoners are being placed at-risk in non-air-conditioned environments.

5.9 It is acknowledged that air-conditioning is a costly form of temperature control, especially if buildings need extensive retrofitting for efficient operation. The provision of air-conditioning in all cells across the state would undoubtedly be cost-prohibitive, especially at a time of fiscal restraint across the public sector. The need for air-conditioning in some locations may be reduced through a variety of building improvements but can never be entirely eliminated due to the extreme temperatures experienced in Western Australia, the inherent design compromises required for safe and secure prison cells, and the at-risk status of many prisoners. At the very least, the provision of air-conditioning needs to be consistent and risk based, and should be provided in areas that experience extreme temperatures or house particularly vulnerable prisoners (see [Recommendations 4 and 5](#)).

Building materials

5.10 The most effective type of building material for moderating temperature is dependent on climate conditions. The geographical diversity of Western Australia means there is no one-size-fits-all type of building material for all prisons in the state. However, with the exception of the use of dongas,⁷⁴ and the accommodation units in the main prison at Roebourne, most Departmental facilities are constructed from building materials which are appropriate for moderating temperature at their location. The vast majority of accommodation units across the state are constructed from brick.

5.11 The appropriate building material for a location is contingent on its 'thermal mass'. Thermal mass refers to the capacity of a building material to absorb and

⁷² As of 16/01/14, Wandoo exclusively housed 18-25 year old prisoners. At Karnet, only 6.8% of Karnet's population is in this age group, with approximately 1 in 5 (18.0%) prisoners over 50 years old. In addition, over half of the population at Karnet is overweight or obese (59.8%) versus a little over a third at Wandoo (35.9%).

⁷³ See Western Australia Country Health Service, *Pilbara health profile* (April 2012).

⁷⁴ A donga describes a prefabricated transportable building that is typically used in mine sites across Western Australia. They can be constructed from a variety of lightweight materials but in Western Australian prisons they are constructed from steel sheeting.

store heat energy.⁷⁵ High density materials such as concrete and brick have a high thermal mass and therefore require large amounts of energy to change temperature. As a result, they take a long time to heat up and cool down. Alternatively, lightweight low thermal mass materials such as timber or steel sheeting require less energy to change their temperature.⁷⁶ Buildings made from low thermal mass materials heat up quickly but also cool down quickly.

- 5.12 High thermal mass building materials are not recommended in very hot and humid climates where there is little variation between night and day temperatures.⁷⁷ These conditions are experienced by Roebourne and West Kimberley. In these climates, high thermal mass building materials slowly radiate heat absorbed during the day at night, maintaining hot daytime temperatures during sleeping hours.
- 5.13 Low thermal mass building materials maximise the benefits of any cooling breezes or lowered night-time temperatures in hot and humid climates and so are far more effective at maintaining acceptable temperatures. The recently built Roebourne Work Camp (just outside the main prison) and West Kimberley are constructed from low thermal mass, lightweight steel sheeting, which is appropriate for the climate of the area.
- 5.14 High thermal mass building materials are better suited in climates where there is a large variation in day and night temperatures as it moderate extremes in temperature.⁷⁸ These conditions are experienced in Eastern Goldfields Regional Prison (Eastern Goldfields).
- 5.15 In the Perth metropolitan area it is not clear-cut which building materials are most suitable. The variation in night and day temperatures is low near the coast and increases in inland areas.⁷⁹ Both high and low thermal mass building materials are suitable provided a building is designed well enough that overheating is avoided in summer.⁸⁰ Therefore it is appropriate that the majority of prisons in the metropolitan area are constructed of brick. Lightweight building materials have also been used in at Karnet and Bandyup. These accommodation units are dongas made from steel sheeting. In theory these units should have maintained acceptable temperatures, however, as discussed later, they performed poorly.⁸¹
- 5.16 Roebourne Regional Prison is a significant exception as it is constructed from building materials inappropriate for its climate. Roebourne is constructed from concrete blocks, a high thermal mass building material. The use of high thermal

⁷⁵ Reardon C, McGee C & Milne G, *Thermal Mass - Your Home: Australia's guide to environmentally sustainable homes* (Commonwealth of Australia Department of Industry and Science, 5th ed., 2013).

⁷⁶ *ibid*

⁷⁷ *ibid*

⁷⁸ *ibid*

⁷⁹ *ibid*

⁸⁰ *ibid*

⁸¹ See paras 5.18- 5.24.

mass building materials at Roebourne resulted in consistently hot temperatures that lingered throughout the night. The average night-time temperature in non-air-conditioned cells at Roebourne was 33°C, with temperatures consistently exceeding 35°C in the few hours prior to midnight, a time when prisoners would be attempting to sleep. Prisoners had little prospect of escaping the heat during sleeping hours as the hot concrete blocks surrounded their bed, leading to some prisoners preferring to sleep on the floor rather than in their own bed.



Figure 5
Interior of a cell in Roebourne Regional Prison.

- 5.17 The design deficiencies of Roebourne (which extend well beyond the issue of climate control) necessitate its demolition and replacement. However, this is unlikely to occur in the near future given population pressures and budget constraints. Targeted remedial work is therefore urgently required to ensure that appropriate temperatures are maintained for the remaining lifespan of this facility. While it would be prohibitively expensive and difficult to alter the thermal mass of Roebourne, improved shading⁸² and air-conditioning⁸³ must be installed in the short term to mitigate the prolonged exposure to extreme temperatures (see Recommendation 6).

Dongas

- 5.18 The Department uses dongas⁸⁴ to provide both prisoner accommodation and staff workplaces. Our results show they are inefficient at moderating temperature. Dongas are prefabricated transportable buildings used as stop gap

⁸² See para 5.29.

⁸³ see paras 5.3-5.9.

⁸⁴ A donga describes a prefabricated transportable building that is typically used in mine sites across Western Australia. They can be constructed from a variety of lightweight materials but in Western Australian prisons they are constructed from steel sheeting.

measures to cope with prison population pressures. The Department’s use of dongas as accommodation for prisoners was initially intended to only be a temporary solution to the growing population, however, they have remained as permanent fixtures in several facilities.⁸⁵

5.19 The dongas used in metropolitan facilities had unacceptable temperature variation. Temperatures were measured in dongas in Karnet and Bandyup. They demonstrated widely variable temperatures that corroborated prisoner descriptions of them being exceptionally hot, uncomfortable, and akin to a sauna. The donga cells demonstrated substantially warmer temperatures than cells in an adjacent brick constructed building.

Table 6

Temperature conditions in donga and brick constructed cells at Karnet Prison Farm (Unit 2)

Cell type	Avg. temperature (°C)	Avg. maximum temperature (°C)	Avg. temperature variation (°C)
Brick cells	27.5	31.9	10.7
Donga cells	28.5	38.8	18.5
<i>Difference</i>	+1.0	+6.9	+7.8

5.20 The donga accommodation at Karnet placed prisoners at an increased risk of heat-related illnesses:

- Temperatures within dongas were observed to be 6°C hotter than brick constructed cells in the middle of the day.
- Acceptable temperatures were attained in dongas 63 per cent of the time. Brick constructed cells attained acceptable temperatures 80 per cent of the time.
- Dongas attained an ‘extreme caution’ risk rating for one-third of the measurement period, with one donga attaining a ‘danger’ risk rating on some occasions. In comparison, brick constructed cells rarely attained an ‘extreme caution’ risk rating and never came close to attaining a ‘danger’ risk rating.

5.21 Ventilation windows and block out curtains have been retrofitted to the dongas in Karnet in an attempt to address the heat. Fly screens have also been installed in doorways. This has improved air flow which was previously inhibited by prisoners draping torn-up garbage bags across doorways to prevent flies from entering. While these small measures are commendable, the temperature

⁸⁵ Department of Custodial Services, *Female Prisoners Plan 2012-2022*, (July 2012) 31. There are 16 individual dongas at Bandyup, 32 at Karnet and 14 at Greenough. The dongas at Bandyup and Greenough have air-conditioning while the dongas at Karnet have heating and no air-conditioning.

readings show that they have not significantly improved conditions to acceptably reduce the risk of heat-related illness.

- 5.22 The donga at Bandyup also recorded wide variations in results. At the time of measurement this donga had a wall-mounted heater which was likely responsible for the very high temperatures recordings. Despite being the middle of winter, the donga cell achieved a maximum temperature of 32°C and achieved a risk rating of 'extreme caution'. While the heater elevated the temperature it is possible these results were exacerbated by the thermal mass of the donga.⁸⁶
- 5.23 Our results indicate that other factors such as orientation and lack of shading intensified the poor performance of dongas, however, good use of shading and appropriate orientation seemed to have only a limited effect on the overall temperature. Dongas with shading still obtained 'extreme caution' temperatures.
- 5.24 While donga use appeared to be a quick solution to the expanding prisoner population, these results show that they are poor and potentially dangerous in temperature mitigation (see [Recommendation 7](#)).

Orientation and shading

- 5.25 Cell orientation and shading have a large impact on temperatures but are under-utilised at some sites. Ideally, buildings should be orientated and shaded in such a way that harsh summer sun is minimised while cooling breezes are maximised.⁸⁷ As per other temperature mitigation strategies, the use of orientation and shading is dependent on the location. In the northern part of Western Australia it is recommended all walls are shaded.⁸⁸ In other areas, the elimination of summer sun and the allowance of winter sun are desired. This can be achieved through the use of deciduous trees or shade cloth.
- 5.26 Orientation and shading was demonstrated to have a significant impact on cell temperatures. Cells in shade and in particular protected positions demonstrated lower average temperatures, lower maximum temperatures, and less temperature variation.

⁸⁶ These cells have since had reverse-cycle split system air-conditioners installed.

⁸⁷ McGee C, *Shading - Your Home: Australia's guide to environmentally sustainable homes* (Commonwealth of Australia Department of Industry and Science, 5th ed., 2013).

⁸⁸ *ibid*

Table 7*Orientation and shading temperature impacts*

Cell type	Avg. temperature (°C)	Avg. maximum temperature (°C)	Avg. temperature variation (°C)
Bandyup (winter)			
Lower level shady side (Unit 2)	15.1	19.9	6.2
Upper level sunny side (Unit 2)	17.3	21.1	6.7
<i>Difference</i>	+2.2	+1.2	+0.5
Karnet (summer)			
Donga with some shade and breeze	28.0	35.8	15.4
Other dongas	28.8	40.3	20.1
<i>Difference</i>	+0.8	+4.5	+4.7

- 5.27 At Bandyup, a cell located on the lower level, shady side of Unit 2 was on average 2.2°C cooler than the cell located on the upper level, sunny side of the same unit.⁸⁹ At Karnet, a donga placed in an area with some afternoon shade and exposure to a cooling breeze attained a considerably lower maximum temperature than dongas without these benefits. Unlike the unshaded dongas, the shaded donga never attained a ‘danger’ risk rating and temperatures were typically at the lower end of the ‘extreme caution’ risk rating. While presenting less risk, temperatures in the shaded donga were still by no means acceptable.
- 5.28 While shade and cooler cell orientations can reduce the risk of heat-related illnesses in summer they may also increase discomfort in winter. The provision of blankets and other temperature mitigation devices therefore needs to be flexible and risk based given the substantial temperature differences between cells even within a single unit. Ideally, shade that can be removed during the winter (e.g. shade cloth, deciduous trees) should be used whenever possible. The exception to this is in the northern part of Western Australia where shade is required all year round.
- 5.29 Despite the effectiveness and relatively low cost of shading it was observed to be under-utilised by the Department in the facilities that were assessed:
- Dongas at Karnet are largely unshaded despite their increased vulnerability to temperature extremes.

⁸⁹ Prisoners remarked that a far greater temperature disparity between the two sides of this unit was present in summer.

- Shade sails were installed in the unit yards at Roebourne in 2009 in response to consistent recommendations from this Office concerning climate control.⁹⁰ While an improvement, the shade sails do little to prevent heating up of the external walls of accommodation units. Roebourne's climate requires the shading of all external walls.
- At Bandyup Women's Prison, shade sail supports within Unit 1 have not had shade sails installed for the past three years.



Figure 6

The dongas at Karnet Prison Farm are illogically placed and unshaded.

- 5.30 The use of shading at West Kimberley Regional Prison presents a stark contrast to the rest of the custodial estate. Prisoner accommodation at West Kimberley has large roof eaves which limits sun exposure on walls. Natural vegetation is plentiful, with prisoner accommodation placed amidst natural bushland. This not only contributes to a feeling of privacy, seclusion, and cultural security among the predominately Aboriginal prisoner cohort, but has a practical benefit in terms of further shading prisoner accommodation.
- 5.31 Additional shade may affect security, given changes to the line of sight of prison officers, however, this can be overcome with a focus on relational security practices. The recent inspection of West Kimberley found that there was a low rate of incidents and prisoners and staff reported feeling safe.⁹¹ West Kimberley therefore demonstrates that trees can be used as a cost-effective method to improve conditions without undermining security.

⁹⁰ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

⁹¹ OICS, *Report of an announced inspection of West Kimberley and Broome Regional Prisons*, Report No. 96 (March 2015).

5.32 It is beyond the scope of this report to examine all areas of Departmental facilities that require increased shading. There is a need to assess shade requirements across the prison estate and implement appropriate shade options where necessary. It is typically not possible or prohibitively expensive to fix the orientation of already built units but new developments should be positioned in such a way that cooling breezes are maximised and exposure to the hot summer sun in minimised. In many cases, the appropriate use of shade and building orientation will reduce the need for costlier forms of climate control.

Other cooling methods

5.33 Other cooling methods such as fans and roof ventilators can assist in the maintenance of acceptable cell conditions but do not eliminate the risk of heat-related illnesses in poorly designed or non-air-conditioned cells that experience high temperatures. For example, fans are an extremely cost-effective method to improve thermal comfort but are only useful when temperature conditions are not extreme. Fans do not prevent heatstroke when temperatures exceed 32°C and humidity exceeds 35 per cent.⁹² At high temperatures fans may in fact accelerate the onset of heat-related illnesses.⁹³ At Roebourne, fans are the primary form of temperature mitigation, however, the temperature and humidity threshold for effectiveness was exceeded for 40 per cent of the time that cell temperatures were measured. Alternative cooling sources are required to maintain safe conditions in such temperatures.

5.34 Roof ventilators were similarly found to have limited risk reduction benefits in poorly designed and non-air-conditioned environments. A donga cell with a roof ventilator at Karnet demonstrated a marginally lower maximum temperature than a comparable cell without a roof ventilator.

Table 8

Temperatures of a cell with and without a roof ventilator at Karnet Prison Farm.

Cell type	Avg. temperature (°C)	Maximum temperature (°C)	Temperature variation (°C)
Cell with roof ventilator	28.7	39.4	19.9
Cell without roof ventilator	28.8	41.1	20.3
<i>Difference</i>	<i>+0.1</i>	<i>+1.7</i>	<i>+0.4</i>

⁹² Centre for Disease Control and Prevention, *Heat-Related Illnesses, Deaths, and Risk Factors - Cincinnati and Dayton, Ohio, 1999, and United States, 1979-1997*, Morbidity and Mortality Weekly Report (June 2, 2000).

⁹³ <<http://www.houstontx.gov/health/heatillness.html?>>

5.35 There appears to be little practical benefit of installing a roof ventilator in the absence of other complimentary measures to mitigate temperatures. There was a slight difference in thermal conditions between the two cells, however, this difference was substantially less than the differences apparent between cells with different building materials or differing amounts of shade provision. Both cells exceeded the 18 – 30°C acceptable temperature range by near identical amounts.

Occupancy

5.36 Higher cell occupancy was associated with higher temperatures. This is concerning given that adding more occupants into a cell is being used as a common strategy to manage the growing prisoner population. In just the last 12 months, the prisoner population has increased by 9 per cent (approximately 400 prisoners). Regrettably, across large parts of the prison system, the ‘double-bunking’ of cells designed for one person has now become a routine and accepted norm, not an exceptional practice. The population increase has been pronounced at metropolitan maximum-security prisons, where the proportion of cells occupied by a single prisoner has dramatically declined.⁹⁴

5.37 The impact of cell occupancy was assessed at Karnet and Albany and at both sites the higher occupancy cell demonstrated higher average temperatures, higher maximum temperatures, and increased temperature variation.

Table 9

Temperatures of single and double occupant cells

Cell type	Avg. temperature (°C)	Maximum temperature (°C)	Temperature variation (°C)
Karnet Prison Farm			
Cell with one occupant (Unit 2)	27.1	31.1	10.0
Cell with two occupants (Unit 2)	27.8	32.6	11.3
<i>Difference</i>	+0.7	+1.5	+1.3
Albany Regional Prison			
Cell with one occupant (Unit 1)	18.3	19.8	3.5
Cell with two occupants (Unit 1)	20.7	22.8	4.9
<i>Difference</i>	+2.4	+3.0	+1.4

⁹⁴ As of 13 January 2015, 46% of occupied cells at Bandyup had a single occupant. The year before, 66% of occupied cells had a single occupant. A similar decline in single-occupancy cells was apparent at Hakea (56% to 45%) and Casuarina (65% to 53%).

5.38 The impact of occupancy on temperatures was less than that of shading, building materials, or air-conditioning but needs to be considered when planning for the accommodation of increased prisoner numbers. It is not appropriate to simply double-bunk prisoners as a solution to population increases if the addition of beds in a cell is not accompanied by improvements to temperature mitigation. An increase in occupancy in cells already prone to temperature extremes is a considerable source of risk for heat-related illnesses.

6 Does the Department do enough to mitigate temperatures?

Policies and guidelines for extreme temperatures

- 6.1 The Department lacks adequate policies or guidelines related to temperature control. Temperature mitigation is only briefly mentioned in a Departmental policy directive related to clothing where it is stated that clothing and bedding should be appropriate for climatic conditions.⁹⁵
- 6.2 Of most concern is that there is no formal identification of prisoners who are heat sensitive, such as those receiving medications that can increase vulnerability to heat stroke (e.g. psychotropics, diuretics, beta-blockers). The risks of inadequately identifying and managing heat sensitive prisoners were clearly demonstrated in the Texas correctional system. Out of the 14 prisoners who had died in Texas prisons since 2007, 13 were on prescribed medications for health conditions which exacerbated their risk of heat-related illness.⁹⁶
- 6.3 Ideally, prisoners who are at-risk of temperature related ill-health should be:
- Placed in appropriate units (i.e. preferably air-conditioned);
 - Engaged in appropriate employment at the prison (i.e. not outside or in hot indoor environments such as the laundry during the summer months, unless medically cleared);
 - Provided increased education on hydration and the avoidance of excessive physical activity; and
 - Checked-on more frequently during periods of hot weather.
- 6.4 In a number of U.S. states, the identification and management of heat sensitive prisoners has been longstanding accepted practice.⁹⁷ The Department has medical alerts for fall risks, fitness to travel, work, play sport, and being in the upper bunk but does not have similar alerts for heat sensitive prisoners. While health staff may be aware of the health and medication status of prisoners, the lack of awareness of heat sensitivity among operational staff impedes their capacity to manage risk.
- 6.5 The Department similarly lacks formal guidelines on what additional measures should be undertaken in response to extreme temperatures. In some U.S. states, heat logs are recorded daily in each housing unit and additional heat mitigation measures occur when temperatures reach certain thresholds.⁹⁸ These additional measures may include the provision of increased fluids and ice, allowances for additional showers, and the temporary transfer of prisoners who are heat

⁹⁵ DCS, *Policy Directive 19: Prisoner hygiene - personal, clothing, and bedding* (undated).

⁹⁶ Human Rights Clinic, *Deadly heat in Texas Prisons*, The University of Texas School of Law (April 2014).

⁹⁷ Alabama Department of Corrections, *Psychotropic medication and heat* (March 2005); New Mexico Corrections Department, *Psychotropic medication and heat pathology* (August 2013).

⁹⁸ *ibid*

sensitive to cooler accommodation. Some of these measures are undoubtedly implemented by Departmental staff but the lack of any written guidelines places a high dependency on the good will and expertise of staff (see Recommendation 8).⁹⁹

Prison mitigation strategies

- 6.6 The absence of Departmental policy results in prisoner management decisions being made locally via a common sense approach. Prison staff deserve credit for their management of prisoners in difficult conditions with limited resources.
- 6.7 Health staff described how they educated prisoners on heat stroke and reminded them to drink plenty of water during hot days. They recommended prisoners who were perceived as not coping with hot temperatures to be moved to air-conditioned cells (if available) or in rare cases were transferred to a different prison. Heat wave facts sheets were seen posted on notice boards in some locations.
- 6.8 Operational staff described how shorter working days and additional breaks were used when working with prisoners in the outdoors during hot days. Lockdown hours were also subject to change depending on temperatures. Some prisons were extremely resourceful in the manner they attempted to mitigate temperatures within available budgets. For example:
- Karnet has made roof ventilators on-site utilising the skills of a prisoner who was able to make them.
 - Albany has made doonas on-site. These doonas cost the same as externally-sourced blankets but are superior in quality and therefore warmer.
- 6.9 Prisons also had a diverse array of options to assist prisoners in making behavioural adaptations to manage their thermal comfort. There was a general consistency in the type of options available at Departmental prisons, including:
- Issuing of hats and sunscreen for outdoor activities;
 - Cold water dispensers;
 - Fridges available to chill water bottles;
 - Ability for prisoners to purchase eskies/cold packs;
 - Desk fans in cells; and
 - Provisions of blankets/doonas on request.
- 6.10 Occasional supply issues were reported, but these measures were available to prisoners when requested. At Roebourne Regional Prison, fridges and freezers

⁹⁹ In response to the draft of this report, the Department stated that they developed and implemented 'Operation Solstice' in the 2014/15 summer, an extension and revamping of the Department's 'Summer Strategy'. The Department stated that the lessons learnt from Operation Solstice were being used to develop a broader operational preparedness strategy focusing on the reduction of climatic discomfort and fatigue during summer and winter.

intermittently break down due to the extreme temperature conditions and through overuse. Cold water dispensers also struggle to maintain cold temperatures due to repeated use.

- 6.11 At both Albany and Bandyup blankets were provided on request (depending on availability) though prisoners may not be aware of their ability to request additional blankets. Prisoners at both facilities described how they were extremely cold during the night and were forced to wear multiple layers of clothing to bed in an unsuccessful bid to stay warm. For these cases, it was unclear whether there was a shortage of blankets, or prisoners had not requested additional blankets.

Fans

- 6.12 One area lacking consistency was the provision of desk fans. In some prisons (e.g. Karnet, Eastern Goldfields, Albany, Casuarina) fans were provided, while in other prisons they were provided in limited circumstances (e.g. when doubled up) or available only by purchasing from the prison canteen. Prisoners in poorer quality accommodation are typically those receiving lower gratuity levels and therefore the least likely to afford the approximately \$30 to attain a fan.
- 6.13 In addition, Departmental policy stipulates that there is a limit to the number of electrical items allowed per cell depending on the supervision level of the prisoner.¹⁰⁰ A prisoner on standard supervision is allowed three electrical items in most cases, with desk fans considered an electrical item.¹⁰¹ If a prisoner has a television and a desk lamp they have to choose between a desk fan and other more entertaining items such as a video game console, stereo, radio, or DVD player. Prisoners on stricter supervision regimes have a lower electrical item allowance and would be even less likely to choose a desk fan.
- 6.14 As discussed previously, fans are limited in their ability to reduce the risk of heat-related illnesses. Fans will cool people when the air temperature is cooler than the person's skin temperature. Therefore when the temperature conditions are hot, but not extreme, they are effective in providing a cooling effect. When the temperature goes above skin temperature (between 34-36 degrees) fans are only effective if sweat can be evaporated, which may not occur in humid conditions or when a person's ability to sweat is impaired.¹⁰²
- 6.15 The principal factors underlying the provision of desk fans should be need and effectiveness. Recommendation five in this review calls for an assessment of a person's risk of heat-related illness to be considered when assigning people to

¹⁰⁰ DCS, *Policy Directive 42 – Prisoner property procedures* (December 2013).

¹⁰¹ There is leeway in some facilities on the enforcement of the 3 electrical item limit. At Roebourne, the Superintendent may issue personal fans or may authorise a prisoner to have more than 3 electrical items during periods of excessively warm weather. See DCS, *Roebourne Regional Prison local order 51 – Reception prisoners property* (April 2011).

¹⁰² Health Canada. *Extreme heat events guidelines: Technical guide for health care workers*. Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch (2011).

cells. This assessment will also indicate which people should not be left with only a fan to mitigate harm from heat.

- 6.16 For everyone else, the availability of fans should be based on cell conditions. Cells that attain high temperatures should have fans available regardless of the electrical item allowance or cost of the fan. This moves the responsibility for keeping cell temperatures within an acceptable range back to the Department, rather than implying it is a choice for the person in custody ([see Recommendation 9](#)).

7 A two-tiered system

- 7.1 The Department's recent prison projects have commendably placed a high emphasis on cell construction and design that is appropriate for the climate and ensures the maintenance of acceptable temperatures. This represents good planning as temperature mitigation strategies are most cost-effectively implemented in the design phase. The thermal conditions of older facilities were assessed in this review and they present a stark contrast. The temperatures attained at older facilities were highly variable, and at times, dangerous. These older facilities are unlikely to be replaced in the near future given Western Australia's burgeoning prisoner population and budget constraints, and yet there are no specific plans to mitigate temperatures for the remainder of their lifespan. As a result, a two-tiered system of accommodation quality exists, where some locations present a higher risk to prisoner health than others due to their inadequate temperature mitigation.
- 7.2 West Kimberley Regional Prison is an example of a recently built prison that demonstrates good practice in terms of climate control:¹⁰³
- The orientation of buildings at West Kimberley minimises sun exposure and maximises natural cross-ventilation;
 - Buildings are made from low thermal mass materials so that heat is not radiated out at night;
 - Large eaves on accommodation units and plentiful natural vegetation limits sun exposure on buildings;
 - Prisoners are provided with the option of sleeping in an enclosed outdoor area for night-time sleeping comfort; and
 - Air-conditioning in cells only operates when the cell doors are closed so that energy efficiency is improved. Temperatures are set at 26°C.
- 7.3 There were few temperature concerns during a recent inspection of West Kimberley Regional Prison, despite the hot and humid climate of the area.¹⁰⁴
- 7.4 The new Roebourne Work Camp and the redeveloped Eastern Goldfields Regional Prison similarly reflect an emphasis on maintaining acceptable temperatures. The Roebourne Work Camp has been constructed from low thermal mass building materials, large roof overhangs provide shade, and air-conditioning is provided in all accommodation. For the Eastern Goldfields Regional Prison redevelopment, the Department specified in the design brief that temperatures must be maintained at 18 – 30°C at all times. Thermal simulations conducted with sophisticated computer software predicted that cells will not

¹⁰³ See <<http://architectureau.com/articles/west-kimberley-regional-prison/>>

¹⁰⁴ The only complaint was that the air-conditioning would be more efficient if it did not constantly try to maintain the pre-set temperature of 26°C during the cooler months. See OICS, *Report of an announced inspection of West Kimberley and Broome Regional Prisons*, Report No. 96 (March 2015).

exceed these temperature limits, even on the hottest and coldest days of the year.¹⁰⁵



Figure 7

West Kimberley Regional Prison – plentiful natural vegetation, large roof eaves, and air-conditioning help maintain cool temperatures within cells.

- 7.5 While new Departmental facilities are well placed to mitigate temperature extremes, the same cannot be said for some older facilities. The temperature data in both winter and summer clearly demonstrated that some older Departmental facilities were ill-equipped to tolerate the temperature conditions of today and were incapable of tolerating any worsening of climate conditions due to climate change. Roebourne Regional Prison, the ‘hottest prison in Australia’,¹⁰⁶ was the most notable example. Roebourne has been the subject of repeated recommendations from this Office to implement climate control improvements. While some remedial work has been undertaken,¹⁰⁷ the conditions remain unacceptable. Similarly limited progress has occurred at Karnet and Bandyup.¹⁰⁸
- 7.6 The Department does not have any specific plans or strategies to implement any temperature moderating equipment in facilities without air-conditioning. The Department advised the Office that existing measures including windows that can be opened, ceiling fans, high ceilings, and shade sails in the yards will

¹⁰⁵ Aurecon Australia, *Dynamic Thermal and CFD Modelling Report for the Cooling & Heating of the Cells and Bedrooms - Eastern Goldfields Regional Prison Redevelopment Project* (9 July 2012).

¹⁰⁶ OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

¹⁰⁷ Improvements include the installation of air-conditioning in a small proportion of cells, installation of extra shade sails in the medium security yard and the provision of desk fans.

¹⁰⁸ Fly screens, ventilation windows and block-out curtains were installed at Karnet however these measures do not appear to have reduced temperatures to acceptable levels. Little progress has occurred in improving the conditions of Unit 1 and Unit 2 at Bandyup, with increased occupancy in these units likely further reducing thermal comfort within cells.

continue to be utilised.¹⁰⁹ These existing measures were clearly demonstrated to be either inadequate or not applicable in the prisons that were assessed.

- 7.7 The lack of meaningful action by the Department accords with previous Departmental responses to this Office on this issue. Climate control has been described as an ‘issue for the future’¹¹⁰ and a ‘low relative priority’.¹¹¹ The Department advised that they plan to review climate control needs across the state for consideration in the budget out-years,¹¹² however, as per previous Departmental responses to this issue there are no firm commitments or timeframes.¹¹³
- 7.8 It is unknown how the Department came to the conclusion that climate control should not be prioritised given that they have not systematically assessed the thermal conditions of their facilities.¹¹⁴ While newer facilities have been designed to maintain specific temperatures, the Department is unaware of the temperatures that are attained in the multitude of different accommodation types in older facilities across the state. This is a significant organisational risk. The Department has a duty of care over prisoners and is responsible for the allocation of potentially temperature vulnerable prisoners to cells that may attain dangerous temperatures.
- 7.9 The Department has committed unequivocally to SSSR (security, safety of staff, safety of prisoners and rehabilitation). In terms of managing prisoner safety, it would be acceptable to deprioritise climate control if the level of risk does not justify the cost of implementing improvements. However, it is unacceptable to deprioritise climate control when the risks have not been measured or analysed.
- 7.10 Mechanisms for accurately assessing temperatures in cells across the prison estate are urgently needed, at least during the hottest and coldest months. The Department should consider either permanent ongoing monitoring of cell temperatures or the use of computer software to conduct thermal simulations that predict cell temperatures based on variable and static conditions ([see Recommendation 2](#)).
- 7.11 Based on this data, a state plan can be devised on improving units that present an unacceptable risk to occupants. The replacement of some prisoner accommodation may be required and it is acknowledged that this requires both time and money. Delays are inevitable. However, the temperature data

¹⁰⁹ Information received from the Department 17/11/2014.

¹¹⁰ Information received from the Department 19/07/2013.

¹¹¹ During the 2013 inspection of Roebourne Regional Prison, the Department stated that they had no plans to install air-conditioning in cells and that climate control across all Departmental facilities was considered a ‘low relative priority’. See OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

¹¹² Information received from the Department 17/11/2014.

¹¹³ See OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 70 (February 2011); OICS, *Report of an announced inspection of Roebourne Regional Prison*, Report No. 89 (February 2014).

¹¹⁴ The exception being the assessment of temperatures over a three day period at Banksia Hill prior to the installation of air-conditioning and the use of thermal modelling at the new Eastern Goldfields Regional Prison.

demonstrated that the Department cannot afford to simply wait for unsafe units to eventually be replaced. Remedial work needs to be considered in the interim. Other potential improvements such as insulation, glazing, or sealing were not individually examined in this review but should also be considered in prisoner accommodation that attains unacceptable temperatures.

- 7.12 The urgency of the need for intervention cannot be understated. An assessment of all thermal conditions is required and immediate action is needed to address high risk cells. A targeted and phased approach which includes short and long-term intervention is best placed to overcome the dangerous inequities in accommodation quality that is currently present across Western Australia prisons (see [Recommendation 3](#)).

8 Appendix A: Key findings

- Temperatures attained in some prison cells in Western Australia exposed prisoners to dangerous conditions.
- Summer temperatures presented the most acute risk to prisoner health.
- Dongas were inefficient at moderating temperatures.
- The provision of air-conditioning in Departmental facilities was inconsistent and poorly correlated with risk.
- The Department lacked adequate policies, guidelines or standards related to temperature control.
- Recently built Departmental facilities have commendably placed a high emphasis on cell construction and design that is appropriate for the climate and ensures the maintenance of acceptable temperatures. In contrast, some older built facilities were ill-equipped to tolerate extreme temperatures.

9 Appendix B: Department's response to the question of which units were air-conditioned in each facility

Custodial Facility	Temperature Moderation used in Living Accommodation
Acacia Prison	All residential units, including cell and day rooms have HVC system
Albany Regional Prison	All cells have heating
Bandyup Women's Prison	Unit 1, 2, 3, 4, 5, 6 dayrooms have air-conditioning Unit 5 mother and baby houses are air-conditioned Unit 6 cells are air-conditioned Unit 7 bedrooms and living areas air-conditioned
Banksia Hill Detention Centre	All units have air-conditioning in day rooms which also cools cells
Boronia Pre-Release Centre	All bedrooms in the three Mother & Baby houses (Houses 1, 2 & 17) have air-conditioning All bedrooms in Houses 14 & 15 (for women with health concerns) have air-conditioning All houses have heating
Broome Regional Prison	Secure Unit cells and day room have air-conditioning Female section cells and day room have air-conditioning Male minimum section have air-conditioning to four cells Multipurpose cells have air-conditioning
Bunbury Regional Prison	Nil in main prison Pre-Release Unit houses have gas heating in all living rooms
Casuarina Prison	All units have heating to cells and day rooms
Eastern Goldfields Regional Prison (current)	Unit 1 cells have air-conditioning Unit 3 observation cell has air-conditioning Unit 3 dayroom has air-conditioning
Greenough Regional Prison	Unit 6 cells have air-conditioning
Hakea Prison	Unit 11 and 12 have heating to all cells and day rooms Crisis care unit cells have air-conditioning Unit 6, 2 safe cells in have air-conditioning Unit 1, 2 safe cells have air-conditioning
Karnet Prison Farm	All cells have bar heaters
Pardelup Prison Farm	All cells have wall-mounted fan heaters

Roebourne Regional Prison	All maximum-security wing cells have air-conditioning Maximum-security dayroom has air-conditioning Transit cell in Unit 1 has air-conditioning All multipurpose cells have air-conditioning All observation cells have air-conditioning All female wing cells have air-conditioning Female wing dayroom has air-conditioning
Wandoo Reintegration Facility	All common areas save J Block B wing have evaporative air-conditioning which also cools cells All living areas have gas heating
West Kimberley Regional Prison	All cells in all units have air-conditioning
Wooroloo Prison Farm	All cells have bar heaters
Roebourne Work Camp	All bedrooms and living areas have air-conditioning
Warburton Work Camp	Nil.
Walpole Work Camp	All bedrooms have air-conditioning and living areas have air-conditioning
Wheatbelt (Dowerin) Work Camp	All bedrooms have air-conditioning
Wyndham Work Camp	All bedrooms have air-conditioning

Definitions

HVC (Heating Ventilation Cooling as applied to the evaporation of water and gas heating) – Mechanical ventilation that provides tempered air (cooled by water/heated by gas) but temperature cannot be precisely controlled and would not be considered “air-conditioning” in the common understanding where air is cooled to a particular temperature.

Air-Conditioning – would be considered to be refrigerated (DX_ Direct Expansion) cooling of the air.

10 Appendix C: Department responses to recommendations



Government of **Western Australia**
Department of **Corrective Services**

Response to the Report on Thermal Conditions of Prison Cells Department of Corrective Services

July 2015

To protect, to rehabilitate and to serve

Responses to Recommendations

1. Document acceptable temperature ranges for each prison.

Response:

There are few or no Australian guidelines on thermal standards for custodial environments. However, the Department is aware that overseas prison authorities have adopted thermal comfort ranges.

The Department is also aware of a number of heat stress indices that take into account factors such as air temperature, wind movements, vapor pressure, metabolic rates and the insulating effect of clothing. These indices could be used as a means for determining geographical zones of higher and lower thermal comfort. Like all comfort indices, they should only be regarded as a guide for determining heat discomfort and decision making.

To date, each facility has managed temperature extremes with flexible, local solutions depending on the perceived or apparent level of thermal discomfort. Practical examples include changes to structured activities and work routines and adaptive initiatives such as the availability of water coolers and freezers, the provision of fans and the distribution of additional blankets and clothing.

Level of Acceptance: Supported in Principle

Action required:

- Conduct research into the thermal comfort ranges used by other prison authorities and consider their applicability to WA.
- Prisons continue to manage temperature extremes at individual sites in accordance with local management plans, sustainability guidelines and community expectations.

2. Implement mechanisms for assessing cell temperatures in every prison, at least during the hottest and coldest months.

Response:

The suggestion that the Department is unaware of cell thermal conditions is incorrect. Local management at each facility is aware of the cell conditions during the hottest and coldest months. Where appropriate remedial action is taken to maintain or improve thermal comfort. Practical examples include the distribution of fans, cooled water, extra blankets and additional appropriate clothing.

Defining the criteria for physical discomfort is difficult because personal reactions to the weather vary according to a number of factors such as health, age, clothing, physical activity and acclimatisation. Any approved monitoring mechanisms would need to include temperature monitoring and may need to consider a wider set of defining criteria of physical discomfort such as humidity, vapour pressure and air movement depending on the complexity of information required.

The Department is aware of climatic discomfort studies based on the average response of subjects under specified conditions. The data from these studies has been used to chart personal comfort levels and to map the likely number of days of discomfort in different regions and under standardised conditions e.g. indoors and wearing light clothing. The feasibility and cost of monitoring and collecting representative thermal comfort data will be explored further.

Level of Acceptance: Supported in Principle

Action required:

- Investigate the feasibility and cost of mechanisms to monitor and collect representative thermal comfort data in prisons.

3. Develop and implement a state plan for addressing the risk of temperature extremes across the custodial estate.

Response:

The Department has implemented a Summer Strategy at each facility for many years. Last year, the strategy was extended and revamped. In October 2014, Operation Solstice was developed and implemented as the state-wide summer strategy. At the conclusion of the summer period, an evaluation occurred where improvements were identified.

The lessons learnt from this strategy are being used to develop a broader operational preparedness strategy that will focus on reducing climatic discomfort and fatigue during the summer and winter solstice. This strategy will reflect a number of actual and potential site specific preparedness activities for managing physical discomfort and risks to prisoners during temperature extremes.

Level of Acceptance: Supported – existing Departmental initiative

Action required:

- Complete and implement an operational strategy with guidance on actual and potential site specific initiatives to address physical discomfort and risks to prisoners during temperature extremes.

4. Provide air-conditioning in all prison cells where acceptable temperatures cannot be maintained using cheaper methods.

Response:

Air-conditioning is a costly form of temperature control, especially if buildings need extensive retrofitting for efficient operation. The provision of air-conditioning in all cells across the state would be cost-prohibitive, and in some cases is not possible due to the security and safety concerns that retrofitted infrastructure can present.

The limited monitoring snapshot in the Inspectorate's report does not provide sufficient data to build a case for costly and complex infrastructure improvements at some of the older facilities. Detailed longitudinal data at prioritised facilities would be required, along with a business case that considers offender acclimatisation, local community infrastructure standards and broader community based expectations. Potential trade-offs against other work programs would need to be identified.

The Department has adopted a mixed approach to maintaining thermal comfort. The selective use of air conditioning is one of a number of solutions based on an understanding of risk, offender needs and the primary considerations of safety and security.

Air-conditioning is used as a safety measure for cells used to hold prisoners deemed at-risk. Management and observation cells in most facilities are air-conditioned in order to maintain thermal discomfort and to minimize the number of potential ligature points. Air conditioning is also prioritised in crisis care units and day rooms such as communal areas and libraries, mother and baby houses, maximum security wing cells, work camp bedrooms, transit cells and some gender specific wings and cells. All cells at West Kimberly have refrigerated air conditioning.

Elsewhere, the Department utilises a more economical system of air-conditioning the wings of units, which increases the air-flow to cells. For example, at the Banksia Hill Detention Centre, all units have air conditioning in day rooms which is also used to cool cells. At the Wandoo Reintegration facility, all common areas, save the 'J Block' wing, have evaporative air conditioning which also cools cells (Attachment B refers). In all other cases, cost effective forms of passive and temperature control is used to maintain thermal comfort.

The Department is aware of broader regulatory and community expectations for appropriate building designs that keep indoor temperatures comfortable without using energy-intensive space cooling. Both the West Kimberley and Eastern Goldfields regional prisons have been designed to reduce the impact of temperature extremes while also reducing operating costs and increasing building resilience. Practical examples of passive heat management strategies at West Kimberley include the provision of opening windows for air flow and enclosed mesh patios for sleeping in if prisoners wish.

Level of Acceptance: Noted

Action required:

- Investigate the feasibility and cost of mechanisms to monitor and collect longitudinal thermal comfort data at prioritised sites, including Roebourne.
- If data is collected, use this data and any nominated climatic discomfort index as a guide only for future decisions and strategic asset planning.

- 5. Include heat-related illness as part of the risk assessment when assigning people to cells, ensuring people at high risk of heat-related illness are placed in cells with air-conditioning.*

Response:

The Department notes that some health conditions can adversely affect an offender's ability to manage extreme temperatures and can pose a risk to their well-being.

The Department intends to explore options on assessing the potential heat-related risk assessment when assigning people to cells. Given the multiple factors that affect an individual's ability to self-regulate responses to temperature, it is intended to seek advice from relevant health professionals.

Other relevant factors, that are less reliant on the health status of individuals include:

- the thermal environment (which encompasses more than just the weather or the temperature, and includes local humidity, air flow, radiant heat sources),
- the availability of water,
- behaviour and activity level,
- the ability of the person to take reasonable steps to maintain their own temperature management (cognition, mental health, self-management),
- clothing, and
- a heat tolerance threshold which is quite personal and not easily predictable. People also have their own preference as to what environment they feel comfortable in, and do acclimatise.

As you would be aware, prisoners with ongoing medical conditions, the frail and the aged and other risk groups are continually monitored and assessed. Where appropriate, offenders may be relocated or transferred to an air cooled cell or more appropriate facility on the advice of a nurse or doctor.

Level of Acceptance: Supported

Action required:

- Explore the development of an appropriate risk assessment tool that includes heat-related illness.

6. Improve shading and install air-conditioning in Roebourne Regional Prison within the next 12 months to mitigate the significant risk of heat-related illness.

Response:

Roebourne has been referred to as the hottest prison in Australia. At the time of construction in 1984, the Department assessed the use of air conditioning for prisoners against the regulatory and community standards at the time. Air conditioning was not the standard in the local community or a feature of most homes.

The Department has retrospectively installed air-conditioning in the following areas of Roebourne Prison:

- all work camp cells
- all wing 3 cells (maximum rated)
- the observation cell, two multi-purpose cells and the transit cell
- all wing 4 cells (female section) including observation cell, two multi-purpose cells, the mother and child cell and the dayroom
- dining room
- library areas.

Active and passive temperature control measures are also utilised including:

- windows that can be opened by prisoners to allow fresh air into the cells
- ventilation
- ceiling fans in all mainstream cells
- high ceilings
- shade sails in the yard areas.

Adjustments to Roebourne's prison routine and modified patterns of prisoner movement such as flexible lock downs are used to avoid temperature extremes. A range of adaptive and behavioral initiatives such as the use of sun cream, wide brimmed hats, ice machines, water bubblers and water bottles are used and encouraged. Education such as instructions and signage is also used.

The installation of permanent shade structures in place of shade sails at Roebourne has been included in the proposed Infrastructure Program 2015/16.

Level of Acceptance: Noted

Action required:

- Roebourne continues to manage temperature extremes in accordance with local management plans and proposed operational strategy.
- Investigate the feasibility and cost of mechanisms to monitor and collect longitudinal thermal comfort data at prioritised sites, including Roebourne.
- Use this data and any nominated climatic discomfort index as a guide for future decisions and strategic asset planning.
- Continue to evaluate cost effective air cooling options in line with current codes, regulations and community expectations.

7. Cease the practice of using dongas as accommodation for prisoners unless acceptable temperatures can be maintained.

Response:

The Department has dealt with the increasing prisoner population through the selective addition of donga accommodation that can be installed both efficiently and cost effectively. It not intended to install donga style accommodation as a long term measure; although it is occasionally necessary and preferable to the installation of additional beds in existing cells. They are typically, but not always, used to house minimum security prisoners.

Three prison sites use donga accommodation for medium or minimum security rated prisoners. They are:

- Bandyup – 16 individual dongas
- Karnet – 32 individual dongas
- Greenough – 14 individual dongas.

The dongas at Bandyup and Greenough have air conditioning while the dongas at Karnet have heating and no air conditioning.

Other sites including Pardelup prison farm, Walpole, Wyndham, Warburton, Dowerin, and Roebourne work camps and Hakea Unit 8 use transportable/prefabricated buildings with varying levels of air conditioning provided. It should be noted that the transportable/prefabricated buildings at Wyndham, Warburton, Dowerin and Roebourne are custom designed with thermal considerations as part of their design including site placement and the roof materials used.

Level of Acceptance: Supported in Principle

Action required:

- No further action.

8. Develop guidelines on actions to be undertaken in response to extreme temperatures.

Response:

A number of active and passive mitigations are deployed across all facilities to manage physical discomfort and risks to prisoners during temperature extremes. The Department acknowledges that documented guidelines on existing and new mitigations would assist superintendents to manage climatic variables.

The Department has had a Summer Strategy in place at each facility for many years. Last year, the strategy was extended and revamped. In October 2014, the Department developed and implemented Operation Solstice as a state-wide summer strategy. At the conclusion of the summer period, an evaluation occurred where improvements were identified.

It is intended that this strategy will become a broader operational strategy that focuses on reducing climatic discomfort, illness (colds and flu) and fatigue across the full summer and winter climatic cycle. The need for localised plans for each facility to respond to extreme temperatures will also be considered.

Level of Acceptance: Supported – existing Departmental initiative

Action required:

- Complete and implement an operational strategy with guidance on actual and potential site specific initiatives to address physical discomfort and risks to prisoners during temperature extremes.

9. Address the inequity in fan provision for prisoners.

Response:

Fans are periodically used by some prisoners to reduce apparent temperatures in cells. However, portable fans must be used with caution when apparent temperatures exceed 37°C. This is because the increased circulation of hot air can increase thermal stress and health risks unless they draw in cooler air.

Policy Directive 42: Prisoner Property enables the designated superintendent to allow prisoners to retain certain personal effects during their imprisonment. These personal effects may be kept in a prisoner's possession (in their cell for example). Permitting prisoners to retain some private property assists to reduce the negative impact of imprisonment and promotes individual well-being.

The number of electrical items allowed in a prisoner's cell depends on their supervision level. The possession of electric heaters in cells is at the discretion of the superintendent. Air conditioners are not permitted in a prisoner's possession. The superintendent may, on advice from the Director Health Services, supply items of property not normally issued to a prisoner who requires the item due to a medical condition.

In periods of extreme heat, superintendents exercise their discretion to issue personal fans or additional electrical items. Fans are also available for purchase. Roebourne, which experiences hotter temperatures than other facilities during the summer period, applies this discretion under Local Order 51. In all cases, the number of electrical items in the possession of prisoners may be rationed where the electrical system is inadequate or where the presence of multiple electrical items may pose a safety risk.

The Department is updating and consolidating existing policy directives and rules to provide a clear and unambiguous set of guiding principles for the safety and security of staff and offenders. Equity and fairness considerations will be taken into account as part of the policy review process where appropriate.

Level of Acceptance: Noted

Action required:

- Incorporate equity and fairness criteria into the policy consolidation process where appropriate.

11 Appendix D: Methodology

Cell thermal conditions were assessed in four prisons during the summer and winter months. One prison was assessed in late spring for equipment testing purposes. The location and timing of data collection were as follows:

- Casuarina Prison (equipment testing) – 5th to 11th November, 2013
- Karnet Prison – 17th to 24th January, 2014
- Roebourne Regional Prison– 24th February to 5th March, 2014
- Albany Regional Prison– 9th to 18th June, 2014
- Bandyup Women’s Prison – 10th to 17th July, 2014

The thermal conditions of six cells were assessed at each facility. ‘Logtag’ data loggers were installed in these cells and recorded temperature and humidity data during the monitoring period. Logtags were placed at head height away from direct sunlight or any source of direct heating or cooling.

Cells were selected based on previous inspection findings and for the purpose of isolating specific design and environmental features (e.g. orientation, cell construction, shading, occupancy). Cell selection was also based on advice from prison staff who identified prisoners least likely to tamper with equipment. If tampering did occur in a cell it would have appeared in a graphical display of temperature recordings as an isolated, sharp spike. With the exception of one cell at Bandyup (which was excluded from analyses) no evidence of equipment tampering was found.

An outdoor weather station was also installed at each prison so that ambient weather conditions could be assessed and compared with cell temperatures. The outdoor temperature recordings demonstrated good alignment with data from the Australian Bureau of Meteorology.

Researchers from Curtin University analysed the temperature data and provided a report to the Office on the findings.



Figure 8
Logtag data logger and weather station used for temperature measurement

12 Appendix E: Temperature results

Casuarina Prison

Table 10

Location of logtags at Casuarina Prison

Logtag number	Description of cell
1	Unit 5 - upper floor, north orientation. Brick constructed cell.
2	Unit 5 - upper floor, south orientation. Brick constructed cell.
3	Unit 6 - upper floor, north orientation. Single occupant.
4	Unit 6 - Upper floor, north orientation. Two occupants.
5	Unit 13 - lower floor, north orientation, eastern side. Newly built unit.
6	Unit 13 - Lower floor, north orientation, western side. Newly built unit.

Table 11

Summarised cell temperature data at Casuarina Prison

Logtag number	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records exceeding 18-30°C
1	22.3	26.9	24.4	4.6	0.0%
2	21.0	28.6	24.1	7.6	0.0%
3	22.0	27.6	24.9	5.6	0.0%
4	22.1	26.8	24.4	4.7	0.0%
5	22.1	27.9	24.6	5.8	0.0%
6	21.7	25.7	23.6	4.0	0.0%

Table 12

Summarised cell humidity data at Casuarina Prison

Logtag number	Min. humidity (%)	Max. humidity (%)	Average humidity (%)	Humidity range
1	24.7	57.4	44.3	32.7
2	23.3	63.1	46.1	39.8
3	28.8	55.9	45.1	27.1
4	23.9	58.9	45.2	35.0
5	26.0	56.4	43.2	30.4
6	29.0	60.6	44.0	31.6

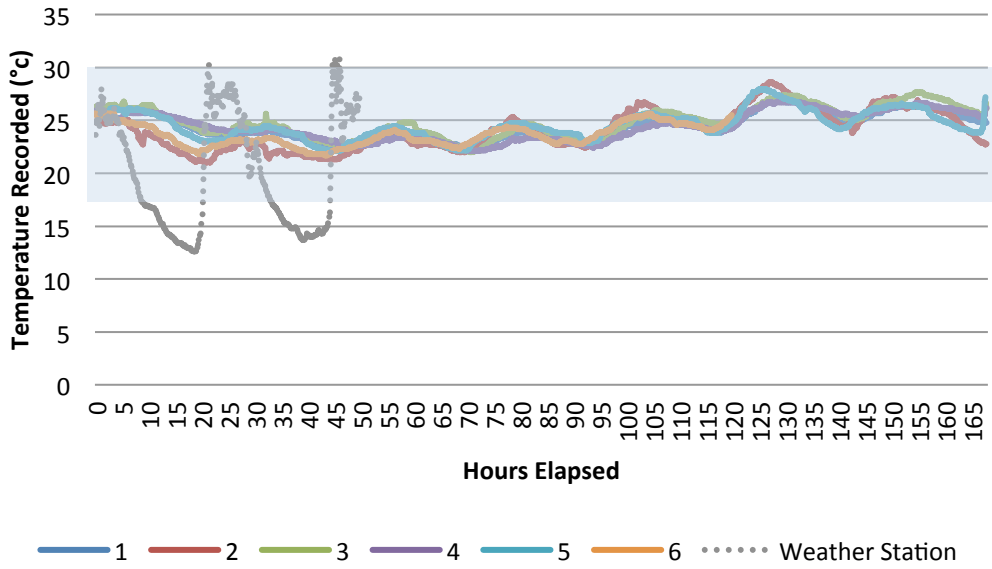


Figure 9
Temperature measurement results at Casuarina Prison.¹¹⁵

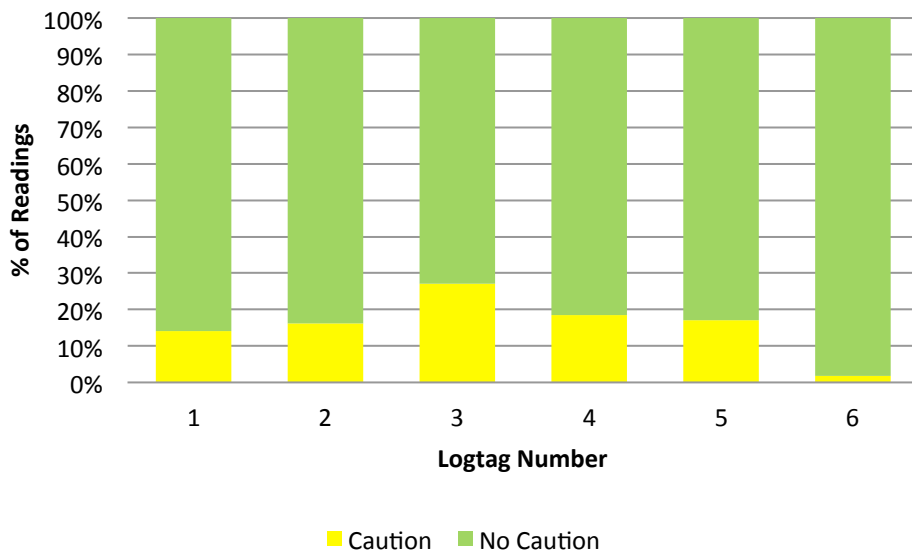


Figure 10
Heat Index categories for Casuarina Prison.

¹¹⁵ The area shaded light blue represents the acceptable temperature range of 18- 30°C. Please note that equipment malfunction prevented the weather station from recording the entire measurement period.

Karnet Prison Farm

Table 13

Location of logtags at Karnet Prison Farm

Logtag number	Description of cell
1	Cell in the 'upper landing' of Unit 2. Fifty year old brick constructed building. Some shade provided by nearby trees.
2	Same as previous, except two occupants instead of one.
3	'Barton's Mill' style hut. Fibre cement construction with wooden floorboards raised off the ground.
4	'Lower landing' of Unit 2. Donga style accommodation, with two rows of dongas facing each other. Steel sheeting attaches the two rows of dongas and creates a corridor closed at one end. A roof ventilator (i.e. whirly bird) was attached to the cell.
5	Same as previous, except no whirly bird present.
6	Stand-alone donga style accommodation in Unit 2. Gets some afternoon shade.

Table 14

Summarised cell temperature data at Karnet Prison Farm

Logtag number	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records exceeding 18-30°C
1	21.1	31.1	27.1	10.0	10.8%
2	21.3	32.6	27.8	11.3	28.7%
3	20.6	40.0	28.5	19.4	36.1%
4	19.5	39.4	28.7	19.9	38.9%
5	20.8	41.1	28.8	20.3	39.2%
6	20.4	35.8	28.0	15.4	33.9%

Table 15

Summarised cell humidity data at Karnet Prison Farm

Logtag number	Min. humidity (%)	Max. humidity (%)	Average humidity (%)	Humidity range
1	28.1	58.4	43.5	30.3
2	24.9	59.9	42.6	35.0
3	15.5	60.2	40.7	44.7
4	16.5	65.9	41.1	49.4
5	14	66.4	40.5	52.4
6	20	58.6	40.6	38.6

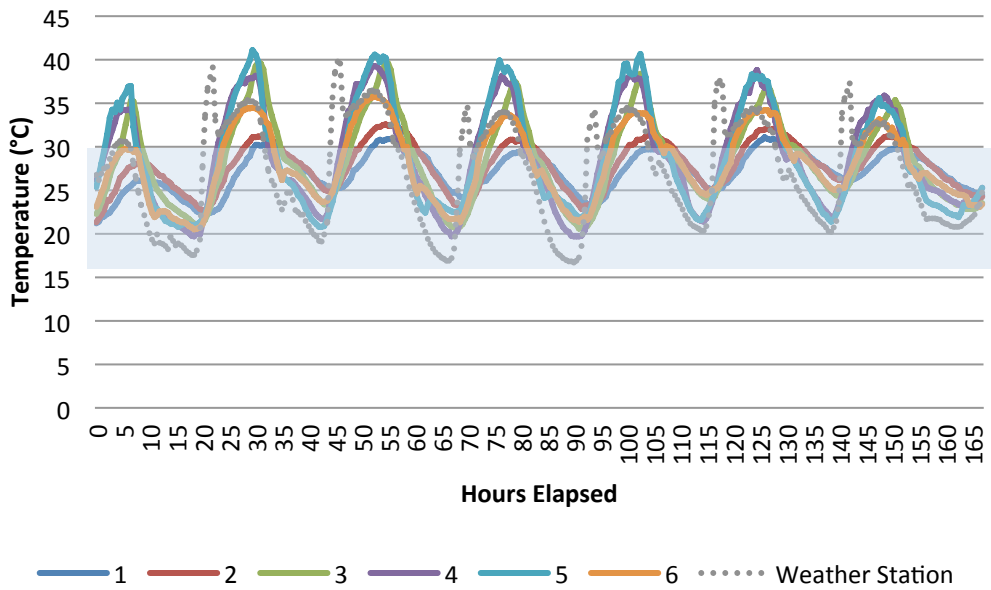


Figure 11
Temperature measurement results at Karnet Prison Farm¹¹⁶

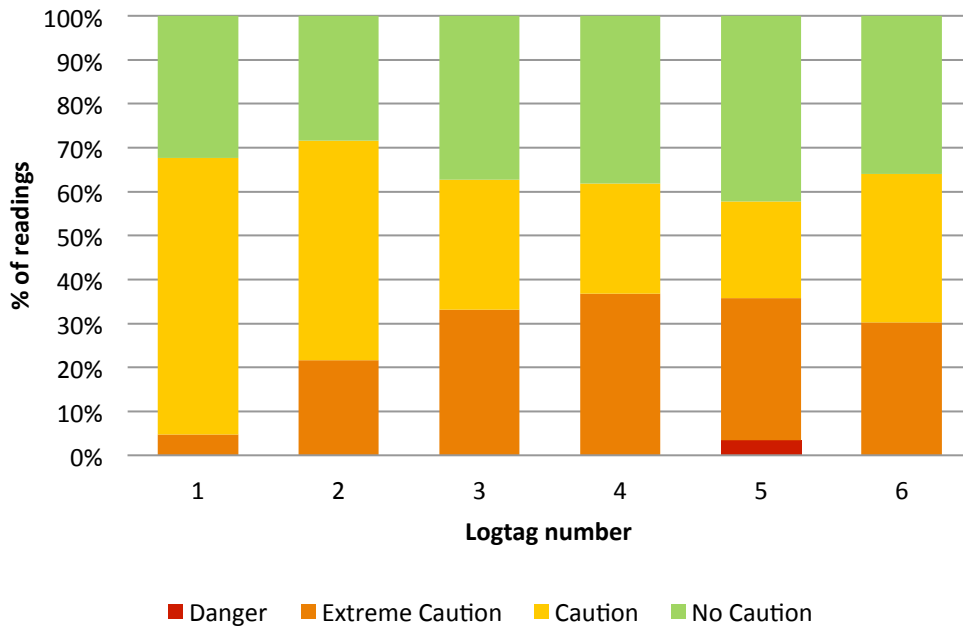


Figure 12
Heat Index categories for Karnet Prison Farm.

¹¹⁶ The area shaded light blue represents the acceptable temperature range of 18- 30°C.

Roebourne Regional Prison

Table 16

Location of logtags at Roebourne Regional Prison

Logtag number	Description
1	High capacity multi-cell on eastern side of prison. Two ceiling fans in cell.
2	High capacity multi-cell on western side of prison. Typically a shade sail present but this was taken down at the time of temperature measurement due to a recent cyclone.
3	Enhanced privileges cell with ceiling air-conditioning vent. Outside courtyard also more shaded.
4	Lower capacity cell on eastern side of prison.
5	Cell for female prisoners with reverse cycle air-conditioning and ceiling fan.
6	Single occupancy cell on western side. Has single ceiling fan. No air-conditioning and gets afternoon sun.

Table 17

Summarised cell temperature data at Roebourne Regional Prison

Logtag number	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records exceeding 18-30°C
1	30.3	38.3	34.0	8.0	100%
2	29.8	39.9	34.1	10.1	99.2%
3	23.9	28.6	25.7	4.7	0%
4	29.2	39.7	33.8	10.5	93.0%
5	26.6	34.4	29.9	7.8	44.4%
6	29.6	38.7	33.7	9.1	97.6%

Table 18

Summarised cell humidity data at Roebourne Regional Prison

Logtag number	Min. humidity (%)	Max. humidity (%)	Average humidity (%)	Humidity range
1	16.6	69.9	43.2	53.3
2	15.6	72.5	43.9	56.9
3	35.4	83.4	58.3	48.0
4	15.8	76.4	45.4	60.6
5	25	64.6	38.9	39.6
6	17.2	73.1	44.9	55.9

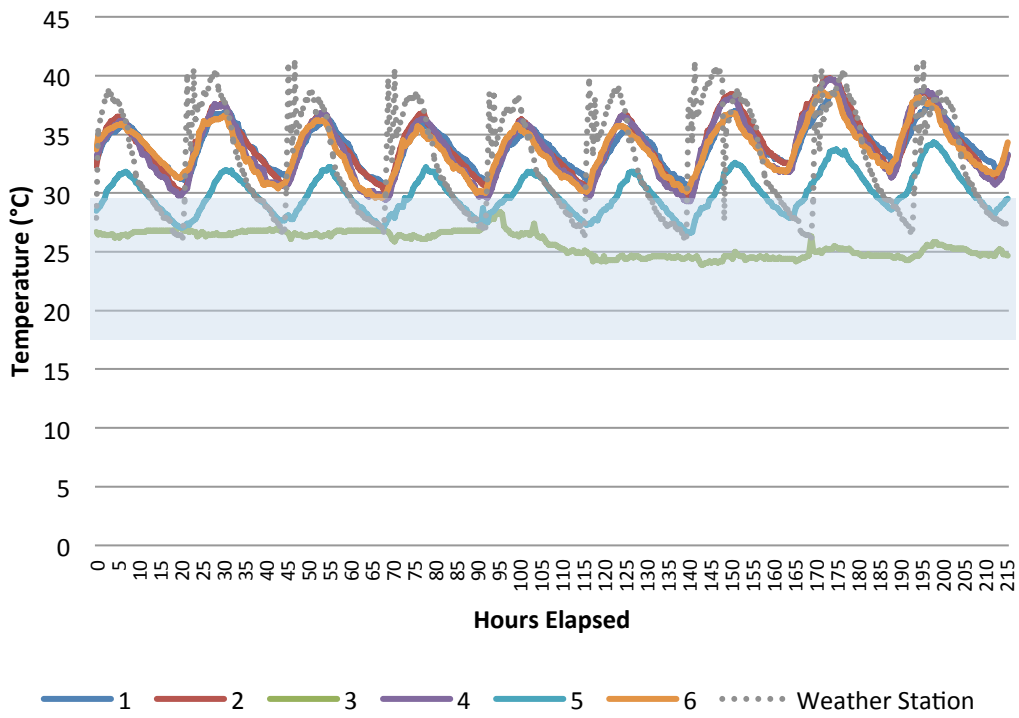


Figure 13

Temperature measurement results at Roebourne Regional Prison¹¹⁷

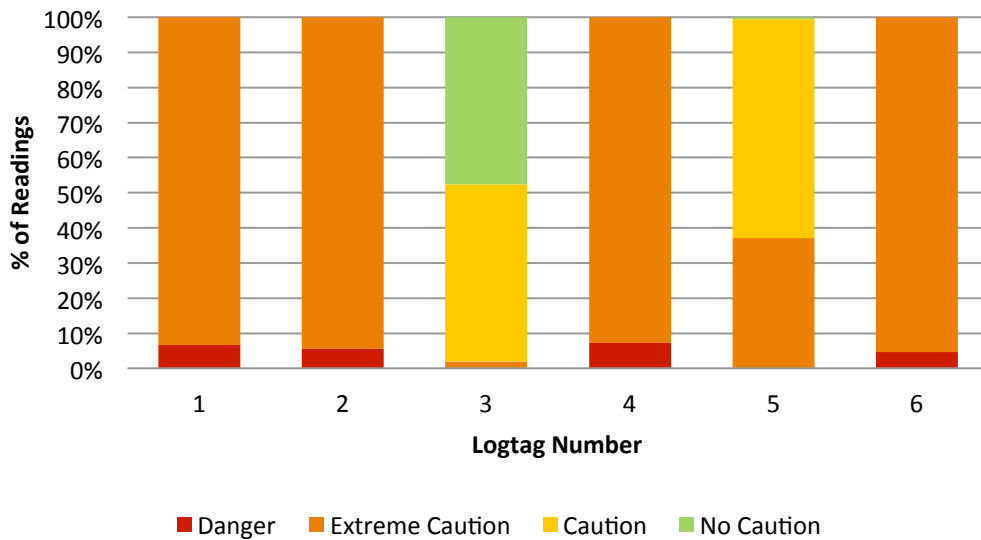


Figure 14

Heat Index categories for Roebourne Regional Prison.

¹¹⁷ The area shaded light blue represents the acceptable temperature range of 18- 30°C.

Bandyup Women's Prison

Table 19

Location of logtags at Bandyup Women's Prison

Logtag number	Description
1	Oldest unit in Bandyup (Unit 1). Limited sunshine and poor ventilation.
2	Multistorey unit (Unit 2). Logtag placed on upper level, eastern side, with north (sunnier) orientation.
3	Recently built community-style self-care house. Logtag placed in one of the four bedrooms of the house. No heating within bedroom.
4	Enhanced unit – donga style accommodation. Cell comes with separate bathroom, evaporative (cooling only) air-conditioner and heater. The heater is installed at head height.
5	Same as logtag 2, except placed on western side of unit.
6	Multistorey unit. Logtag placed on lower level, eastern side, with south (shadier) orientation.

Table 20

Summarised cell temperature data at Bandyup Women's Prison

Logtag no.	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records exceeding 18-30°C
1	12.9	19.1	15.5	6.2	99.3%
2	14.4	21.1	17.3	6.7	67.8%
3	15.6	25.1	17.8	9.5	58.3%
4	14.3	32.2	23.6	17.9	24.1%
5 ¹¹⁸	-	-	-	-	-
6	13.7	19.9	15.1	6.2	99.4%

Table 21

Summarised cell humidity data at Bandyup Women's Prison

Logtag number	Min. humidity (%)	Ma.x humidity (%)	Average humidity (%)	Humidity range
1	47.3	86.1	69.8	38.8
2	38.2	80.1	57.6	41.9
3	37.7	79.0	61.5	41.3
4	25.8	92.6	43.7	66.8
5	-	-	-	-
6	47.7	83.3	65.1	35.6

¹¹⁸ The logtag 5 results were invalidated by the prisoner moving the device during the monitoring period.

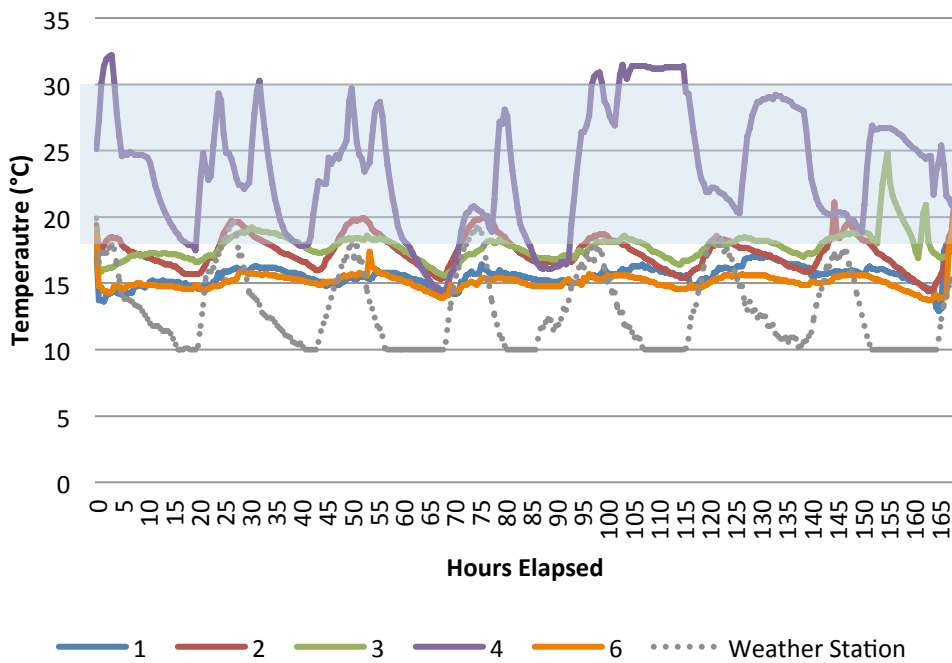


Figure 15
Temperature measurement results at Bandyup Women’s Prison¹¹⁹

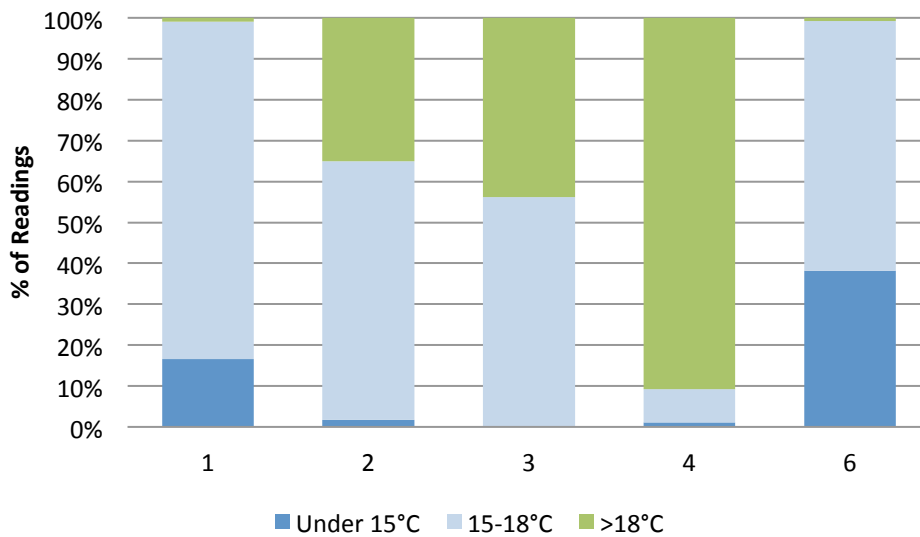


Figure 16
Cold categories for Bandyup Women’s Prison.¹²⁰

¹¹⁹ The area shaded light blue represents the acceptable temperature range of 18 -30° C. Please note that the weather station did not record temperatures below 10°C.

¹²⁰ Given the absence of a recognised cold index, cells were compared according to the extent that temperatures departed from 18°C.

Albany Regional Prison

Table 22

Location of logtags at Albany Regional Prison.

Logtag number	Description
1	Upper level cell, new unit (Unit 4). Brick construction.
2	Lower level cell, new unit (Unit 4). Brick construction.
3	Upper level cell, older unit (Unit 2), south orientation. Brick construction.
4	Upper level cell, older unit (Unit 2), north orientation. Brick construction.
5	Oldest single storey unit (Unit 1). Brick construction. Two occupants.
6	Oldest single storey unit (Unit 1). Brick construction. One occupant.

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Table 23

Summarised cell temperature data at Albany Regional Prison.

Logtag no.	Min. temp (°C)	Max. temp (°C)	Average temp (°C)	Temperature variation (°C)	% records exceeding 18-30°C
1	18.7	23.3	21.5	4.6	0.0%
2	18.0	22.4	20.5	4.4	0.0%
3	15.2	20.0	18.0	4.8	50.1%
4	14.7	20.8	17.8	6.1	55.6%
5	17.9	22.8	20.7	4.9	0.2%
6	16.3	19.8	18.3	3.5	26.2%

Table 24

Summarised cell humidity data at Albany Regional Prison.

Logtag number	Min. humidity (%)	Max. humidity (%)	Average humidity (%)	Humidity range
1	32.4	76.6	46.0	44.2
2	34.9	81.3	52.0	46.4
3	42.2	70.7	55.5	28.5
4	40.2	70.5	55.4	30.3
5	36.7	62.0	49.7	25.3
6	54.7	79.2	68.8	24.5

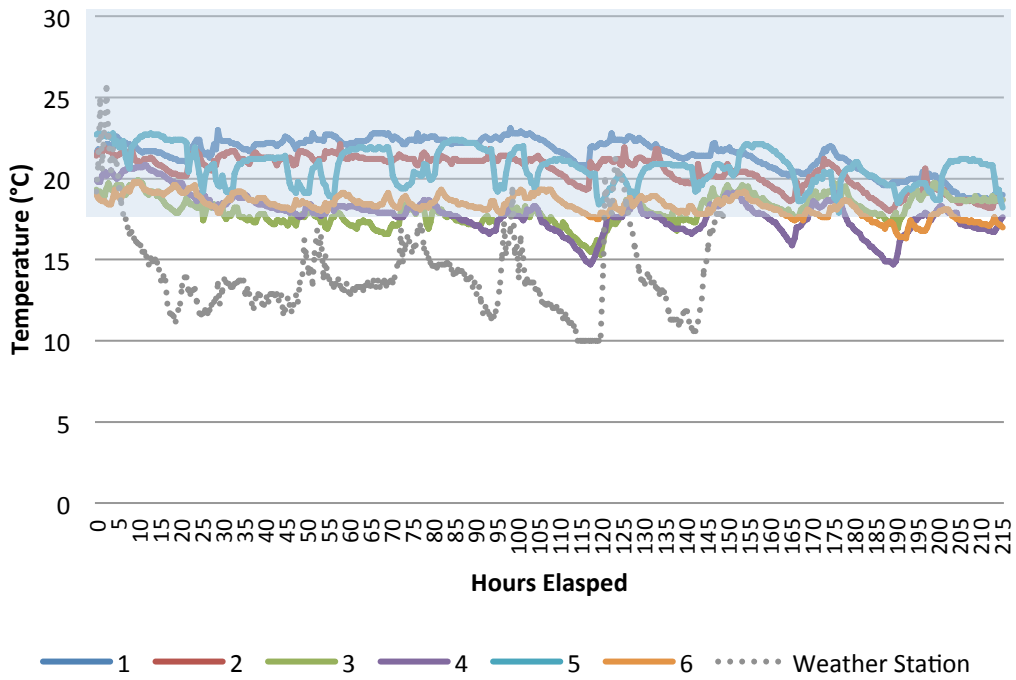


Figure 17
 Temperature measurement results at Albany Regional Prison¹²¹

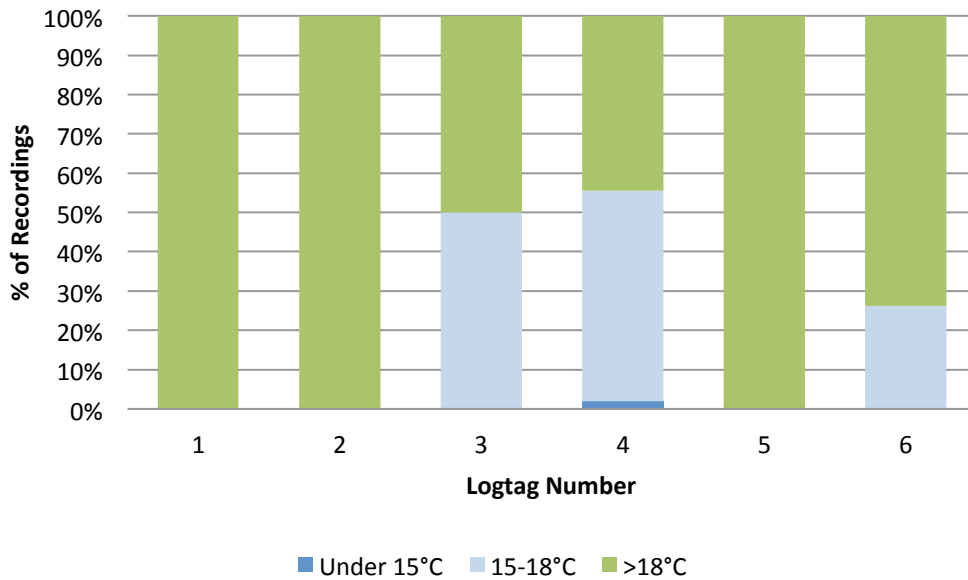
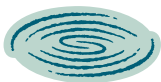


Figure 18
 Cold categories for Albany Regional Prison

¹²¹ The area shaded light blue represents the acceptable temperature range of 18 -30° C. Please note that the weather station did not record temperatures below 10°C.



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