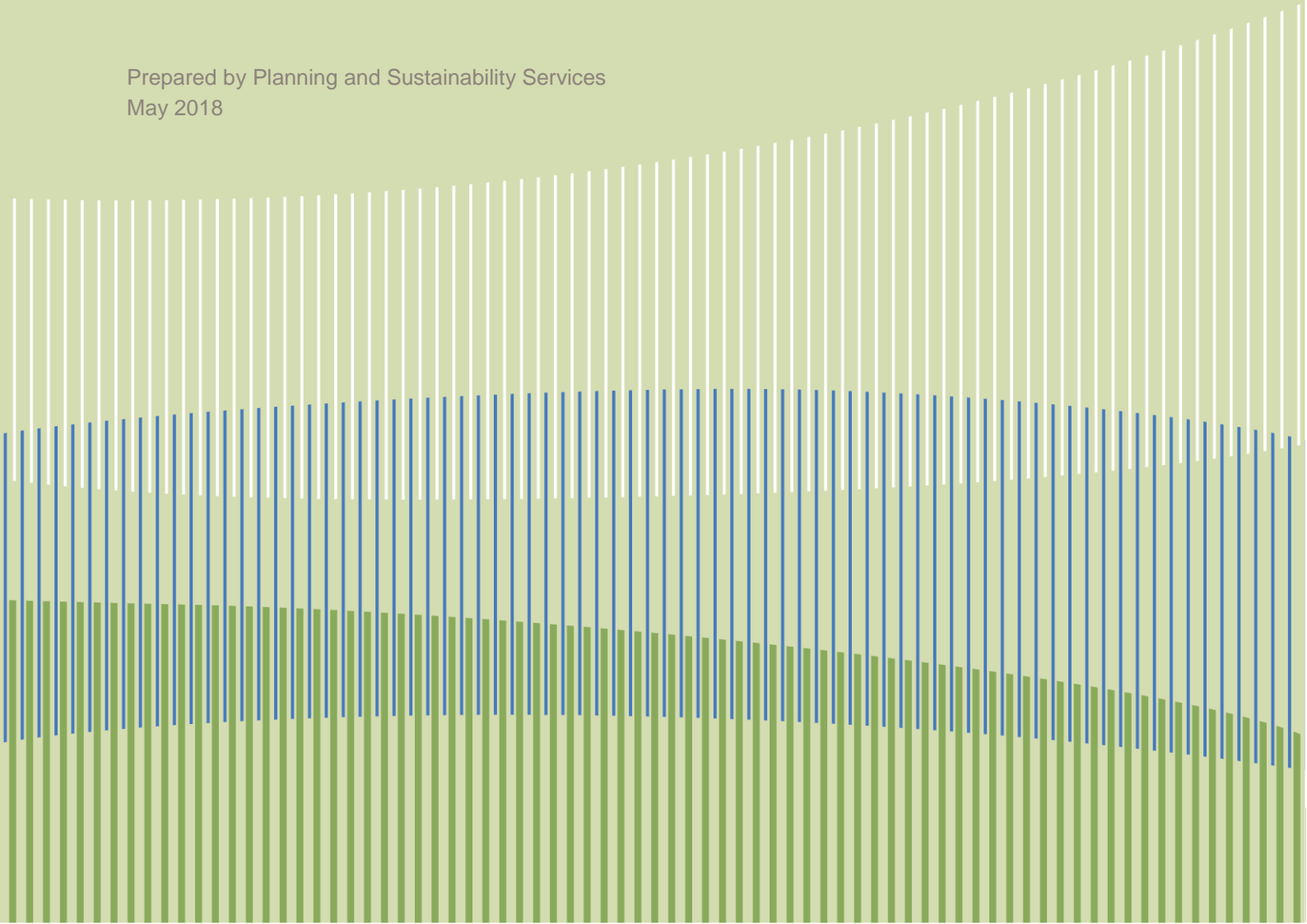


Local Planning Policy

Mosquitoes

Prepared by Planning and Sustainability Services
May 2018



1. Introduction

The Shire of Murray has been identified as having certain areas with frequent 'high' and occasional 'very high' mosquito related disease risk according to environmental conditions (Department of Health [DoH], 2016).

As the Shire of Murray becomes more developed, there is increasing pressure for residential subdivisions to occur in close proximity to mosquito breeding areas. Mosquito breeding areas that have the highest impact in the Shire are the saltmarshes surrounding the Peel-Harvey Estuary, given that salt water mosquitoes generally travel further and are more persistent biters than freshwater mosquitoes. However freshwater mosquitoes still cause issues, particularly when breeding in stormwater after heavy rains.

Many species of mosquitoes in the Shire of Murray have the potential to transmit Ross River and Barmah-Forest Virus. To reduce the incidence of disease, mosquito management should be considered at the earliest opportunity, namely the planning and design stages of a residential development.

Whilst the main focus for mosquito management in the Peel region will continue to involve aerial larvicidal treatment, urban planning is part of a modern integrated approach to mosquito management. The Department of Planning has undertaken work towards a state mosquito planning policy, which includes a background paper Development of a Planning Policy for Mosquitoes and Development 2001. However a state mosquito policy is not expected to be developed in the foreseeable future. In the absence of any suitable state or regional policy, it is considered appropriate for the Shire of Murray to implement a local planning policy that facilitates a risk management approach to mosquito mitigation.

This policy does not aim to eliminate mosquitoes from a development nor does it limit the ability of the Shire of Murray to provide mosquito mitigation measures beyond the confines of this policy. Instead the policy seeks to minimise the impacts of mosquitoes associated with new developments. Despite all efforts there may still be times when residents experience large numbers of mosquitoes after certain climatic conditions that favour significant mosquito breeding.

2. Application of the Policy

This Policy applies to rezoning, structure plans, subdivisions and development proposals for:

- New residential and other development that may be sensitive to the impact of mosquito within 5 kilometres of existing mosquito breeding areas adjoining the Peel-Harvey Estuary and nearby lakes; and
- Proposed residential and other development that may be sensitive to the impact of mosquito that may be further than 5 kilometres from existing mosquito breeding sites, where proposed development will potentially increase mosquito breeding, within new stormwater systems, artificial lakes and canals.

Applications will need to demonstrate how proposals meet the objectives of this policy.

3. Policy Objectives

To reduce the potential impact of mosquitoes on new residential development by:

- addressing mosquito risk when considering the location and design of new residential development;
- encouraging developments that are compatible with the long-term protection of public health and quality of life;
- prioritising mosquito prevention measures over treatment measures;
- promoting developer and public awareness of mosquito management issues;
- minimising impacts on natural ecosystems; and
- integrating strategic mosquito management into development proposals.

4. Policy Requirements

The following measures will be considered at the nominated planning stages including rezoning, structure planning, subdivision application and development application stages, for residential and other developments that may be sensitive to the impact of mosquito that are proposed within specified distances from breeding sites.

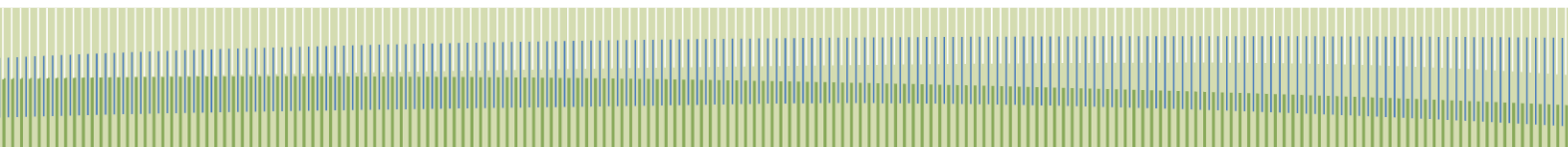
The policy recommends strategies that include risk assessment, developer mosquito management plans (MMPs), urban design, buffers, standard conditions, local water management, appropriate stakeholder referrals and building design.

Each measure will be applied according to the nominated distance from mapped mosquito breeding areas (see Appendix 1) specified in Table 1. This is based on the principle that there is a greater risk of mosquito impacts closer to major mosquito breeding areas

Table 1 – Planning measures to mitigate mosquito impacts on proposed development

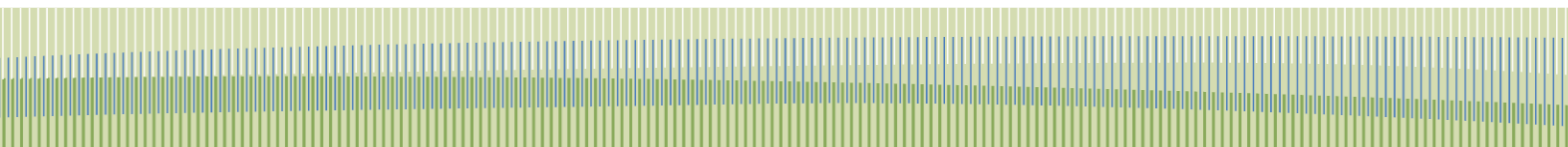
Planning measure	Distance from mosquito breeding sites	Stage Applicable (use first available opportunity)	Description/Comment
1. Risk assessment	≤ 5 km	Rezoning, Structure Plan, Subdivision, Development as appropriate	It is likely that existing mosquito breeding sites will affect a proposed development if the development is located within 5 kilometres, which is the flight range of most adult mosquitoes (former EPA guidance statement 40). A risk assessment for proposed developments in this vicinity will allow the Shire to provide advice to developers in relation to which planning measures developers should apply to development proposals. For reference the mapping in Appendix 1 shows incremental one kilometre buffer zones up to 5 kilometres of breeding sites around the Peel-Harvey Estuary (Jardine, Neville & Lindsay, 2015). This risk mapping is stored on the Shire of Murray electronic mapping system and will be used as part of the Shire of Murray development assessment process. Developers should provide a risk assessment as part of a proposal within 5km of mosquito breeding sites. The risk assessment should consider the risks shown in Appendix 2 and present these in a risk assessment matrix. An example is shown in Appendix 3. If the risk assessment identifies a high or greater risk then mitigation measures must be identified and implemented to reduce the risk to at least a moderate level of risk.
2. Mosquito Management Plans	≤ 3 km	Structure Plan, Subdivision, Development as appropriate	<p>Mosquito management plans should be provided as part of the application and implemented as a condition of approval. The plan should be written by a suitably qualified and experienced person, detailing the following:-</p> <ol style="list-style-type: none"> a. Extent and impact of proposed and existing on-site and off-site mosquito breeding sites within 3 kilometres of the proposed development; b. Quantification of mosquito impacts by direct monitoring or the use of existing relevant data of larval and adult mosquito abundance (may be available from <u>DoH</u>), including species prevalence, over a period that reflects the full spectrum of environmental conditions that influence breeding and survival of mosquitoes in the region, as per advice from the Shire or

			<p><u>DoH</u>, usually of one to three years. Note that over 50 adult mosquitoes per trap overnight, and/or over 50 larvae per scoop, is expected to create a nuisance;</p> <p>c. Risk assessment of the proposal addressing the factors included but not limited to those in Appendix 2;</p> <p>d. Extent that mosquito impacts could change as a result of the proposal;</p> <p>e. Measures available to reduce the risk of health and nuisance impacts for future residents. Preferably this is to be provided as a quantitative assessment as shown in Appendix 3.</p> <p>f. How measures will be implemented such as:</p> <ul style="list-style-type: none"> i. Construction <u>practices</u> to avoid the creation of new mosquito breeding sites, including from wheel ruts, depressions, or blocking drainage lines with spoil materials; ii. Urban design (see section 3); iii. Urban stormwater management, including filling or levelling of low lying areas where practical; iv. Notifications on certificate of title advising of proximity to mosquito breeding sites (see section 6a); v. Public education packages including the encouragement of insect screened outdoor entertaining areas; vi. Providing vehicle or personnel access around the shoreline of breeding areas for local government (LG) monitoring and maintenance; vii. Public signage advising of mosquito risks and personal protection measures. <p>Further information is contained in the <u>DoH Mosquito Management Plan template</u> on their website at: http://ww2.health.wa.gov.au/~media/Files/Corporate/Reports%20and%20publications/Word/MMP%20template%20A%20-%20guidance%20notes%20web%20version.ashx</p> <p>MMPs should describe individual management approaches, demonstrate why these have been selected (evidence that they will be effective) and outline triggers or thresholds for required actions.</p>
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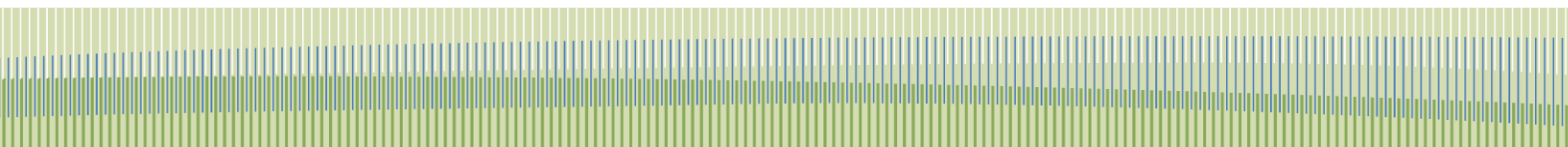


3. Urban design	≤ 3 km	Structure Plan, Subdivision, Development	<p>Developers should incorporate mosquito protective measures into the design of structure plans and residential subdivision or development proposals within 3 kilometres of mosquito breeding areas which may include:</p> <ol style="list-style-type: none"> Continuous thick vegetation belts should be avoided where possible in public open space (POS) or altered to accommodate environmental considerations to lessen potential harbourage and passage of mosquitoes from breeding areas to residential lots. Subdivision orientation of lots and roads should be designed to utilise the prevailing winds to disperse mosquitoes. Street lighting should be designed (location, orientation, colour) so that a 'barrier' is formed particularly around areas of POS, or uses lighting orientation or colour so as not to attract mosquitoes. Appropriately distributed planting with native shrubs such as grevillea, banksia and casuarina are suitable for landscaping or screening. Lot size, shape and distribution in relation to mosquito breeding areas.
4. Developer contributions	≤ 3 km	Structure Plan, Subdivision, Development	<p>The Shire may consider the imposition of developer contributions to assist with the management of mosquito on a case by case with developers. For example contributions could be made towards the cost of district and local drainage, water management, foreshore management, and public open space infrastructure provision.</p>
5. Buffers	≤ 2 km	Structure Plan, Developer Concept Plan, Subdivision	<p>There is a significantly higher risk of Ross River Virus for residents who live within 2 kilometres of breeding sites surrounding the Peel-Harvey Estuary, as shown in Appendix 4. Wherever possible, land that exposes significant numbers of people to mosquitoes should not be intensified.</p> <p>In addition to residential development, other development which may be sensitive to mosquito impacts such as tourist accommodation, lifestyle villages and night time recreational developments should be discouraged in buffer zones. These should only be permitted if there are suitable site-specific measures taken to mitigate mosquitoes.</p>

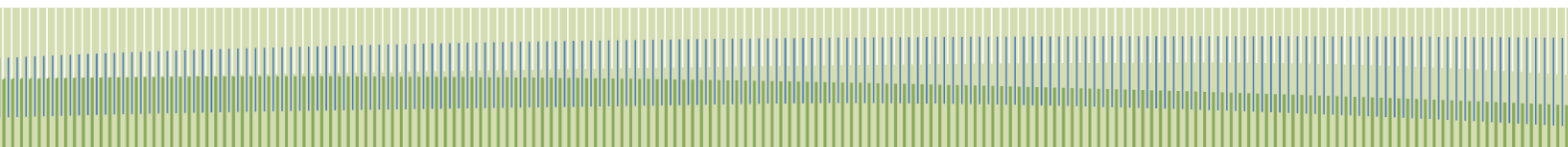
			<p>There is a presumption against urban lots (<4000m²) closer than 1km to a breeding site, unless the land is already zoned, there is an endorsed structure plan in place, the proposal involves the rounding off of an existing urban area or the development is otherwise necessary to achieve strategic transit related development. Lower density residential development may otherwise be supported as shown in Table 1b below.</p>												
			<p>Table 1b – Lot sizes adjoining large mosquito breeding areas</p> <table border="1"> <thead> <tr> <th>Lot size</th> <th>Distance to saltmarshes</th> </tr> </thead> <tbody> <tr> <td>Minimum 2 hectares</td> <td>0-300m</td> </tr> <tr> <td>Minimum 1 hectare</td> <td>300-500m</td> </tr> <tr> <td>Minimum 4000m² (R2.5)</td> <td>500m-1km</td> </tr> <tr> <td>Residential sized lots less than 4000m² (with rural-residential or cleared rural land buffer)</td> <td>1-2km</td> </tr> <tr> <td>Residential sized lots less than 4000m² (with no rural-residential or cleared rural land buffer)</td> <td>2km or greater</td> </tr> </tbody> </table>	Lot size	Distance to saltmarshes	Minimum 2 hectares	0-300m	Minimum 1 hectare	300-500m	Minimum 4000m ² (R2.5)	500m-1km	Residential sized lots less than 4000m ² (with rural-residential or cleared rural land buffer)	1-2km	Residential sized lots less than 4000m ² (with no rural-residential or cleared rural land buffer)	2km or greater
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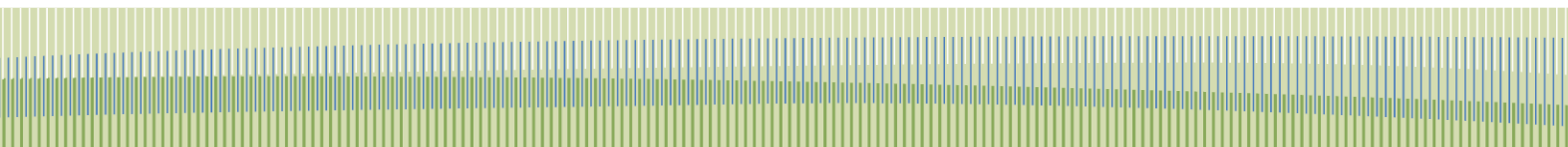
			<p>These lot sizes are, subject to consideration of other planning criteria, minimum lot sizes only. Higher density housing may be considered abutting wetlands where engineering of artificial wetlands connected to natural wetlands such as the construction of canals or marinas can significantly reduce the level of mosquito breeding opportunities. Consideration may also be given to a report submitted by a suitably qualified and experienced person that provides justification for higher density lots than those listed in Table 1b, within the 2km buffer zone. This would be appropriate for the subdivision of sites that are already zoned for urban development at the time this policy was adopted, that already show residential lots on approved structure plans.</p> <p>If there are mosquito breeding sites within the proposed residential development, an internal buffer should also be created between the breeding site and residential areas in accordance with the Department of Health document <i>Chironomid midge and mosquito risk assessment guide for constructed water bodies</i> available at:</p> <p>http://ww2.health.wa.gov.au/~media/Files/Corporate/general%20documents/Mosquitoes/PDF/Chironomid%20midge.ashx.</p> <p>The internal buffer should be clear of thick shady vegetation that provides harbourage for resting adult mosquitoes. Tall lightly foliated trees such as eucalypts and palms tend to allow good circulation at ground level. Recommended buffer widths are dependent on the predominant mosquito species, prevailing wind, the existence of other barriers such as open grassland, carparks, agricultural land, golf courses, and the connection of bushland from breeding sites to residential areas that allows a dispersal route for mosquitoes.</p>
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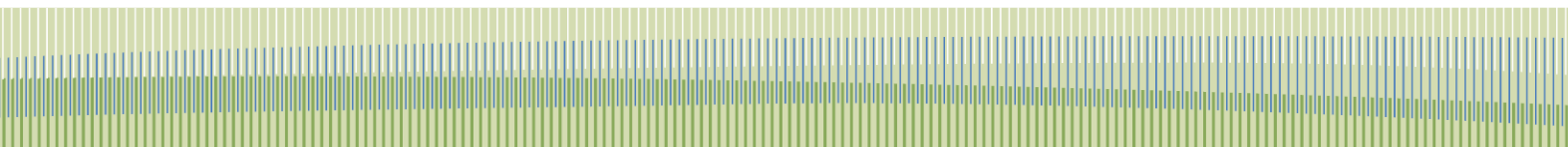
6a. Standard conditions	≤ 2 km	Structure Plan, Subdivision, Development	<p>To be consistent with best practice, and other local governments in the Peel Mosquito Management Group, notifications on titles pursuant to section 165 of the Planning and Development Act will be recommended to the WAPC by the Shire of Murray for residential subdivisions within 2 kilometres of mosquito breeding areas, as shown on the risk mapping in Appendix 1, stating:</p> <p>“This lot is in close proximity to known mosquito breeding areas. The predominant mosquito species is known to carry viruses and other diseases.” (based on Model Subdivision Conditions schedule 2015, amenity condition 5.</p> <p>Another standard condition endorsed at State Government level is:</p> <p>“An urban water management plan to be prepared prior to commencement of ground disturbing activities, consistent with the [name] local water management strategy and the [name] [regional or district] water management strategy, to the satisfaction of the WAPC on advice of <u>DoW</u>.” (Better Urban Water Management Guidelines, 2008, p33).</p>
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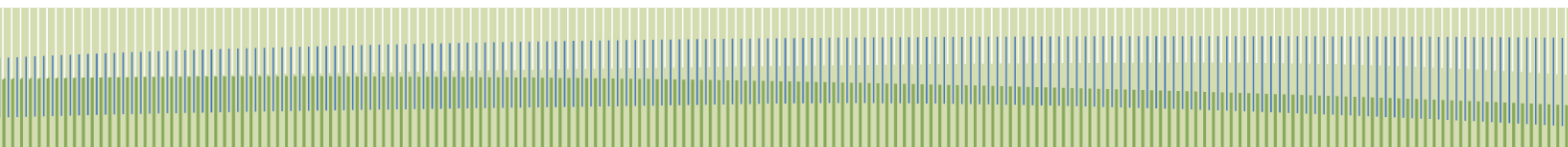
6b. Standard conditions	All areas of Shire	Development application	<p>As appropriate, conditions will be applied to developments requiring that:</p> <ul style="list-style-type: none"> a) Stormwater drains discharge within 96 hours; b) Stormwater drainage basins are designed to control the breeding of mosquitoes, by appropriate edge design, outflow design and inspection access; c) Artificial lakes are to comply with the Chironomid Midge and Mosquito Risk Assessment Guide for Constructed Water Bodies. d) Stock are not permitted to access areas subject to inundation due to the likelihood of mosquitoes breeding in hoof prints; e) Rain water tanks are to be fitted with a tight fitting mosquito proof cover which shall not be removed at any time except for the purpose of cleaning, repairing or maintaining the tank; f) Dwelling house external windows and doors are to be fitted with mosquito proof screens, which are to be maintained in good order and repair; g) Drainage and water holding infrastructure to be regularly maintained in good condition to minimise the breeding of mosquitoes; h) Developer is to inform prospective land purchasers or employees that there is a risk of mosquito borne disease in the area and is to provide practical advice on protective measures.
7. Local water management	All areas of Shire	Any development stage	<p>The impact of mosquitoes that potentially breed in stormwater systems constructed as part of a development will be considered irrespective of the proposed subdivision location in the Shire. Mosquito mitigation design requirements are to be included in local urban water management plans (UWMP).</p> <p>Drainage systems shall be designed to provide ease of silt and vegetation maintenance, and should drain within 96 hours.</p> <ul style="list-style-type: none"> a. Open water ponds and constructed wetlands should be designed to minimise the risk of mosquito breeding, including avoiding the potential for extensive emergent aquatic plant growth,



			<p>as described in the Chironomid Midge and Mosquito Risk Assessment Guide for Constructed Water Bodies, or allow for feeding by endemic native <u>larvivorous</u> fish.</p> <ul style="list-style-type: none"> b. Drains to be designed to discourage silting, with a minimum longitudinal grade of 1:1000 and batters designed to avoid erosion and pooling. c. Concrete drains are preferred over earthen drains. d. Discharge point to be designed to limit erosion and mosquito breeding. e. Cutting and filling during earthworks does not create pooling water, and depressions that may cause mosquito breeding are filled where practical. f. Drains are preferred to be concrete so that it is easier to maintain silt and vegetation accumulation. Swales are discouraged unless grassed banks are easy to maintain to promote timely water drainage.
8. Referrals	All areas of Shire	Any development stage	<ul style="list-style-type: none"> a. The Shire will request the WAPC to refer subdivision applications to the Department of Health where they relate to the subdivision of land within 3 km of a mapped mosquito breeding site as shown on Appendix 1. b. The Shire will refer structure plans and development applications to the Department of Health where they relate to residential or other development that may be sensitive to mosquito impacts for land within 3 km of a mapped mosquito breeding site as shown on Appendix 1. c. All applications for residential or other development that may be sensitive to mosquito impacts for land within 5 km of a mapped mosquito breeding site as shown on Appendix 1 will be referred internally to Environmental Health, Environmental and Engineering Departments as appropriate for comment.
9. Building design	All areas of Shire	Any development stage	<p>The Shire of Murray will provide information packages upon request to land-owners to <u>advise</u> of suitable building measures that will assist with reducing mosquito impacts on residents within the Shire. Special control areas may be considered within 1 km of mosquito breeding sites so that the local planning scheme requires new dwellings to incorporate building features that mitigate mosquitoes.</p> <p>Features within private residential properties that minimise the impact of mosquitoes include:</p>



			<ul style="list-style-type: none"> a) Insect screens on dwelling windows and security doors, outdoor entertaining areas (which may be retractable), evaporative air conditioning intakes, rainwater tanks, septic tanks and other connections to the outdoors. b) Locating houses as far as possible from off-site mosquito breeding areas. c) Orientation of houses on a block to maximise mosquito dispersal by prevailing winds d) External lights as either yellow lights or downward facing lights, located away from windows and doors. e) Effective internal drainage that discourages standing water. f) Selection of shrubs and garden design that minimises the harbourage of mosquitoes g) Regular cleaning of gutters, residual insect spray on eaves, emptying of water containers. h) Internal air movement to discourage mosquitoes using vents, fans or air conditioning.
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5. Other Issues to Consider

In determining or providing advice on subdivision or development proposals, planning decision-making by the Shire of Murray may have regard to the following provisions within the existing planning and mosquito management frameworks, including:

- SPP 2 Environment and Natural Resources Policy
- SPP 2.9 Water Resources
- DCP 1.8 Canal Estates and Artificial Waterway Development
- Better Urban Water Management Guidelines 2008
- Model Subdivision Conditions Part 2, AM5
- *Planning and Development (Local Planning Schemes) Regulations 2015*, Sch2 cl 67(r)
- *Narcom Holdings v WAPC 2011* State Administrative Tribunal Appeal notes
- DoH Chironomid Midge and Mosquito Risk Assessment for Constructed Water Bodies
- DoH Scoping Tool for Residential Estates: Public health considerations
- DoH Planning a Mosquito Management Program – Template, guidance notes and case study examples (principles apply to LG programs and Developer plans)
- The South Metropolitan Peel Sub-Regional Structure Plan
- Perth and Peel Green Growth Plan for 3.5 million
- Shire of Murray Public Health & Wellbeing Plan

A number of withdrawn planning or related documents previously provided guidance on how to reduce the impact of mosquitoes on development:

- The Structure Plan Preparation Guidelines 2012
- The EPA Guidance Statement 40 Management of Mosquitoes by Land Developers

6. Summary of Policy

A summary of the policy requirements is shown in Table 2 overleaf.

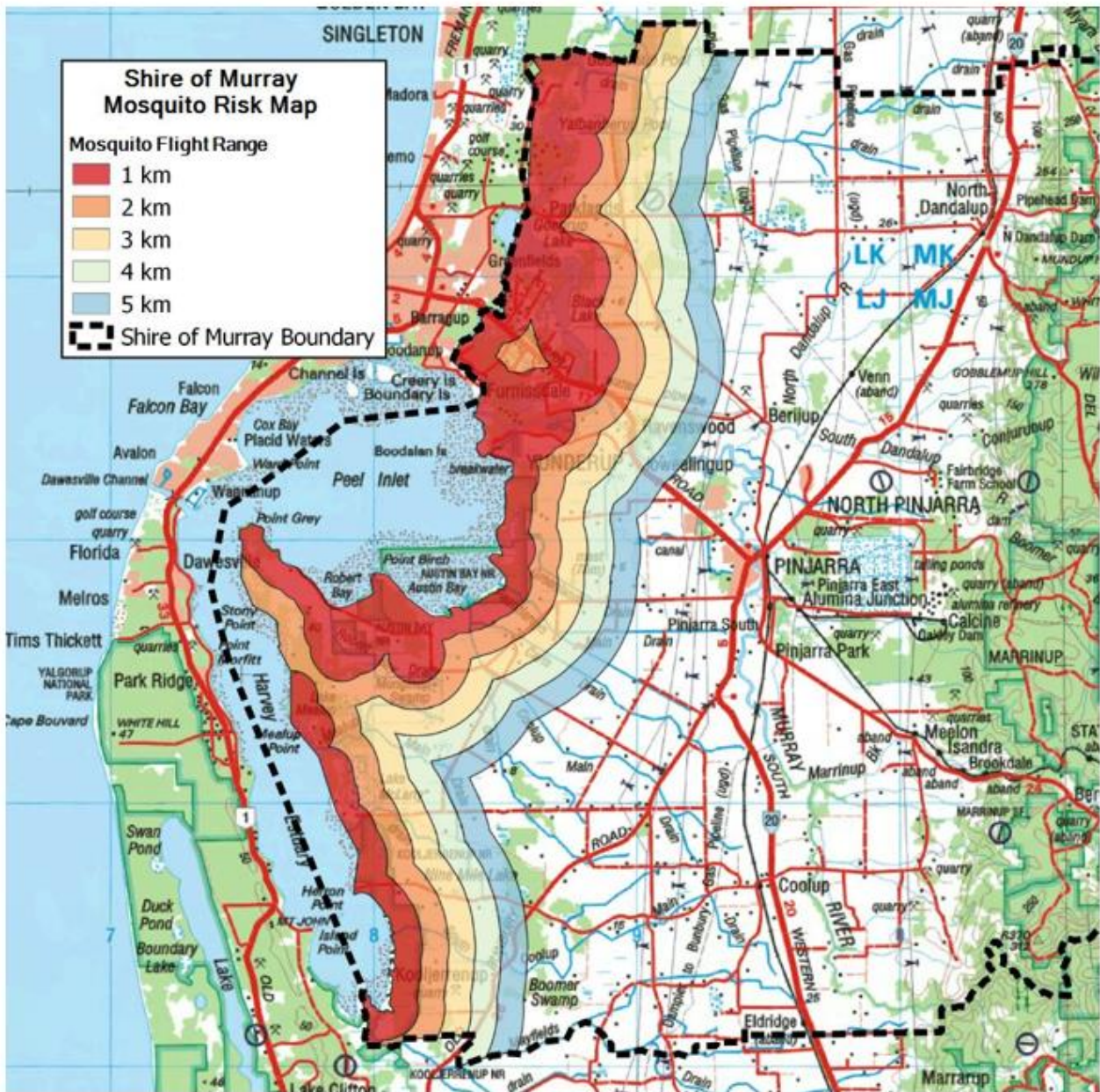
Table 2

Planning Measure	Distance Applicable from Mapped Breeding Sites	Comments
Risk assessment matrix	≤ 5km	See Appendix 2 and 3
Mosquito management plan	≤ 3km	See Appendix 2
Urban design	≤ 3km	Design of neighbourhood
Developer contributions	≤ 3km	Case by case
Buffers	≤ 2km	See Table 1b
Notifications on title	≤ 2km	Advice of mosquito risk
Local water management plan	All areas	Requiring drainage within 96 hours
Building design	All areas	Educational

Administration

Directorate		Officer Title	
Planning and Sustainability		Director Planning and Sustainability	
Version	Decision to Advertise	Decision to Adopt/Amend	Current Status
1	OCM17/056 – 27/4/2017	OCM17/144 – 27/7/2017	Adopted

APPENDIX 1 – MOSQUITO RISK MAPPING AVAILABLE ON SHIRE OF MURRAY 'INTRAMAPS'



• **APPENDIX 2 – FACTORS FOR DEVELOPERS TO ACCOUNT FOR IN RISK ASSESSMENTS AND TO ADDRESS IN THE PREPARATION OF MOSQUITO MANAGEMENT PLANS**

Factor	Notes
Risk as a function of local mosquito breeding factors	
Location of proposed development in the region	Risk zone according to risk mapping, topography
Climatic conditions	Temperature, water abundance, prevailing winds, humidity, El Nino cycle, storm surge, seasonal variation
Local mosquito habitats	Drivers of mosquito numbers eg saltmarsh, tides, stormwater pooling, vegetation type and density
Local mosquito hosts	Hosts of mosquito borne viruses (eg kangaroos), animals for blood meals (eg cattle)
Mosquito fauna surveys	Mosquito and larval abundance particularly in Nov-May, but accounting for season and year and noting that abundance and disease risk is historically high in the Peel region in the months prior to November – numbers, species (ie nuisance biter, disease vector, domestic breeder, traveller), extrapolated for problem years
Virus activity	Isolation of mosquito borne virus in the area, arbovirus incidence in surrounding areas
Comparative risk analysis	Risk compared to other areas in the Shire and region
Ongoing maintenance costs to Councils	Including surveillance, treatment, de-silting, weeding, environmental sensitivity, impact on existing program, administration and community engagement
Risk as a function of subdivision design features	
On-site mosquito habitat construction, creation or removal	Are new habitats proposed (eg swales, rainwater tanks, septic systems, pools, ponds), risk during construction, filling of low-lying areas.
Constructed, modified or rehabilitated waterbodies	Artificial wetlands, canals and associated risk according to design
Building design	Buildings with insect screens on windows, doors and water storage; well-draining gutters; and outdoor screened areas including access to house and garage
Buffer zones	Width of buffers, distance to breeding sites, direction of prevailing winds
Urban design and layout	Capitalising on wind dispersal, street lighting, landscaping, construction practises for roads
Urban residential density	Lot sizes and lot number

Drainage infrastructure	Drains, swales, sedimentation basins
Public use	Mosquito risk at parks, lakes, open space. Design of POS to consider elevation, landscaping, mosquito harbourage and accessibility for mosquito treatment.
Human vulnerability	Demographics, awareness, risk of exposure, immunity, population mobility, level of community concern

**APPENDIX 3 – EXAMPLE OF RISK MATRIX SHOWING QUANTITATIVE RISK ASSESSMENT AND RISK REDUCTION
POTENTIAL FOR SUBMISSION BY DEVELOPERS WITH STRUCTURE PLAN**

Activity	Aspect	Impact	Inherent Consequence	Inherent Likelihood	Inherent Risk Score	Mitigation measures	Residual Consequence	Residual Likelihood	Residual Risk Score
Construction works	Pooling water (e.g. in laydown areas, stockpiles, tracks, in drum/tyres)	Reduced human health from mosquito-borne diseases due to the creation of mosquito breeding habitat	4	5	20	Undertake drainage work to avoid the creation of pooling water. Remove materials that may hold water (e.g. drums/pipes). Inspect laydowns weekly for pooling water.	3	3	9
		Reduced amenity because of pest mosquitoes due to the creation of mosquito breeding habitat	2	3	6		2	4	8
	Presence of construction staff onsite	Reduced human health from mosquito-borne diseases due to the exposure of construction staff to mosquitoes	4	5	20	Provide repellent, long clothing and training regarding avoidance. • Minimise work hours at dusk and night.	3	3	9
Drainage infrastructure (e.g. drains, swales, sedimentation basins, lakes)	Increased area of standing waterbodies	Reduced human health from mosquito-borne diseases due to the creation of mosquito breeding habitat	4	5	20	Install drainage which does not pool or create mosquito breeding habitat Design future ponds, retention basins and wetlands as per DoH guidelines to reduce mosquito-breeding habitat	3	3	9
		Reduced amenity because of pest mosquitoes due to the creation of mosquito breeding habitat	2	4	8		2	3	8
Residential occupancy	Recreational use of parks, lakes and waterway areas	Reduced human health from mosquito-borne diseases due to the exposure of residents to mosquitoes	4	5	20	Design lakes to minimise breeding habitat. • <u>Larvicide</u> if required.	3	3	9

		Reduced amenity because of pest mosquitoes due to the creation of mosquito breeding habitat	2	3	6	<ul style="list-style-type: none"> Rectify drainage in all onsite mosquito-breeding areas within 1.6 km of the village centres; specific actions will be to drain and/or fill borrow pits, scrapes and disturbed seasonally-waterlogged areas to reduce mosquito-breeding habitat. Where possible, locate larger lots closest and smaller lots furthest from breeding areas to create a buffer around major sources Impose notifications on title living close to mosquito breeding areas. Dwellings to install mosquito screening on all external doors and windows, and outdoor entertainment areas. 	3	1	3
Location of lots within high risk mosquito areas		Reduced human health from mosquito-borne diseases due to the exposure of residents to mosquitoes	4	5	20		3	3	9
		Reduced amenity because of pest mosquitoes due to the creation of mosquito breeding habitat	2	4	8		3	1	3
Standing water bodies and septic systems within individual lots (e.g. pools, ponds, tyres)		Reduced human health from mosquito-borne diseases due to the creation of mosquito breeding habitat	4	5	20		3	3	9
			2	4	8		3	1	3

Likelihood Rating Scale

Level	Description	Probability
5	Almost Certain	Expected to occur in most circumstances Eg More than once per year or greater than 90% chance
4	Likely	Will probably occur in most circumstances Eg At least once per year or between 60% and 90%
3	Possible	Should occur at some time Eg At least once in three years or between 30% and 60%
2	Unlikely	Could occur at some time Eg At least once in ten years or between 5 and 30%
1	Rare	May occur, only in exceptional circumstances Eg Less than once in fifteen years or less and 5%.

Risk Level

		Consequence					
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5	
Likelihood	Almost Certain	5	M(5)	H(10)	H(15)	E(20)	E(25)
	Likely	4	M(4)	M(8)	H(12)	H(16)	E(20)
	Possible	3	L(3)	M(6)	M(9)	H(12)	H(15)
	Unlikely	2	L(2)	M(4)	M(6)	M(8)	H(10)
	Rare	1	L(1)	L(2)	L(3)	M(4)	M(5)

L Low
 M Moderate
 H High
 E Extreme

Risk Acceptance Criteria

Risk Rating	Descriptor	Action Required	Criteria for Risk Acceptance	Review Frequency		Risk Owner	
				Strategic/ Operational	Project Risks	Strategic/ Operational	Project Risks
Low	Acceptable	Accept the risk	Risk acceptable with adequate controls	Annual	If the scope / context changes	Operational Manager	Project Manager
Moderate	Monitor	Monitor the risk but consider Risk Treatments	Risk acceptable with adequate controls	Semi-annual	If the scope / context changes	Operational Manager	Project Manager
High	Treat	Treat the risk. Reduce either the likelihood, consequence or both by improving existing controls or adding new controls	Risk acceptable with excellent controls	Quarterly	Monthly	Executive Management	Steering Committee where relevant or Project Director
Extreme	Treat	Treat the risk. Reduce either the likelihood, consequence or both by improving existing controls or adding new controls	Risk only acceptable with excellent controls and all treatment plans to be explored and implemented where possible	Monthly	Monthly	CEO	Steering Committee where relevant or Project Director

APPENDIX 4 – MOSQUITO RISK ACCORDING TO BUFFER DISTANCES IN THE PEEL REGION

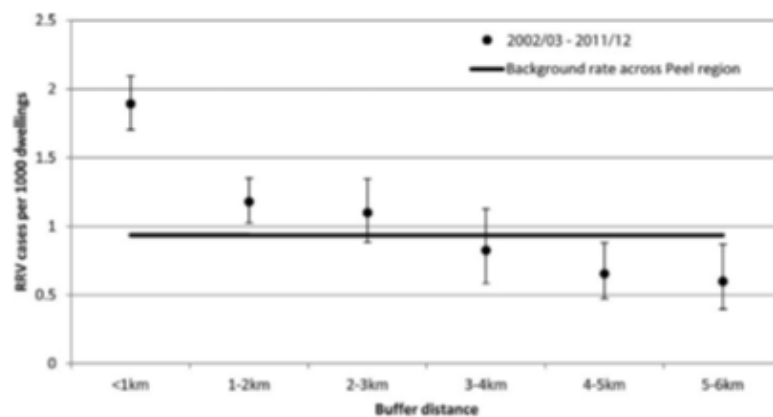




FIG. 2. Number of Ross River virus (RRV) cases per 1000 dwellings versus buffer distance from a mosquito breeding habitat, Peel region, July, 2002, to June, 2012.

(Jardine, Neville & Lindsay, *Vector-borne and Zoonotic Diseases*, 15(2), 2015)

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