



Byron Shire Development Control Plan 2014

Chapter B7 Mosquitoes and Biting Midges



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Chapter B7 – Mosquitoes and Biting Midges

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B7.1 Introduction

B7.1.1 Mosquitoes and Biting Midges in Byron Shire

This purpose of this Chapter is to address the public health and nuisance issues associated with mosquitoes and biting midges by recommending strategies to be incorporated into the approval and construction process of new residential and tourism developments. While it is impossible to eliminate all biting insect risk, minimizing pest problems through 'mosquito aware' urban design is possible.

In April 2012 Byron Shire Council adopted a comprehensive Mosquito Management Plan that provides important information on the biology, ecology and pest status of mosquitoes in Byron Shire and the most effective management strategies to deal with them. This document should be referred to in preparing any development application in a mosquito risk area.

Biting midges are a less diverse group of insects and, although they are not responsible for the transmission of human disease-causing pathogens, they are important vectors of veterinary disease. These insects are often mistakenly called "sandflies" in Australia. However, true sandflies belong to a completely different group of biting insects (subfamily Phlebotominae, family Psychodidae) that do not occur in Australia.

While both mosquitoes and biting midges have the potential to cause serious nuisance-biting impacts, it is the transmission of disease-causing pathogens by mosquitoes that is of greatest concern in the Byron Shire. The two most common mosquito-borne pathogens that cause human disease are Ross River virus (RRV) and Barmah Forest virus (BFV). These viruses can cause potentially debilitating (but not fatal) disease with symptoms including fever, rash, arthritic pain, fatigue and nausea and rash that may last for less than a week but occasionally for many months.

Predicting areas of greatest risk

Predicting the areas of greatest risk from biting insects can be difficult due to the biological and ecological traits of each species, particularly their propensity to disperse from breeding habitats and the environmental/climatic drivers of population abundance. A map of mosquito and biting midge risk zones has been produced for Byron Shire (See Map B7.1). This map has been produced based on surveys of vegetation categories and their associated adult and immature mosquito and biting midge populations (both diversity and population abundance) as well as local environmental drivers of population abundance. This information is a guide that can be used to estimate those areas where potential biting insect pest problems is most likely to occur.

Detailed information on the key pest mosquito and biting midge species is provided in the Byron Shire Council Mosquito Management Plan (Webb & Russell 2011).

Development considerations

As well as increasing the human population close to biting insect habitats, the developments themselves can increase pest impacts by enhancing breeding conditions for these insects. Developments that can increase the biting insect problems include the creation of waterfront estates, extensive stormwater basin development, reduced water quality through nutrient load or acidic runoff, altered natural drainage systems and siltation problems. Many elements of **water sensitive urban design (WSUD)**, including the installation of rainwater tanks, rain gardens and bio-retention swales, can create potential mosquito habitats if not designed, constructed or maintained appropriately.

B7.1.2 Aims of this Chapter

The Aims of this Chapter are:

1. To provide advice on mosquito and biting midge risk in Byron Shire.
2. To highlight areas where there is greater risk and to make provision in new developments to minimize pest and public health risk.
3. To provide guidelines for the consideration of reducing habitats for biting insects within new developments

B7.1.3 Application of this Chapter

This Chapter applies to all development in Byron Shire incorporating residential subdivision, **residential accommodation** or **tourist and visitor accommodation**.

B7.2 General Provisions

B7.2.1 Mosquito and Biting Midge Risk Zones

Objectives

1. *To identify potential mosquito and biting midge risk zones.*
2. *To ensure that Development Applications identify all potential mosquito and biting midge risks and consider risk minimisation strategies.*

Performance Criteria

There are no Performance Criteria.

Prescriptive Measures

To facilitate this Chapter, a risk map has been developed for the Shire that highlights areas of elevated risk posed by mosquitoes and/or biting midges. These risk zones are illustrated in Map B7.1. It must be noted however, that the impacts of mosquitoes and biting midges may be experienced beyond the current mapped risk zones.

The following measures apply to areas identified in Map B7.1:

- a) Development Applications must address biting insect mitigation and management issues.
- b) Where the presence of biting insect risk is disputed, the onus of proof is on the developer to demonstrate that mosquitoes and biting midge nuisances and/or associated disease problems are not serious. In those cases it will be necessary for the developer to submit a report prepared by a suitably qualified and experienced entomologist engaged to carry out the scientific investigations necessary to evaluate Mosquitoes and Biting Midge nuisance and/or disease risks. The report will need to address the issues in Table B7.1. Furthermore it will be necessary for both the entomologist and his/her proposed methodology to be acceptable to the Council.

B7.2.2 Strategies and Guidelines for proposed developments within risk zones

Objectives

1. To identify minimum mosquito and biting midge mitigation strategies for proposed development in risk zones.
2. To provide mosquito and biting midge management guidelines for proposed new development.

Overview

A common strategy to mitigate the nuisance-biting impacts of mosquitoes and biting midges is to provide a buffer zone cleared of substantial vegetation between known biting insect habitats and residential **allotments**.

Mosquitoes and biting midges usually travel along well-vegetated corridors where the shaded, relatively cooler and humid conditions provide protection from the desiccating effects of sun and wind. Consequently an open, lightly treed buffer is preferable to heavily shaded, moist, foliated buffers.

Council is guided by the Byron Biodiversity Conservation Strategy 2004 and by other statutory requirements regarding habitat management and clearing of vegetation.

Various planning objectives contained within those planning policies and instruments may be inconsistent with the guidelines for alleviating and minimizing biting insect nuisance. It is therefore essential that landowners and developers contact Council prior to clearing vegetation or proposing to clear vegetation.

Performance Criteria

The following suggested management and mitigation considerations are to be addressed in development proposals relating to subdivision for residential purposes, **tourist and visitor accommodation**, **multi dwelling housing** and **artificial waterbodies** associated with residential developments.

1. Residential Subdivision

To assist in mitigating mosquito and biting midge nuisance biting in residential subdivisions proposed in risk areas, the following design features should be considered:

- a) Open buffer zones should be placed between new housing subdivisions and known mosquito and biting midge breeding and harborage areas. These buffers should be free of dense shady vegetation.

Different mosquito and biting midge species vary greatly in their ability to disperse in search of blood meals, so the width necessary for buffer zones to be effective can vary from as little as 50m to over 3km. It should be noted that mosquito and biting midge impacts will gradually reduce as the distance from breeding habitat increases rather than suddenly disappearing once a critical distance is reached.

The appropriateness of buffer zone distances will tend to be site-specific with consideration needing to be given to the species of mosquito present, mosquito habitats adjoining the proposed development and the local environmental drivers of mosquito abundance. Buffer zone distances of less than 20m would not be considered effective in mitigating any pest mosquito impacts. Mitigation of the impacts associated with coastal swamp mosquitoes may be achieved with buffer distances of over 40m dependent on site-specific environmental factors.

Where possible, residential **allotments** within a proposed development should be located as far as possible from known biting insect habitats in adjoining environments. Open parkland, sporting fields, car parks, cycle ways and roadways should be located between the adjacent habitats and the nearest residential allotments.

- b) Continuous vegetation lines or smaller clumps of dense vegetation leading into residential areas from breeding areas will act as corridors for biting insects.
- c) Any earthworks to be undertaken in conjunction with development (e.g. filling of land above flood height, roadway construction etc) must consider the implications for runoff and surrounding drainage systems. This is to minimize any opportunities for the creation of standing water on-site or increases in water flow into potential mosquito and biting midge breeding areas.
- d) **Water Sensitive Urban Design (WSUD)** elements such as the installation of bioretention swales, raingardens and above ground and subterranean rainwater storage tanks should be designed in a way to minimize mosquito breeding. Structures should be designed so that standing water drains from surface pools quickly and rainwater tanks should be appropriately screened and installed so that mosquitoes have no access to the internal areas of the tank.
- e) Discharge or overflow points from drains into waterways or wetlands should be designed to avoid habitat changes at discharge points such as will occur if organically enriched drainage from urban areas is directed into mangrove areas or tea tree wetlands.
- f) Development applications for the subdivision of five (5) or more lots within risk zones, or where it is considered necessary by Council, must be accompanied by a report from a suitably qualified and experienced entomologist addressing mosquito and biting midge risks and management measures. In most instances, such a report will require sampling of site-specific biting insect populations and this sampling should be undertaken at an appropriate time (e.g. within the period November – May) and following environmental events (e.g. spring tides or substantial rainfall) that would be expected to trigger population abundance increases of biting insects. The report will need to address the issues in Table B7.1.

2. **Tourist & Visitor Accommodation and Multi Dwelling Housing**

The above 'Residential Subdivision' considerations apply equally to **tourist and visitor accommodation** and **multi dwelling housing**. However due to the master planned nature of these developments some considerations can be taken further, including the following:

- a) Daytime only recreation areas such as golf courses and tennis courts and open parkland, car parks, cycle ways and roadways should be located between the adjacent habitats and the accommodation facilities.
- b) On-site habitat modification of low-lying areas (e.g. degraded cattle pasture or cane farms) may be possible to reduce the risk of mosquito and biting midge breeding. However, the design plans of any wetland construction and/or rehabilitation planned to be undertaken within the proposed development should be reviewed by a qualified entomologist as to provide site-specific mosquito mitigation elements into the initial phases of the project's design and construction.
- c) Landscape layout and vegetation species should be selected to minimize the enhancement of biting insect harborage and dispersal corridors. Sparse growing native ground covers can provide aesthetic appeal to buffer zones without facilitating the movement of biting insects. Native shrubs (e.g. grevilleas and banksias) can be useful but care should be taken when planting extensive stands

of she-oaks (i.e. casuarinas) or paperbarks/tea-trees (i.e. melaleucas) that can create shaded areas. Heavily foliated plants, particularly those requiring frequent watering as used in “Hawaiian” styled gardens should be avoided near accommodation areas or evening recreation areas. Tall, lightly foliated species with a high canopy such as eucalypts and palms pose a lower risk as they allow good air circulation at ground level.

- d) The provision of screened outdoor areas of a size commensurate with the number of people who are likely to use it will provide protection from mosquitoes during the periods of peak activity and during the evening when mosquito activity is generally greatest. A combination of permanent and temporary screened areas can be employed and with the incorporation of retractable and/or removable screens providing additional flexibility to respond to seasonal differences in mosquito activity.
- e) Development Applications within risk zones of five (5) or more tourism units, or where it is considered necessary by Council, must be accompanied by a report from a suitably qualified and experienced entomologist addressing mosquito and biting midge risks and management measures. In most instances, such a report will require sampling of site-specific biting insect populations and this sampling should be undertaken at an appropriate time (e.g. within the period November – May) and following environmental events (e.g. spring tides or substantial rainfall) that would be expected to trigger population abundance increases of biting insects. The report will need to address the issues in Table B7.1.

3. Constructed waterbodies within residential or tourism developments

The following guidelines are suggested for constructed waterbodies to reduce potential biting insect problems:

- a) Maintaining good water quality in the waterbody will encourage the colonization of predatory macroinvertebrates (e.g. dragonfly larvae, beetle larvae etc) that may assist in minimizing the production of mosquitoes as well as sustaining endemic predatory fish populations.
- b) Water levels in waterbodies should be able to be managed and maintained at a depth of at least 300mm. Shallow waterbodies hold a greater likelihood of producing abundant mosquito populations. Waterbodies should also not be highly ephemeral in nature as habitats that regularly flood (and remain flooded for more than one week) and dry out can produce abundant mosquito populations following each flooding.
- c) Waterbodies should be designed to avoid the potential for extensive emergent aquatic plant growth. Native plants with a generally sparse growth are most desirable and fast growing invasive species (e.g. *Typha* spp and *Phragmites* spp.) should be avoided. Deep water areas that are resistant to invading aquatic plants and will not quickly fill with sediment are important to facilitate wind generated wave action across the water body and provide a refuge for predatory fish populations. Deeper water zones along the shoreline separating shallow macrophyte zones can provide additional access by predatory fish. Hard edges around the wetland that separate aquatic and terrestrial vegetation can greatly assist maintenance of both vegetation classes.
- d) Water flows and circulation should be actively managed as stagnant water and/or poor circulation can promote biting insect production directly or indirectly by encouraging algal growth that can provide enhanced conditions for biting insect production. The outline of the wetland should be simple and avoid complex areas where water flow is restricted. To maximize water movement around the margins of the wetlands, the installation of a hard vertical edge of at least 200mm (or a

- suitable height to ensure that the water level remains in contact with the hard edge) will greatly reduce the suitability of the habitat for mosquitoes.
- e) Wetlands which cannot be managed using the above methods or would require the use of pesticides to maintain mosquito and biting midge control will be unlikely to receive approval.
 - f) Constructed waterbodies should have a maintenance manual and an ongoing funding base for maintenance activities. All constructed waterbodies will require some level of maintenance on an annual basis to ensure inflow structures are cleaned of sediments, debris and rubbish, vegetation density is minimised and invasive plants removed and water flow/circulation devices are adequately serviced. A key element of the maintenance of the water body should be periodic monitoring to assess mosquito and biting midge productivity and the impacts on nearby residents.

Prescriptive Measures

The following measures apply to all development incorporating a **residential dwelling(s)**, **educational establishment**, **recreation area** or **tourist and visitor accommodation** located within a mosquito risk zone identified in Map B7.1:

- a) All development must provide effective insect screening to all windows, doors and other openings to all parts of the development used for residential purposes.
- b) All development must incorporate an effectively screened outdoor area of a size commensurate with the number of people who are likely to use it, to enable an outdoor lifestyle to continue to be enjoyed during periods of high mosquito and biting midge activity. This may be a communal area for development incorporating more than one **dwelling** or more than one tourist accommodation unit.
- c) Measures arising from the entomologist's recommendations to minimise the potential impact on residents from mosquitoes and biting midges must be based on a demonstrated investigation strategy and sound knowledge of all the nearby habitats that could be expected to significantly affect the breeding and harborage of mosquitoes and biting midges.
- d) Establishment of any buffers required must be within the development site and not reliant upon neighbouring or adjoining land, public reserves, Crown Land and Nature Reserves. Buffers must be on land of low biodiversity significance.

Map B7.1 – Mosquito risk zones associated with saltmarsh and coastal swamp habitats in Byron Shire.

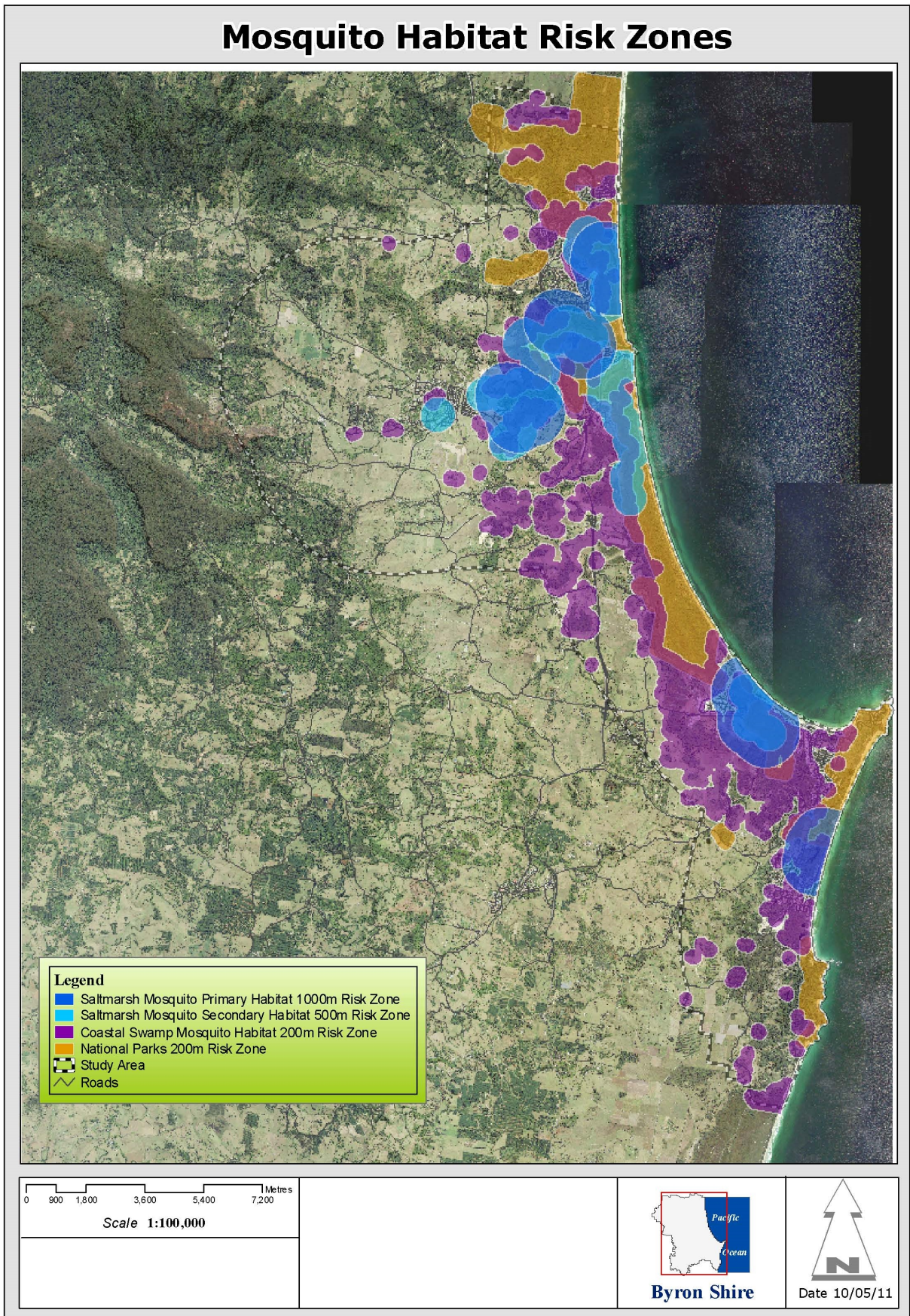


Table B7.1 – Entomological and environmental factors to be considered in mosquito risk assessment reports

| Consideration | Notes |
|--|---|
| Location of proposed development | Does the site of the proposed development occur within the nominated mosquito risk zones of Byron Shire (Map B7.1) |
| Local mosquito habitats | Have the neighbouring actual and potential mosquito habitats to the proposed development been identified along with the local drivers of increased mosquito activity in those habitats? |
| Local mosquito fauna | Have the key pest species, and their role in mosquito-borne pathogen transmission, likely to impact a proposed development been identified through existing site-specific data or fauna surveys |
| Mosquito fauna surveys | In the absence of site-specific data on pest mosquitoes, have mosquito fauna surveys been conducted? Detailed information on the methodology of mosquito surveys should be included in documentation and include: <ul style="list-style-type: none"> i. Dates of sampling ii. Location of trap sites within proposed development as well as reference sites iii. Trap types and other sampling methods iv. Reference to taxonomic guides used for identification and records of voucher specimens identified during surveys v. Records of environmental conditions preceding and during surveys (e.g. tide heights, rainfall, temperature) |
| Comparative risk analysis | Site-specific mosquito data should be compared to existing data collected by Byron Shire Council to provide a relative measure of potential mosquito risk within the proposed development compared to other areas within the region |
| On-site mosquito habitat construction or creation | Will new mosquito habitats be created on-site in the form of constructed, modified or rehabilitated waterbodies, stormwater systems or elements of Water Sensitive Urban Design (WSUD) (e.g. rain gardens, bioretention swales) or installation of above ground or below ground rainwater tanks? |
| Constructed, modified or rehabilitated waterbodies | If such waterbodies are to be included in proposed development, detailed information should be provided regarding the design, construction, planting and maintenance strategies and how mosquito production will be minimised |
| Building design and layout | Has the layout of the proposed development and the building design within given consideration to mosquitoes (i.e. appropriate screening of windows and provision of outdoor screened enclosures)? |
| Buffer zones | Has appropriate consideration been given to buffer zones between residential allotments and adjoining mosquito habitats? |

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