



Environmental Protection Authority

Guidance for the Assessment of Environmental Factors

(in accordance with the
Environmental Protection
Act 1986)

Guidance Statement for Management of Mosquitoes by Land Developers

No. 40

June 2000

Western Australia

FOREWORD

The Environmental Protection Authority (EPA) is an independent statutory authority and is the key provider of independent environmental advice to Government.

The EPA's objectives are to protect the environment and to prevent, control and abate pollution. The EPA aims to achieve some of this through the development of environmental protection Guidance Statements for the environmental impact assessment (EIA) of proposals.

This document is one in a series being issued by the EPA to assist proponents, consultants and the public generally to gain additional information about the EPA's thinking in relation to aspects of the EIA process. The series provides the basis for EPA's evaluation of, and advice on, development proposals subject to EIA. The Guidance Statements are one part of assisting proponents in achieving an environmentally acceptable proposal. Consistent with the notion of continuous environmental improvement and adaptive environmental management, the EPA expects proponents to take all reasonable and practicable measures to protect the environment and to view the requirements of this Guidance as representing the minimum necessary process required to achieve an appropriate level of environmental protection.

The Guidance deals with the management of mosquitoes.

This Guidance Statement has the status of "**Final**" which means it has been reviewed by stakeholders and the public. The EPA has signed off the Guidance Statement and published it although it will be updated regularly as new documents come to hand.

I am pleased to release this document which now supersedes the draft version.



Bernard Bowen
CHAIRMAN
ENVIRONMENTAL PROTECTION AUTHORITY

30 June 2000

Table of Contents

	Page
1	PURPOSE..... 1
2	THE ISSUE..... 2
3	GUIDANCE FOR ASSESSMENT..... 3
3.1	Mosquitoes as a Relevant Factor..... 3
3.2	Guidance for Achieving Desired Outcomes..... 4
3.2.1	Need for mosquito management..... 4
3.2.2	Mosquito control measures..... 5
3.2.3	Mosquito monitoring and management considerations..... 5
3.2.4	Management system..... 6
3.2.5	Mosquito Management..... 8
4	APPLICATION..... 8
4.1	Area..... 8
4.2	Duration and Review..... 8
5	RESPONSIBILITIES..... 9
5.1	Environmental Protection Authority Responsibilities..... 9
5.2	Department of Environmental Protection Responsibilities..... 9
5.3	Proponent Responsibilities..... 9
5.4	Health Department of Western Australia Responsibilities..... 9
5.5	Local Government Responsibilities..... 9
6	DEFINITIONS..... 10
7	LIMITATIONS..... 10
8	BIBLIOGRAPHY..... 10
	APPENDIX 1 - Guidance Flow Chart
	APPENDIX 2 – Contiguous Local Authority Groups in WA

Guidance Statement No. 40

Guidance Statement for Management of Mosquitoes by Land Developers

Key Words: mosquito, arbovirus, arthropod

1 PURPOSE

- 1.1** Guidance Statements generally are developed by the EPA to provide advice to proponents, and the public generally, about the minimum requirements for environmental management which the EPA would expect to be met when the Authority considers a proposal during the assessment process.

This is a final Guidance Statement, and thus the EPA expects that proponents will give full attention to the information provided when they submit proposals for assessment.

- 1.2** This Guidance Statement specifically addresses the management of mosquitoes. The Guidance provides information which the EPA will consider when assessing proposals where mosquito management is a relevant environmental factor in an assessment. It takes into account:
- (a) the factor of mosquitoes, where mosquitoes present a health risk or severe nuisance to residents; and
 - (b) protection of the environment as defined by the *Environmental Protection Act 1986 (WA)* with a focus on minimising environmental impacts associated with methods for mosquito management.
- 1.3** Proponents are encouraged to consider their proposals in the light of the guidance given. A proponent who wishes to deviate from the minimum level of performance set out in this Guidance Statement would be expected to put a well researched and clear justification to the EPA arguing the need for that deviation.

2 THE ISSUE

Proposals subject to assessment by the Environmental Protection Authority (EPA) often involve development which is either adjacent to existing wetlands or involves the creation of an artificial water body. Where there is water, there is the potential for mosquitoes to breed. Mosquitoes are known to present serious health risks to humans by acting as transmitters or vectors of pathogenic arboviruses. They are known to be carriers of a number of diseases in Western Australia including Ross River (RR) virus, Barmah Forest (BF) virus and Australian encephalitis (AE). The only way humans can catch these diseases is by being bitten by a mosquito carrying the virus. Mosquitoes can also create severe nuisance problems which may severely impact upon the amenity for residents of affected areas.

While it is not possible to eliminate all mosquitoes, it is important to take measures to reduce the risk of people being bitten by infected mosquitoes.

The objective of this Guidance Statement is, therefore, to ensure that:

- mosquito numbers on-site and off-site should not adversely affect the health, welfare and amenity of future residents; and
- the breeding of mosquitoes is controlled to the satisfaction of the Health Department of Western Australia (HDWA) without adversely affecting other flora or fauna.

3 GUIDANCE FOR ASSESSMENT

3.1 Mosquitoes as a Relevant Factor

When assessing proposals which are likely to present a mosquito nuisance problem, the EPA will assess 'mosquitoes' as an environmental factor which will need to be addressed within the proponent's documentation. In undertaking this assessment, the EPA will liaise closely with the HDWA.

It is the expectation of the EPA that the proponent will develop measures to manage this factor in the following manner :

- undertake adequate survey in consultation with HDWA to establish the presence, extent and likely impact of mosquitoes on or adjacent to development sites;
- where, as a direct result of a proposal being implemented, mosquitoes are likely to be a problem "on-site" (for example, through the construction of artificial waterbodies such as wetlands) it is the EPA's expectation that the proponent will develop and implement measures to manage mosquitoes in consultation with HDWA and the Local Government Authority (LGA). The EPA recognises that this will have funding implications for the proponent; and
- where a potential mosquito problem exists "off-site" (for example, in areas prone to tidal inundation), and is likely to affect a proposed development because it is within the flight range of adult mosquitoes (up to 5 kilometres), it is the EPA's expectation that the proponent will take joint responsibility with the relevant LGA for the implementation and monitoring of measures to manage mosquito problems. Again, this will have some funding implications. HDWA will assess proposed measures and provide advice as appropriate.

Specific issues of concern to the EPA associated with this factor are :

- potential impacts of mosquitoes on the health, welfare and amenity of future residents; and
- potential short and long term environmental impacts resulting from the implementation of mosquito control measures on the environment, necessitated by the proximity of humans to mosquito breeding areas.

Monitoring and management commitments must be included by the proponent to address this factor, otherwise the EPA will recommend that Environmental Conditions and/or procedures be imposed on a specific development proposal by the Minister for the Environment.

When advised by the HDWA, the EPA will recommend a procedure to notify prospective residents at a development site if mosquitoes are likely to present a health risk.

3.2 Guidance for Achieving Desired Outcomes

3.2.1 Need for mosquito management

Mosquitoes are known to present serious health risks to humans by acting as transmitters or vectors of pathogenic arboviruses. They are known to be carriers of a number of diseases in Western Australia including Ross River (RR) virus disease, Barmah Forest (BF) virus disease and Australian encephalitis (AE). The only way humans can catch these diseases is by being bitten by a virus-carrying mosquito. RR and BF viruses cause non-fatal but potentially debilitating chronic diseases of humans. Both viruses occur throughout WA when conditions are warm enough for the virus to be active and when it is wet enough for mosquitoes to be active. The Peel Region is one example of a region in which the occurrence of mosquito-borne diseases occur because of the extent of shallow tidal areas and proximity to significant numbers of people. AE usually occurs in the north of Western Australia, however it is potentially fatal.

There are a number of critical factors which determine mosquito population abundance. Most significantly, mosquitoes require an aquatic environment to breed during their larval stage. Suitable mosquito larval habitats include estuaries, vegetated margins of lakes and streams, floodplains, man-made wetlands and physically disturbed environments (Harrington, in Health WA, 1998). Water bodies with high organic pollution levels, such as sewage treatment works are often a prolific source of mosquitoes (Whelan, in Health WA, 1998). Factors important for adult mosquito survival include temperature, wind and humidity. These factors in turn influence the abilities of adult mosquitoes to act as vectors of diseases and to disperse away from breeding sites.

Mosquito numbers vary between seasons and years. A major contributing factor to this is the amount of rainfall received, or the height and frequency of tidal inundation. While it is not possible to eliminate all mosquitoes, it is important to take measures to reduce the risk of being bitten by infected mosquitoes.

Mosquitoes are considered to be a 'nuisance' when the number of mosquitoes caught at a single location in a single carbon dioxide baited insect trap exceeds 50 over a normal sampling period (12 to 18 hours). If the species caught are ones that are known, or suspected to be vectors of mosquito-borne disease, and the mosquito population is in close proximity to a heavily populated area, then the mosquitoes may present a health risk (Harrington and Lindsay, pers. comm.).

3.2.2 Mosquito control measures

Physical, chemical and biological control methods are used to manage mosquito populations.

Physical methods used to control mosquito numbers involve the reduction or elimination of mosquito breeding grounds, through the filling or draining of breeding areas. Runnelling is one method of physical mosquito control which involves the digging of shallow channels to facilitate flushing of mosquito breeding habitat and thereby improving access by fish, which feed on mosquito larvae.

Chemical control involves the use of pesticides (larvicides) to kill mosquito larvae in breeding sites. Adulticides are less effective due to the ability of most WA mosquitoes to disperse over wide areas, and are less specific than larvicides, killing other insects in addition to mosquitoes.

A number of organisms have been investigated for the purposes of controlling mosquito larvae, a process referred to as 'Biological Control' (Harrington, in Health WA, 1998). To date, fish and larvicides derived from bacteria have shown some prospect in aiding the control of mosquito larvae.

The appropriateness of these measures will depend on the site characteristics, the mosquito species concerned, local control possibilities and environmental impacts in both the short and long-term.

The use of any control measures has the potential to have a long term environmental impact, and must therefore be carefully considered before application and be properly monitored.

Public education is also an important element in mosquito management. This includes making people aware of nuisance and health risks associated with mosquitoes and encouragement of self protection through the use of insect repellents, screens, nets, and insect-proof clothing, and minimising potential breeding sites on domestic properties through public awareness campaigns.

3.2.3 Existing mosquito management in WA

The HDWA has a state wide charter to ensure the protection of public health. This includes the threat to public health from mosquito-borne disease. A group known as the 'Mosquito Control Advisory Committee' (MCAC) currently oversees the provision of HDWA funding to LGA's with recognised mosquito-borne disease problems. The MCAC includes representatives from HDWA, the Department of Conservation and Land Management, the Ministry for Planning, the Water and Rivers Commission, the Department of Environmental Protection, the Peel Development Commission, the Local Government Association and the Country Shire Council's Association.

State Government funding for the management of mosquitoes requires as a pre-requisite the formation of 'Contiguous Local Authorities Groups', known as 'CLAGS'. CLAGs generally comprise several

neighbouring LGAs with a common mosquito problem. However, a single LGA may form a CLAG where the problem is confined to that LGA area. A CLAG must demonstrate the existence of human cases of locally acquired mosquito-borne disease, as well as a knowledge of the location of mosquito breeding habitats, before State funding is provided for mosquito larvicides (not adulticides). Where necessary, HDWA may fund the provision of a helicopter for aerial application of larvicides.

There are currently eight CLAGs in WA (listed in Appendix 2). CLAGs are required as a condition of funding to monitor mosquito larvae to determine the appropriate timing to initiate the application of mosquito larvicides. Adult monitoring is also encouraged as a measure of the effectiveness of the control program. Monitoring is undertaken throughout the risk period for transmission of mosquito-borne disease.

Many LGAs outside the CLAG system undertake adult mosquito monitoring to quantify the extent of local mosquito nuisance and to determine (from the species present) the likely breeding habitat in order to facilitate control programs. In most cases, this monitoring is driven by public complaints.

Several problems have been experienced in relation to this form of mosquito management. These include :

- lack of adequately planned and co-ordinated mosquito control - much of the existing mosquito control is undertaken in response to high numbers of biting adult mosquitoes. Ideally, an effective larval monitoring program will treat breeding areas before adult mosquitoes emerge, potentially transmitting disease;
- on-going expense in managing mosquitoes through repeated and widespread application of pesticides;
- little co-ordinated monitoring of long term environmental impacts of traditional methods of mosquito control, including pesticide application; and
- increasing urban development adjacent to areas that are known to experience a mosquito problem.

3.2.4 Mosquito monitoring and management considerations

The choice of effective mosquito control will depend on a variety of factors, according to specific site requirements. However, **the EPA encourages the adoption of mosquito control measures which maintain healthy wetland ecosystems, and minimises the physical alteration of foreshore areas or wetlands. The use of 'Water Sensitive Urban Design' principles (Whelan, 1993) is also encouraged to ensure appropriate management of urban stormwater run-off.**

Before a decision is made regarding control measures it is important to gather relevant information to :

- determine the need for a control program. This could include defining the mosquito species present, potential breeding sites, and incidence of mosquito-borne disease;
- guide the planning of the program;
- monitor the operation of the program; and
- evaluate the program (Russell, in Health WA, 1998).

Information must be obtained through a number of surveys to determine information such as the type of mosquito species present, breeding sites, dispersal or flight range, and seasonal fluctuations in numbers. In some locations, information will already be available from HDWA or the relevant LGA, and this may be sufficient. However, where information is not available, additional work will be required. A good understanding of local conditions is critical to making timely, economic and environmentally responsible decisions (Harrington, in Health WA, 1998). It would also be helpful for a prospective developer to ascertain with which agency/authority land on which mosquito breeding may occur is vested, and if there is already an existing policy on mosquito control.

It is important that a mosquito monitoring program is established, ideally for three years, but at least for one year, prior to the commencement of any ground disturbing activities to ensure that there is a good understanding of the mosquito population and associated health risk cycle, and environmental fluctuations characteristic of a particular location.

On-going monitoring programs are important for assessing the effectiveness of a control program, and to provide guidance for control procedures. These should be prepared in consultation with the local waterway management authority (where relevant) and continue for up to five years after completion of the development. Consideration could then be given to handing this responsibility to the relevant LGA. A Technical Review Committee should be established to assess and direct the performance of the monitoring program, and include representatives of the Health Department.

The monitoring program must be reviewed three years after completion of development, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, Health Department and Technical Review Committee.

Monitoring should incorporate, but not be limited to, the following considerations:

- the type of mosquito species and an estimate of the size of the adult mosquito population present;
- the seasonal distribution of potential mosquito breeding sites (this will necessitate seasonal larval surveys);

- larval abundance in artificial wetlands, as potential mosquito breeding areas;
- the potential impact of mosquito control measures used on fringing wetland vegetation; and
- incidence of mosquito borne-disease. This information could be obtained from HDWA or the relevant LGA, and should be included as part of the monitoring program.

A follow up evaluation survey is also essential to assess the effectiveness of the control program and provide guidance for future control measures. If, following review of the monitoring program, it is demonstrated that the management techniques are not working, the proponent should investigate an alternative, and be committed to implementing a contingency plan approved by HDWA and Department of Environmental Protection.

3.2.5 Mosquito Management

The EPA seeks an environmentally sensitive approach to mosquito control, based on a good understanding of the types of mosquitoes present, location of potential breeding areas, population size over a full year, and local incidence of mosquito-borne arboviruses.

Control measures should be based on a review of the above information. The developer should be prepared to monitor the effectiveness of control measures (and effect of control measures on the environment). Five years following completion of the development (or earlier if developer is no longer involved after 5 years), consideration could be given to handing this responsibility to the relevant LGA.

4 APPLICATION

4.1 Area

This Guidance Statement applies throughout the State of Western Australia and shall apply to all new proposals.

4.2 Duration and Review

The duration of this Guidance Statement is for five years unless some unforeseen circumstances require it to be revised earlier.

5 RESPONSIBILITIES

5.1 Environmental Protection Authority Responsibilities

The EPA will apply this Guidance Statement during the assessment of proposals under Part IV of the *Environmental Protection Act 1986* where mosquito management is a factor.

5.2 Department of Environmental Protection Responsibilities

The DEP will assist the EPA in applying this Guidance Statement in environmental impact assessment and in conducting its functions under Part V of the *Environmental Protection Act 1986*.

5.3 Proponent Responsibilities

Where proponents demonstrate to the EPA that the requirements of this Guidance Statement are incorporated into proposals, in a manner which ensures that they are enforced and audited, the assessment of such proposals is likely to be assisted.

5.4 Health Department of W.A. Responsibilities

State Government (Health Department of Western Australia) has a statewide charter to ensure protection of public health, including the threat from mosquito-borne disease. Consequently, HDWA is involved in mosquito control in WA, where this is health related. Currently, this involvement extends to:

- partial funding of mosquito control programs for Local Governments (LGs) that have met requirements for formation of a Contiguous Local Authorities Group (CLAG), as determined by the Mosquito Control Advisory Committee (MCAC);
- provision of advice, expertise, training and warnings on mosquito-borne disease and control to all LGs, other State Government departments and the private sector throughout WA; and
- assisting LGs with emergency mosquito control during severe outbreaks of mosquito-borne disease.

5.5 Local Government Responsibilities

In general, mosquito control is considered to be the responsibility of Local Government as required under the Health Act. This extends to control of nuisance and potential disease-carrying mosquitoes within their boundaries and protection of residents from exposure to mosquito-borne disease.

State Government funding has been provided to assist LGs with mosquito management, but requires formation of a CLAG as a pre-requisite. CLAGs must demonstrate a risk of mosquito-borne disease in their region, define

mosquito breeding sites with baseline surveys and undertake ongoing monitoring of breeding sites as part of their mosquito control program. The Mosquito Control Advisory Committee oversees these criteria and allocation of HDWA funds to CLAGs

6 DEFINITIONS

The following technical terms are used in this document -

Arbovirus - arthropod-borne virus that is transmitted between vertebrate hosts via arthropods acting as an intermediate vectors (Health WA, 1998). Arboviruses multiply in both the vector and host (Lindsay, in Health WA, 1998).

Arthropod - segmented invertebrate, having jointed legs (Macquarie Dictionary 1988), for example mosquitoes.

Runnelling - method used to flush surface water accumulating from tidal action and rainfall through the use of shallow (10 - 20 cm deep, 30 - 60 cm wide) spoon shaped channels connecting pools to estuaries, mainly appropriate on tidal marshes. (Health WA 1998).

7 LIMITATIONS

This Guidance Statement has been prepared by the Environmental Protection Authority to assist proponents and the public. While it represents the contemporary views of the Environmental Protection Authority, each proposal which comes before the Environmental Protection Authority for environmental impact assessment will be judged on its merits. Proponents who wish to deviate from the Guidance provided in this document should provide robust justification for the proposed departure.

The EPA is aware that an 'all of (State) Government approach' is being undertaken towards resolving the issue for mosquito management, both for existing and proposed developments, as a public health and planning issue. The EPA expects that this work will be undertaken in consultation with the Mosquito Control Advisory Committee, and that the Guidance Statement may change in response to this work.

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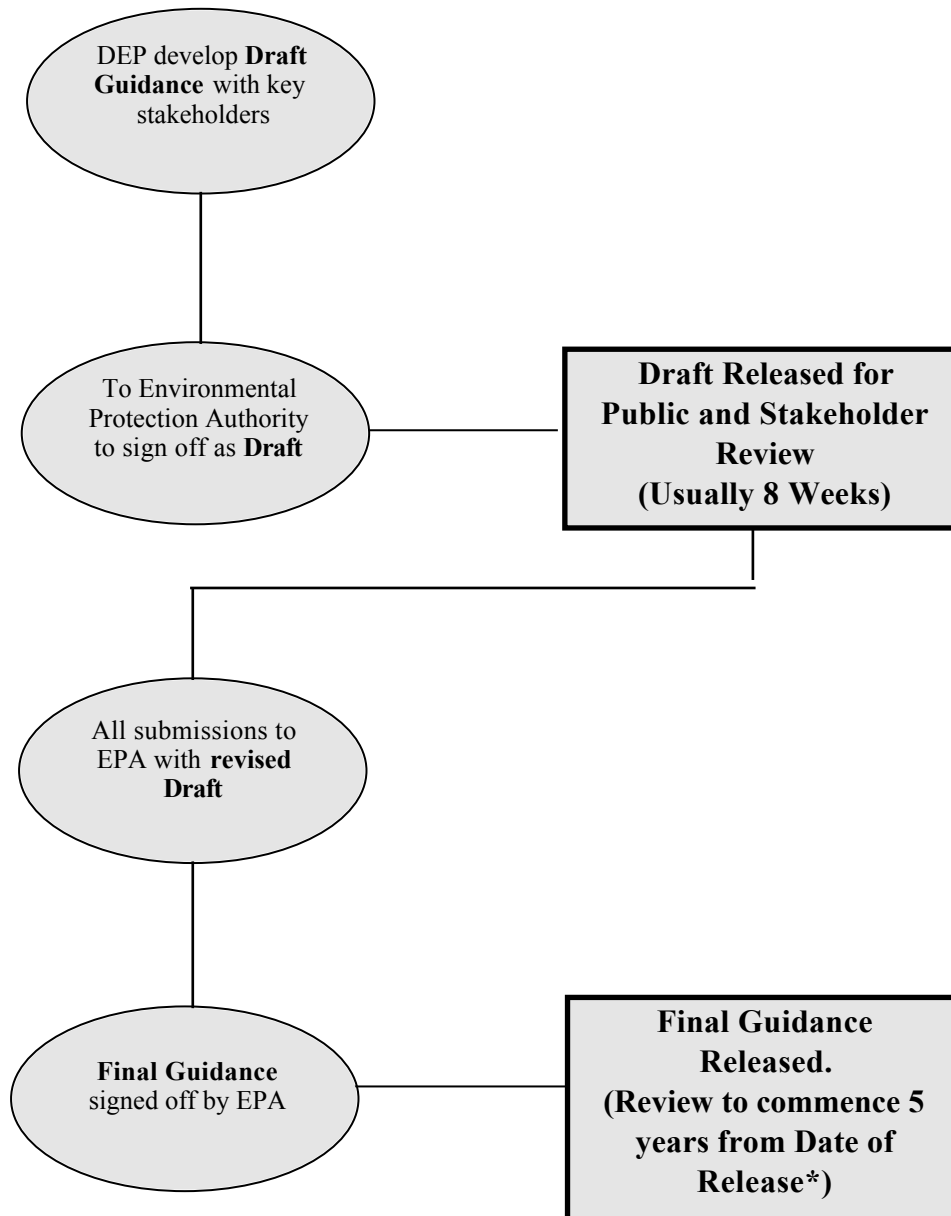
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Appendix 1

Generic Flow Diagram for the Guidance Statement Process



* Guidance may be reviewed earlier if circumstances require it.

Appendix 2.

Contiguous Local Authority Groups in WA

<u>CLAG</u>	<u>LGAs involved</u>	<u>Chairman</u> (as of April 2000)	<u>Contact number</u>
<u>Peel Region CLAG</u>	<u>City of Mandurah</u> <u>City of Rockingham</u> <u>Shire of Murray</u> <u>Shire of Waroona</u>	<u>Mr John Gabrielson</u> <u>City of Mandurah</u>	<u>(08) 9550 3814</u>
<u>East Swan River CLAG</u>	<u>City of Belmont</u> <u>City of Bayswater</u> <u>Town of Bassendean</u> <u>City of Swan</u>	<u>Mr Ken Goldsworthy</u> <u>Town of Bassendean</u>	<u>(08) 9279 5022</u>
<u>Leschenault CLAG</u>	<u>City of Bunbury</u> <u>Shire of Harvey</u> <u>Shire of Dardanup</u>	<u>Mr Tim Hunter</u> <u>City of Bunbury</u>	<u>(08) 9780 8245</u>
<u>Roebourne CLAG</u>	<u>Shire of Roebourne</u>	<u>Mr Angus Kerr</u> <u>Shire of Roebourne</u>	<u>(08) 9186 8543</u>
<u>Port Hedland CLAG</u>	<u>Town of Port Hedland</u>	<u>Mr Anthony Whitfield</u> <u>Town of Port Hedland</u>	<u>(08) 9941 1708</u>
<u>Subiaco - Nedlands CLAG</u>	<u>City of Subiaco</u> <u>City of Nedlands</u>	<u>Mr Phil Swain</u> <u>City of Nedlands</u>	<u>(08) 9386 2414</u>
<u>Wanneroo - Joondalup CLAG</u>	<u>City of Joondalup</u> <u>City of Wanneroo</u>	<u>Ms Elizabeth French</u> <u>City of Wanneroo</u>	<u>(08) 9400 4000</u>
<u>Busselton CLAG</u>	<u>Shire of Busselton</u>	<u>Mr Greg Simpson</u> <u>Shire of Busselton</u>	<u>(08) 9781 0444</u>