MOSQUITO MANAGEMENT PLAN 2025 – 2030

Version Control

Issue Date: 9 July 2024	**Prepared by:** Jan Proposch	**Approved by:** Perry Dedes
Council Adoption: 26 November 2025	**Minute Number:** OM006582	**Quality Check Ref- Doc No.** 2007543

Mosquito Management Plan

Information sourced from World Health Organisation; Queensland Health; New South Wales Health; University of Sydney Medical Entomology Department; and James Cook University.

1.0 Executive Summary

Banana Shire Council have developed a Mosquito Management Plan in accordance with the Mosquito Management Code of Practice developed by the Local Government Association of Queensland. This Plan was also put together to satisfy Council's legislative responsibilities to effectively manage a practical control program.

The Mosquito Management Plan identifies a vision, strategies, objectives, and outcomes aligned with specific actions which enables Council to meet their objectives.

The focus of the Mosquito Management Plan is to characterise the distribution and ecology of key mosquito species throughout the region to better understand the risk posed and, accordingly, identify appropriate vector management activities to be implemented, where necessary.

Furthermore, a mosquito management response hierarchy has been established to provide a consistent response to customer enquiries, surveillance outcomes and disaster management scenarios. This will provide Council with an efficient and effective service that is equitable throughout the Shire.

A suite of response strategies has been developed which include physical, chemical and cultural methodologies to promote an integrated approach. Integrated control programs will usually include a blending of informed methods of environmental management, application of chemical insecticides, consideration of the use of biological control agents and public awareness campaigns.

These activities will mitigate the risk to the community of contracting vector-transmitted diseases as well as reduce the nuisance value of the pests. The plan will similarly look at distribution and ecology throughout the region and identify appropriate pest management activities to be implemented, where necessary. The Plan also focuses on proactive management activities, with the aim of reducing reactive management activities.

Banana Shire Council (BSC) is committed to the implementation of the Plan which has been developed with consideration for relevant best practice methods, legislation and the environmental amenity of the region.

2.0 Introduction

2.1 Banana Shire

Banana Shire is a landlocked local government area in Central Queensland, Australia which covers 28,610 square kilometres with a sparsely spread population of 14,513 people. Most of the residents live within the mix of larger towns and rural villages that service the agricultural and resource sectors (Figure 1).

Banana Shire's landlocked status and vast area of 28,610 square kilometres means it encompasses a variety of microclimates and ecosystems. These diverse environments—ranging from dry areas to potentially more humid zones—can create specialised habitats for different mosquito species. For example, mosquitoes that thrive in stagnant water, and areas with varying rainfall patterns can have differing levels of standing water. Understanding these conditions helps in pinpointing where particular species are likely to breed and thrive.

The agricultural and resource sectors in Banana Shire might involve practices that create mosquito-friendly environments. For instance, irrigation systems, livestock watering points, and even storage of water for agricultural purposes can provide breeding grounds for mosquitoes. The interplay between human activities and mosquito habitats is significant for managing and predicting mosquito populations and their associated health risks.

The sparsely spread population means that large swathes of the land are rural or underdeveloped. This can result in a lower degree of mosquito control and fewer resources dedicated to managing mosquito populations compared to more densely populated areas. Additionally, rural areas may have different types of mosquito habitats compared to urban settings, such as natural wetlands versus human-made water reservoirs.

The mix of larger towns and rural villages means that health interventions and mosquito control measures may need to be tailored to different environments within the Shire. Understanding the demographics and settlement patterns can help in strategizing effective mosquito control programs and preventive measures against mosquito-borne diseases, which can vary in impact based on local conditions.

Knowing the spatial distribution of population and land use in Banana Shire aids in resource allocation for mosquito management and public health planning. Targeted strategies can be developed to address mosquito control where it's most needed, based on the specific conditions present in different parts of the Shire.

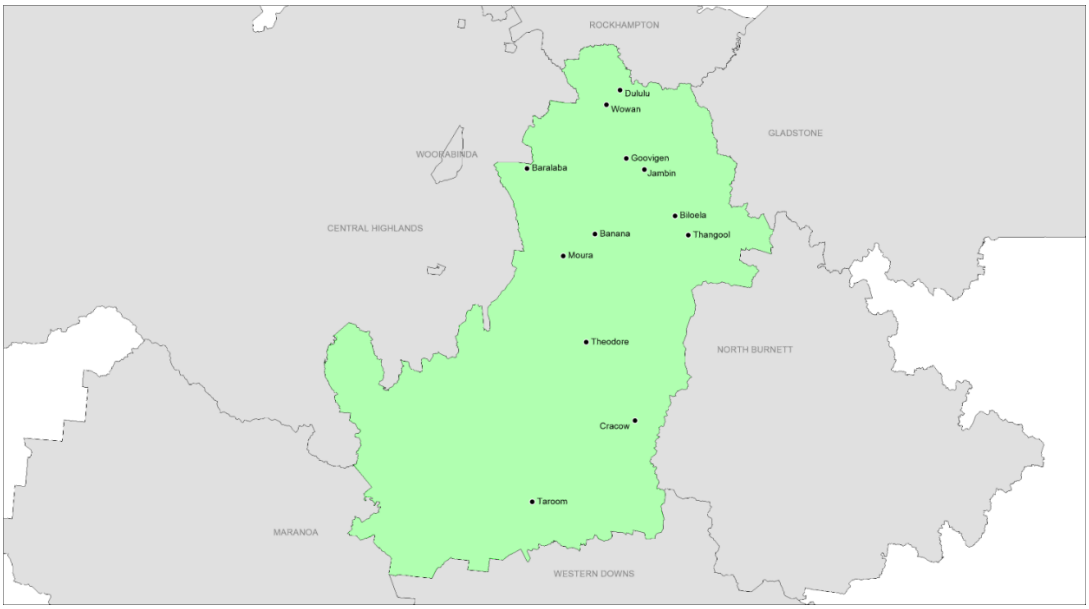


Figure 1: Banana Shire and Adjoining Local Government Area's

Banana Shire Council (BSC) have developed a Mosquito Management Plan in accordance with the Mosquito Management Code of Practice developed by the Local Government Association of Queensland. This Plan was also put together to satisfy Council's legislative responsibilities to effectively manage a practical control program.

Mosquito management within the region is necessary for two reasons:

- Some species of mosquitoes can be vectors of disease
- Some mosquito species are aggressive biters, causing significant nuisance issues

Mosquito management within the Region will be active during all months of the year however escalated during the wet season when mosquito numbers and disease risk are highest.

The main goal of the Mosquito Management Plan is to map the distribution and ecology of key mosquito species across the region. This understanding will help assess the risk they pose and guide the implementation of appropriate vector management activities where needed. These measures will mitigate the community's risk of contracting vector-borne diseases and decrease the nuisance caused by these pests.

The effective management of mosquitoes in the Banana Shire Council area is of considerable importance given the impact on public health due to diseases such as Ross River Virus (RRV), Barmah Forest Virus (BFV), Kunjin Virus (KUNV), Chikungunya Virus (CHIKV), Dengue Fever (DENV) and Japanese Encephalitis Virus (JEV), as well as the impact on outdoor activities of residents due to nuisance biting of mosquitoes. Importantly, key vector species including *Aedes aegypti*, a primary vector of DENV, and *Culex annulirostris,* a competent vector of RRV, are both endemic within the BSC region.

A pilot mosquito surveillance program was conducted in January of 2021 in the Biloela township. From the learnings and recommendations of this program, it was proposed to undertake further surveillance at other populated townships within the Banana Shire to expand the knowledge of the various mosquito species present and potential diseases within the BSC area.

Following on from the successful pilot mosquito surveillance program in 2021, Biloela, Moura, Baralaba, and Taroom were included in the 2023/2024 surveillance expansion. A passive box trapping methodology (Appendix A) was utilised, in conjunction with training of BSC staff by Queensland Public Health Virology, Public and Environmental Health unit over a three-month period at the height of mosquito borne transmission and notifications (January – March).

This primary new method of mosquito surveillance enables BSC to conduct surveillance over a 14-day period between servicing traps, compared to the 12-hour period of the pilot program of 2021.

The aim of the program is to gather and provide current information regarding distribution and abundance of important mosquito species and communicable disease to better understand and manage risks posed by mosquitos to the community.

2.2 Purpose and Scope

The purpose of the Banana Shire Council Mosquito Management Plan is to provide a strategic direction to the management of the public health risk from mosquitoes in the Banana Shire.

The plan establishes a vision, strategies, objectives and outcomes, in addition to actions that aim to address these objectives.

The plan aims to characterise the local mosquito species to better identify and manage risks and incorporates the essential component of integrated mosquito management.

The scope of the plan incorporates all local government-owned and controlled land within the Shire, with particular focus on township areas and land within 1km of each township. Additionally, it includes a crucial component of public education targeting non-council land. This aspect of the plan aims to raise awareness and promote mosquito control practices among residents and landowners in private areas. By engaging the community in preventive measures and fostering cooperation between the public and BSC, the plan seeks to extend its impact beyond council-managed properties and ensure a comprehensive approach to mosquito management across the entire Shire.

2.3 Legislative Framework

Pursuant to the *Public Health Act 2005*, Queensland Health in conjunction with Local Government have the responsibility for the control of communicable diseases in Queensland. Several vector-borne diseases are classified as a communicable disease including RRV, BFV, DENV and Malaria.

The control of mosquitoes is a responsibility specifically delegated to Local Government under the *Public Health Act 2005*. The Act places responsibility on owners, occupiers and local government to perform appropriate works or actions to prevent the breeding of mosquitoes in areas under their control or responsibility.

In cases where the owner or occupier fails to comply with requirements, the Act gives power to local government Environmental Health Officers to utilise a range of enforcement tools including issuing on-the-spot fines such as Penalty Infringement Notices (PINs), or by issuing Public Health Orders. Failure to comply with a public health order and/or undertake the necessary remediation works to reduce the threat to public health in the community can attract higher penalties. There are further provisions within the *Public Health Act 2005,* whereby if Council are required to undertake remedial works, any cost incurred will become a charge on the land and thus any expenditure relating to reducing a public health risk at a private residence or business is recoverable.

Other legislation relevant to Mosquito/Vector management activities include:

- *Public Health Act 2005*
- *Public Health Regulation 2018*
- *Environmental Protection Act 1994*
- *Planning Act 2016*
- *Fisheries Act 1994*
- *Fisheries (General) Regulation 2019*
- *Agriculture and Veterinary Chemicals (Queensland) Act 1994*
- *Chemical Usage (Agricultural and Veterinary) Control Act 1988*
- *Chemical Usage (Agricultural and Veterinary) Regulation 2017*
- *Biosecurity Act 2014*
- *Medicines and Poisons Act 2019*
- *Medicines and Poisons (Pest Management Activities) Regulation 2021*

2.4 Banana Shire Council Corporate Plan

The implementation of the Banana Shire Council Mosquito Management Plan can be associated with following outcomes within Council's Corporate Plan:

Theme 1 - Communities

Goal 1: *To develop strong and vibrant communities across Banana Shire with equitable access to services and a strong sense of place.*

Strategy Four - Council to promote a high level of safety in Banana Shire though increased community engagement and participation

4.3 Activity: Manage disaster management and emergency preparedness

KPI: Implement the Disaster Management Plan

Theme 2 - Environment

Goal 1: *To manage operations in a way that maintains the quality of our local environment for future generations.*

Strategy One - Council will seek to promote and manage the unique natural resources of the Shire to ensure a healthy, sustainable environment for future generations

1.1 Activity: Council will undertake a regular environmental assessment of services to ensure they meet performance requirements

KPI: Council to undertake environmental sustainability audit for the shire

Strategy Three - Council will develop strategies to effectively control pest plant and animal species across the Shire

3.4 Activity: Develop a strategy to minimise the risk of infection from vectors

KPI: Vector control strategy

Theme 4 - Infrastructure

Goal 2: *Organisation and Customer Service.*

Strategy One - Council operations to be conducted efficiently and effectively.

1.3 Activity: Review opportunities for improvements to Council operations

KPI: Improvement review recommendations

Strategy Five - Council will maintain a safe and healthy workplace

5.2 Activity: Continue to implement Quality Management System

KPI: Quality Management System to be expanded across all of Councils operations

Council will require a sufficient budget to cover both initial and ongoing surveillance, equipment purchase, contract work (if required), treatment, monitoring, and health promotion advertising. Funding also needs to incorporate costs of staff undertaking surveillance specifically for the arbovirus sentinel surveillance program.

2.5 Standard Operating Procedures and Work Instructions

At present the standard operating procedures (SOP) and work instructions (WI) relating to operational activities are currently being developed and will be referenced in this section upon completion. The SOP and WI will be subject to regular review and updated as needed.

2.6 Environmental and Safety Considerations

The inherent nature of mosquito management activities has the potential to adversely affect the environment. The *Environmental Protection Act 1994* Chapter 7, Part 1 Division 1, Section 319 makes clear statements of intention in relation to a person's responsibility and the environment, known as General Environmental Duty. Section 319 of the *Environmental Protection Act 1994* states the following:

> *'A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm'.*

The Act stipulates that all activities, including mosquito management activities, should take environmental issues into consideration. The Mosquito Management Code of Practice for Queensland and the Australian Mosquito Control Manual provide further guidance.

Due to the nature of mosquito control operations using 4WD vehicles, all-terrain vehicles and the use of chemicals, safety of the operator and the wider public is imperative. All activities associated with the implementation of the Plan will be consistent with Council Workplace Health & Safety Policy and Plans.

3.0 Public Health Significance

The mosquito is the world's deadliest animal. Spreading diseases like malaria, dengue, West Nile, yellow fever, Zika, chikungunya, and lymphatic filariasis, the mosquito kills more people than any other creature in the world.

Within Australia there are more than 300 different species of mosquitoes but only a small number are of major concern to public health. Clinical symptoms associated with vector borne disease range from mild fevers to a severe and potentially life-threatening haemorrhagic disease. Several important human diseases are transmitted in Australia by these insects including Dengue Fever, Murray Valley Encephalitis, Ross River Virus disease and Barmah Forest Virus disease.

Malaria is another debilitating communicable disease that affects several nations worldwide and is spread by the *Anopheles spp.* of mosquito. Although malaria was previously endemic in Australia, it was declared eradicated in 1981. Local transmission of malaria is extremely rare, but there have been a few imported cases from overseas travellers recorded in Australia. The results of the survey carried out in January 2021 identified at least three examples of the *Anopheles spp.* in the BSC area. The identification of this vector, coupled with the possibility for malaria to be present in the community unreported, could provide a potential incursion pathway for malaria into the BSC region.

Chikungunya is also emerging as a possible threat. The disease is evident in Southeast Asia and has been found more recently in Papua New Guinea. This is an extremely debilitating disease and mosquitoes that are known to be able to transmit the disease are found in Australia. Vectors of Chikungunya are found in the BSC region; however, the virus is currently not endemic to Australia.

Zika virus can be transmitted by *Aedes aegypti* mosquitoes that are found in north, central and parts of southern Queensland. It is possible that local *Aedes aegypti* and *Aedes albopictus* mosquitoes could contract the virus by biting an infected traveller. This could lead to further local cases. Zika virus can be harmful to unborn babies, so pregnant women or women planning pregnancy should consider deferring travel to Zika affected areas.

Japanese encephalitis is caused by the Japanese encephalitis virus (JEV). The virus is spread through mosquito bites, with mosquitoes becoming infected by feeding on amplifying hosts such as pigs and waterbirds, which harbor high levels of the virus which can be transmitted to humans (Figure 2). JEV is endemic to parts of Asia and the Torres Strait region of Australia. JEV has now also been detected in humans, animals and mosquitos in mainland Australia. Infection in humans is most commonly asymptomatic, but on rare occasions it can result in severe disease and even death. It cannot be transmitted from human to human, or by eating meat from an infected animal.

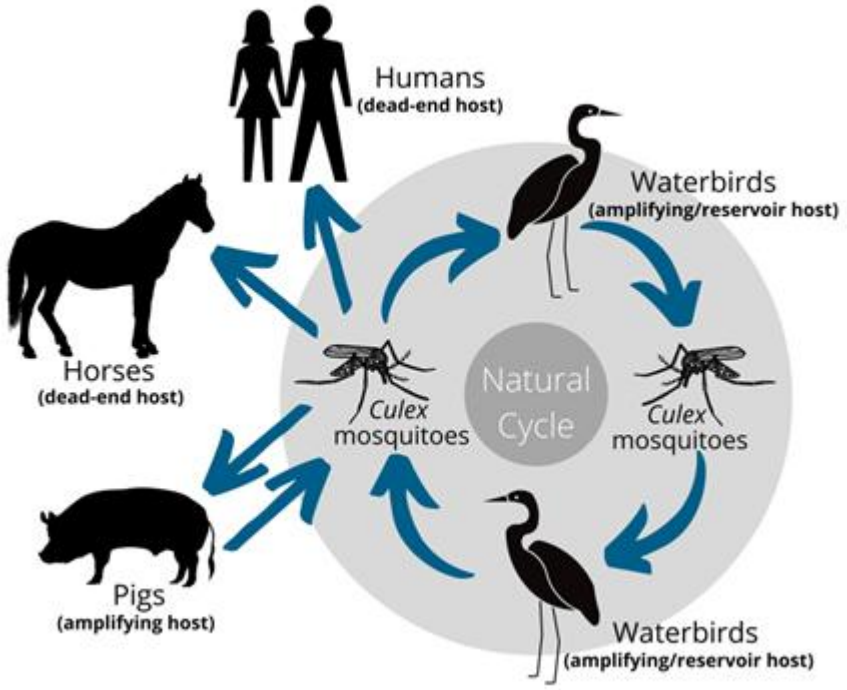


Figure 2: JEV Lifecycle

Besides transmitting diseases, mosquito bites can also lead to infections and significantly disrupt occupational, recreational, and social activities due to their persistent biting, thereby increasing their nuisance factor.

3.1 Communicable Disease Notifications

The Communicable Diseases Branch of Queensland Health compile and issue Banana Shire's Monthly Notifiable Diseases reports listing the count of notifications of selected mosquito-borne diseases over the past 18 months. Table 1 below contains counts of mosquito borne disease notified in the Banana Shire.

However, since 2016, there have been over 2000 cases of mosquito borne diseases in Queensland, with the most common being Ross River Virus, Barmah Forest Virus and Dengue Fever. Prior to the last 18-month period, there had been elevated notifications of Barmah Forest Virus and Ross River Virus in communities

within the Banana Shire related to rainfall activity and warmer summer months when mosquito numbers are generally higher.

Year	Barmah Forest	Chikungunya	Dengue	Malaria	Ross River	Zika
2023	1	0	0	0	4	0
2022	4	0	0	1	15	0
2021	1	0	0	1	5	0
2020	5	0	0	0	26	0
2019	0	0	0	0	13	0

Table 1: Excerpts from Local Government Notifiable Disease Reports 2019 – 2023 (Queensland Health).

Despite enjoying an absence of dengue fever notifications in the BSC area in recent years, the presence of the dengue vector, *Aedes aegypti*, in towns within the BSC highlights the susceptibility of the region. There have been thirteen (13) reported cases of Dengue Fever in Rockhampton in 2019. Rockhampton region is known to be a regular destination for residents of the BSC and is located only 145 kilometres from Biloela and is a neighbouring local government area with Banana Shire. Indeed, dengue fever cases imported into the region could present a public health risk with each providing an opportunity for local transmission if sufficient mosquito vectors are present. Thus, ongoing monitoring of *Aedes aegypti* populations are necessary to accurately assess risk across the BSC region. If dengue fever cases are notified to the Public Health Unit based in Rockhampton (CQPHU), contact will be made with BSC to assess risk and consider possible mosquito control measures.

4.0 Mosquitoes

4.1 Overview

Mosquitoes belong to the family of flies called *Culicidae*. They have a complex life cycle; the immature stage is totally aquatic while the adult is terrestrial (Figure 3). Importantly, mosquito species vary in their breeding habits, biting behaviour, host preferences and flight range. Most mosquitoes disperse less than two kilometres; some move only a few metres away from their original breeding place, others can fly some five (5) or ten (10) kilometres, and a few species will disperse up to fifty (50) kilometres downwind from the larval habitats.

On average, a female mosquito will live two (2) to three (3) weeks, but the male mosquito lifespan is typically shorter. Within their lifetime both adult male and female will feed on nectar and plant fluids, but some females will also seek a blood meal to incubate eggs. In humans, this process provides a potential pathway for the transmission of pathogens such as mosquito-borne viruses to enter a host. After a female has fed, she will find a resting place to digest the meal and develop eggs before dispersing to deposit them in a suitable aquatic habitat.

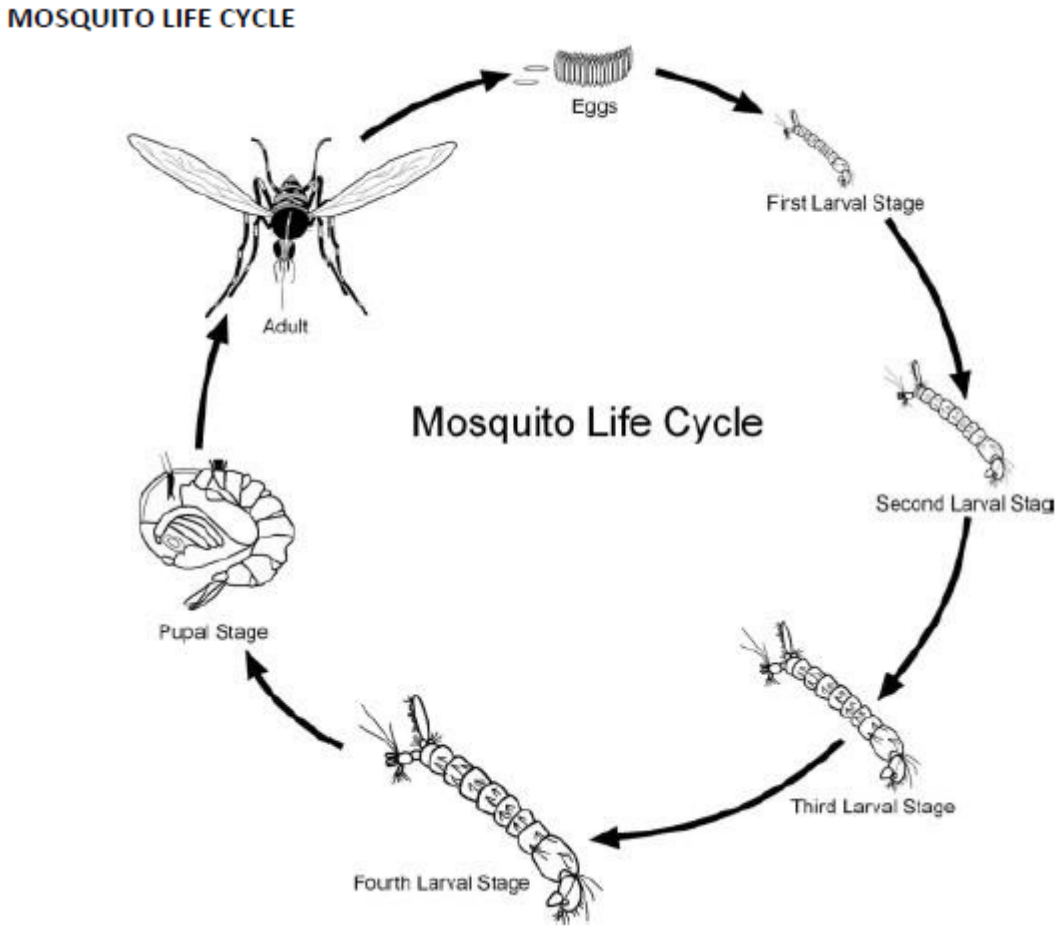


Figure 3: Mosquito Life Cycle

4.2 Habitats

Larval habitats are diverse and differ between rural and urban settings. Typical habitats found in rural settings include large permanent water bodies like freshwater lagoons and swamps, dams, and rainwater tanks to smaller temporary and semi-temporary water bodies like drains, hoof prints and vehicle tracks. Urban sources can include birdbaths, pot plants, rainwater tanks, abandoned swimming pools, flowerpots, some plants that hold water e.g. Bromeliads, plastic tubs, watering cans, tyres, dog bowls.

Depending on the species, certain larval habitats have preferred characteristic aspects such as sunlit or shady areas, polluted or freshwater or brackish and saltwater. Some species are very specific in their choice of larval habitat whereas others are more tolerant of a wide range of conditions.

The techniques used for surveillance and response vary depending on the breeding/larval habitat. In the Banana Shire, breeding/larval habitats can be grouped into two (2) general classes for surveillance and response purposes:

- *Groundwater/freshwater/polluted water habitats, and*
- *Container/Urban habitats*

4.2.1 Groundwater/freshwater/polluted water habitats

There are a wide range of both natural and man-made mosquito habitats that fall into this category. The diversity of mosquitoes present, and the productivity of the individual sites are predominately dependent on the characteristics including water depth, water quality, vegetation composition, vegetation density and predator (fish and macro invertebrate) populations.

Important vector/pest mosquitoes associated with these habitats and identified in the pilot program undertaken in January 2023 include, *Aedes vittager* and *Culex quinquefasciatus.* Others include *Culex annulirostris* and *Culex linealis.*

4.2.2 Container/Urban habitats

Container breeding mosquitoes utilise various natural and artificial containers like bird baths, tree-holes, bromeliads, leaf axils, wells, tyres, tins and pot plant bases. The most important vector/pest mosquitoes associated with these habitats are *Aedes aegypti* and *Aedes notoscriptus* in containers and *Culex quinquefasciatus* in habitats with a high organic content.

There is limited information available regarding the species found in BSC. The following mosquitoes capable of transmitting disease and causing nuisance were identified at different times during mosquito surveillance programs conducted during 2000-2013, 2019-2020 and more recently in January 2023:

- *Aedes aegypti,*
- *Aedes vittager,*
- *Culex annulirostris,*
- *Aedes notoscriptus,*
- *Anopheles annulipes,*
- *Culex quinquefasciatus,*
- *Culex halifaxii.*

4.3 Prevention

Using effective prevention measures is the most effective way to avoid the transmission of arboviral diseases. Large scale measures that can be undertaken by BSC include:

- *habitat modification to reduce water availability for breeding of the larval stage;*
- *use of appropriate larvicides / insecticides for controlling the larval or adult stage;*
- *treatment of drainage and water detention areas;*
- *routine inspections of Council yards / assets; and*
- *assessment of development applications in conjunction with mosquito activity*

Measures that can be undertaken by the community include:

- *checking your home for potential mosquito breeding areas e.g., any uncovered water containers should be discarded, screened or emptied and cleaned regularly;*
- *taking precautions against being bitten by mosquitoes;*
- *avoiding being outside during times of heavy infestation of mosquitoes;*
- *using insect repellents (containing Diethyl Toluamide {DEET} or picaridin) and wear protective, light coloured long sleeve shirts and long pants; and*
- *screening living and sleeping areas*

Other preventative measures include government-based programs (including the Queensland Peri-Urban Alphavirus Surveillance Program) that undertake mosquito monitoring and virus surveillance of mosquitoes. These programs aim to act as an early warning system for virus activity by monitoring data collected from trapped mosquito populations.

4.4 Surveillance

Surveillance is a fundamental tool for the planning, operation, and evaluation of any effective mosquito control program. All decisions related to mosquito surveillance should be grounded in the most extensive scientific evidence available. Effective surveillance will ensure the timing and choice of response methodologies will have a scientific basis. An initial survey will determine the nature and extent of the problem and indicate an appropriate response. The initial survey can be used to determine:

- *The species of mosquito present,*
- *Source/s (breeding sites),*
- *Relative densities, and*
- *Dispersal or flight range.*

If baseline data is not collected before starting a control program, any subsequent evaluation may be inaccurate. Surveillance undertaken during/after a disaster situation or a weather event, should also be compared with baseline data, to determine the subsequent impact on mosquito populations, which will guide decision making processes.

Routine surveillance yields the location of breeding habitat and identification of problem sites where control should be concentrated. Survey data will provide vital information, such as:

- *an increase in adult numbers within an area suggesting a need for increased control; and*
- *a dominance of one species may indicate missed or novel breeding habitat that can be investigated; or*
- *timing treatment to catch the greatest number of larvae and adults within a given breeding habitat or location.*

Surveillance (such as the Queensland Peri-Urban Alphavirus Surveillance Program) will also detect disease activity, allowing for control measures prior to an epidemic.

Routine Mosquito Surveillance Provides:

- *A list of mosquito species within a local area,*
- *An estimate of adult and larval mosquito populations,*
- *Insight into mosquito breeding habitats, and*
- *Source of female mosquitoes for disease surveillance.*

The surveillance and monitoring methods used within the Banana Shire will depend on the type of environment the mosquito inhabits. Monitoring and surveillance schedules are listed in Table 2. Surveillance locations for Biloela, Moura, Baralaba, and Taroom can be found in Appendix E.

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Surveillance												
Arbovirus Sentinel Surveillance												
QLD Peri-Urban Alphavirus Surveillance												
Monitoring												
Council Yards/Assets												
Drainage or Detention Areas												
Referral from External Customer												
Annual Review of Mosquito Management Plan												

Table 2: Blue shaded areas represent when works are conducted

4.5 Response

In most cases it will not be possible to eradicate mosquitoes or even eliminate a particular species from an area. If there is a significant risk or nuisance, then an appropriate response should be determined. Methods used to control mosquitoes vary according to the species concerned and the local situation and circumstances. Economic and environmental considerations can also influence response methodology. Therefore, the accurate identification of the target species and its habitats is important to ensure controls are efficient and pose no/limited risk to the environment.

When determining which response methodology to utilise, consideration should be given to using the most appropriate control rather than the most expedient method. Long term benefits usually outweigh short term gains. An 'integrated control' method should be used, and this essentially means the use of a combination of methods that are complimentary and will limit the sources and reduce the abundance of the mosquito populations, and protect the health and well-being of the community, and exert minimal detrimental effects on non-target species and the environment. Integrated control programs will usually include a blending of informed methods of environmental management, application of chemical insecticides, consideration of the use of biological control agents and public awareness campaigns.

4.5.1 Physical Control

Advances in habitat modification techniques have shown that the suppression of mosquito populations is possible without reliance on chemical control or endangering the flora, fauna or ecological function of habitats such as wetlands. However, it is important to note that any modification to the environment to reduce the production of mosquitoes may have the potential to impact other components of the local ecosystem and should be fully investigated before any strategies are implemented.

Strategies to reduce the productivity of mosquito habitats without the use of control agents are generally achieved by the manipulation of water flows and/or vegetation to reduce the suitability of the habitat for mosquito production. In urban environments, source reduction is generally directed towards habitats such as sullage pits, drains, guttering, backyard containers and other areas where water is retained for long periods of time.

Physical control measures are taken to reduce the potential of mosquito breeding and harbourage by modifying the natural or built environment. Examples of physical control include:

- *Maintenance of open stormwater drains to remove silt and weeds to ensure water is not held for more than 5 days.*
- *Reduction of emergent vegetation in known breeding sites.*
- *Filling in, or drainage of low-lying land to reduce pooling.*
- *Slashing of vegetation which provides harbourage for adult mosquitos.*
- *Cleaning up yards to remove containers which will collect water.*
- *Ensure septic tanks are sealed and vents are fitted with mosquito proof screens.*
- *Ensure roof guttering is regularly maintained to clear debris, operating effectively and connected to either a rainwater tank or stormwater system.*
- *Ensure rainwater tank access points and outlets are fitted with mosquito proof screens and regularly maintained to remove debris.*

Some physical controls, such as maintenance of drains are undertaken routinely. Yard clean-ups and sealing of tanks are the responsibility of occupants and forms part of the education campaign.

4.5.2 Chemical Control

Chemical control is often seen as the initial method of choice to reduce vector populations and interrupt transmission and disease. This is short term control, but it will continue to be the pivotal component of 'epidemic-control' for many years to come. However, product contamination or environmental pollution can lead to community concerns and legal problems. Chemical control programs should use the most species-specific chemicals available, but this is often difficult due to the broad toxicity of many of the available insecticides.

The *Medicines and Poisons Act 2019* and the Australian Pesticides and Veterinary Medicines Authority restrict the types of chemicals that can be used for mosquito control.

Chemical applications on pest or vector mosquito populations will be aimed at either the point of source with the larval stages (larviciding), or at the point of nuisance with the adult stages (adulticiding), or a combination of both. Larviciding locations can be located in Appendix E, where identified drainage / retention areas are present. These maps will be updated in accordance with the annual review of the mosquito management plan to ensure that information is up to date.

The most effective, and generally environmentally friendly, strategy to control mosquito populations, and minimize nuisance and public health risks, is to target larval populations and their habitats. However, the effectiveness of larval control is very dependent on the timing of the applications and the efficacy of routine surveillance.

Adulticide application may be considered when quick reductions in adult pest or vector numbers are required. However, the effectiveness can be unreliable, and this method may have a greater negative impact on non-target species, particularly bees. As with larviciding the correct timing of application is essential. During an epidemic of mosquito-borne disease or during a disaster situation, adulticiding can be considered essential. (Refer to the Queensland Health – Guidelines for Controlling Public Health Risks relating to Mosquitoes, Flies and Black Flies in a flood event for recommended actions).

Repellents are chemicals that tend to produce avoidance reactions in mosquitoes approaching a host, block the host-detection senses or at least 'cover' the attractiveness of the host. Repellents are often the most

practical agent for personal protection against mosquitoes. The most common commercial anti-mosquito repellents contain ingredients such as DEET or picaridin.

As stated earlier the types of breeding habitats in the Banana Shire region can be grouped into two classes and treatment responses vary accordingly.

4.5.3 Cultural Methods

Cultural methods involve influencing people in the community to take measures to protect themselves from mosquito bites and to remove or reduce mosquito activity on their own property. Promotion and education of key personal activities the community can take is the driver to cultural control.

One of the most important aspects of mosquito management is engaging the community in the program. It is important for the BSC to assist in the dissemination of accurate information to the community of the public health risks associated with mosquitoes and the strategies to reduce those risks. It is also crucial that the community is aware of mosquitoes in the local environment and the reasons why specific management strategies have been employed in the region.

There is often a lot of misinformation in the community regarding mosquitoes. A lack of understanding of the diversity of mosquito species, their life cycle and habitat associations are common. Concise, accurate information regarding the local mosquito populations can not only provide important public health messages, but it may also encourage a greater interest in the ecology of local wetlands and the importance of environmentally sensitive mosquito management.

Community awareness programs are a way for BSC to interact with the community and communicate information. In the case of mosquito programs, they generally revolve around mosquitos, their disease potential and personal protection. However, benefits could be gained by the inclusion of biological and/or ecological facts and figures associated with the locally identified mosquito. Using media/social media platforms is an important component of community education that can be used by BSC as it provides an opportunity for the dissemination of accurate information on mosquitoes and personal protection strategies, as well as opportunities to publicise the BSC Mosquito Management Plan.

Public education will begin towards the end of the dry season (winter) and will be active throughout the wet season (late spring – summer). These promotion and education activities should first focus on the concept of residents protecting themselves against insect bites.

Activities will be intensified when surveillance indicates that disease risk is high, due to high mosquito numbers detected in adult traps, larval dip samples or from community enquiry in conjunction with the mosquito management response hierarchy (Table 4).

Further activities will be intensified as a preventative measure when large-scale activities for a limited duration are to occur throughout the Shire. For example: Town shows, large sporting events, music events (Festival of Small Halls), and Australia Day celebrations. Council's Environmental Health Officers will work with the Corporate and Community Services directorate to identify any short-term, large-scale events that can be included as a preventative measure to control adult mosquitoes at outdoor events. Activities will include surveillance and chemical treatment if deemed appropriate.

Education materials may include the following:

- Social media and media releases
- Website updates
- Letter PO Box drops
- Local notice board posters

- Corflute signage
- Public notifications of planned chemical and physical mosquito control activities
- Displaying appropriate signage while in the field conducting monitoring or treatment.

Promotion and education initiatives have been prepared and align to the intervention levels that are proposed in this Management Plan.

Threat Level	Promotion and Education
Level 1	Self-protection messages (use quality repellent, avoid dawn/dusk, wear light coloured loose fitting long clothes, check your insect screens, tip out water from containers and check water tanks). These messages can be delivered through social media, print media and public place signage.
Level 2	Message to install at larvicide location on corflute sign “This area treated by BSC”, etc.
Level 3	Messages for public place adulticiding Corflute sign - this area will be treated on __/ __ / __ by BSC. Use repellent. Social media messages re: self-protection, adult treatments not perfect. Beekeeper messages.
Level 4	Last resort treatment with extremely high mosquito numbers and risk of disease. Corflute’s as per Level 3. Disaster related social media messages. Beekeeper messages.

Table 3: Threat Level and Promotional and Educational Intervention

5.0 Vision and Strategies

Vision: ***To minimise the impact of mosquitoes on public health and social amenity through surveillance, prevention and control of mosquitoes and mosquito-borne disease threats that have significant health impacts.***					
Strategy					
Awareness and education	Informed decision making	Surveillance, Prevention, Monitor, Control	Strategic planning framework and management	Effective integrated management systems	Commitment and partnership
Objectives					
To provide accurate, accessible, and timely information on Mosquito management to Council and community. Raise awareness of Council's Mosquito Management Plan within Council and the wider Banana Shire community. To have appropriately skilled and knowledgeable officers able to respond effectively to mosquito management.	To collect, use and make available reliable data relevant to Mosquito management. To further the understanding of the biology, ecology and impacts of mosquitoes. Undertake detailed species monitoring and data analysis for the purpose of developing and implementing proactive and effective operational programmes.	Undertake monitoring and surveillance programs to accurately understand the mosquito population dynamics within the Shire. Control mosquitoes by use of cost effective and environmentally appropriate management methods.	Undertake regular implementation, review and improvement of best practice methods for mosquito management to efficiently and adequately resource mosquito management programs.	To adopt and develop new, and improve existing, mosquito management practices. To reduce populations and impacts of Mosquitoes on the wider public.	To establish and maintain commitment to Mosquito management with Queensland Health. To ensure compliance with the *Public Health Act 2005,* the *Mosquito Code of Practice for Queensland* and the *Australian Mosquito Control Manual.*
Outcomes					
Community is informed and is knowledgeable	Reliable information is the basis for decision making.	Provide effective and equitable mosquito management service to the Banana Shire community	Strategic directions are developed and maintained	Effective and integrated management systems are developed and widely implemented.	

6.0 Stakeholders

Banana Shire Council may engage with local industries, piggeries and other important stakeholders to increase mosquito awareness within the shire.

These industries, and their associated processes, may produce potential breeding sites for various mosquitoes (such as container breeders) and some, due to the transient nature of the workforce, may inadvertently provide a potential transit route of arboviral disease into the Shire, potentially from exotic species of mosquito.

> *For example, people regularly travelling to locations where Dengue Fever is prevalent may return to an area within BSC where the Aedes aegypti mosquito is breeding, this creates a greater potential for imported cases of Dengue Fever to occur within the BSC region.*

Encouraging primary industries to become involved in mosquito surveillance, and where appropriate, to develop management programs, will provide invaluable assistance to BSC, while potentially managing risk to industry, should an outbreak occur. For example, the recent JEV outbreak throughout several Australian States reported production losses of up to 80% at piggeries, with other impacts noticed including the cancellation of pigs at petting zoos and pig exhibits cancelled during the outbreak.

6.1 Internal Stakeholders

Local government has responsibility for the public health risks related to breeding grounds for designated pests and harbourages of designated pests. Mosquitoes are defined as a designated pest under the *Public Health Act 2005*.

Ideally, residential developments should be situated far from extensive mosquito breeding sites to reduce mosquito management needs. However, in the Banana Shire, this is often impractical due to the vast natural environment and potential breeding areas compared to the size of townships.

Nevertheless, the Council's Development Services Team assesses the suitability of proposed land for development applications. Similarly, the Council's Infrastructure Team is responsible for several factors affecting mosquito management, including stormwater drains and vegetation management. Effective implementation of this plan, particularly physical control methods, will require close collaboration with relevant internal stakeholders.

Councillors play an essential role in mosquito management because of their direct connection to the community and their influence over local policies and resources.

1. **Community Liaison**: Councillors are often the first point of contact for residents with concerns about mosquitoes. They regularly interact with community members, understand their issues, and can communicate these concerns effectively to the appropriate department.
2. **Policy Advocacy**: Councillors have the authority to advocate for policies and initiatives that support effective mosquito control. They can push for funding allocations, legislative measures, and community outreach programs that enhance mosquito management efforts.
3. **Resource Allocation**: As decision-makers, councillors allocate resources for various core services, including mosquito control. They can prioritise funding for surveillance, larval control, public education

campaigns, and other preventive measures based on community needs and expert recommendations.

4. **Public Awareness**: Councillors can play a significant role in raising awareness about mosquito-borne diseases and prevention strategies among residents. They can support educational campaigns and outreach efforts to ensure that the community understands their role in reducing mosquito breeding sites and protecting public health.
5. **Feedback and Support**: By staying informed about local mosquito issues and management strategies, councillors can provide valuable feedback and support to Environmental Health Officers and Vector Control Teams. This collaboration ensures that management efforts are responsive to community needs and effectively implemented.

Overall, councillors act as a bridge between the community and mosquito management teams, leveraging their position to enhance communication, advocate for resources, and ensure effective control measures are in place to protect public health.

6.2 External Stakeholders

To ensure effective surveillance, management, and prevention of mosquitoes in the region, Banana Shire Council collaborates with key stakeholders, including the community, State and Federal Governments, and industry. Banana Shire Council's Environmental Health Team participates in meetings with relevant stakeholders to discuss current strategies, emerging issues, and upcoming projects from various agencies.

6.2.1 Queensland Health

Queensland Health seeks to protect the health of Queenslanders and is responsible for the coordination and support of initiatives to reduce the risk of transmission of mosquito-borne diseases to human and managing the response to outbreaks of mosquito borne disease.

Queensland Health achieves this through:

- Identification of and mechanisms to prevent or minimise adverse health impacts from notifiable conditions such as RRV, JEV, and BFV under the *Public Health Act 2005*.
- Working with or supporting local government to prevent or control outbreaks of mosquito borne diseases such as Dengue, Japanese encephalitis and Malaria.
- Preventive Dengue control programs in high-risk areas.
- Health promotion activities focusing on the prevention of mosquito bites and reduction of household mosquito breeding.
- Facilitation of education and training for health workers covering mosquito management, prevention, surveillance, and control.
- Taxonomic reference service to identify mosquitoes.
- Leading and supporting eradication campaigns, in collaboration with AQIS and local government, against the exotic mosquito Aedes albopictus in north Queensland.
- Contributing to research on mosquito biology and control.
- Surveillance of mosquito-borne diseases.
- Providing an expert advisory resource on mosquito control issues for local governments and other agencies.

- Collaboration with government, research institutions and industry towards the development of new mosquito control products and methods through research and development programs, revision of products and contributing research funds.
- Distribution of annual applied research funds for the control of mosquito-borne diseases in humans and mosquito management programs.
- Provision of advice, interpretation of, guidance notes and operational procedures on legislation relevant to mosquito control i.e. *Public Health Act 2005*, *Public Health Regulation 2018*, *Medicines and Poisons Act 2019* and assistance to local government to develop and implement integrated mosquito management programs.

6.2.2 Department of Environment, Tourism Science and Innovation

The Department of Environment, Tourism and Science and Innovation (DETSI) is responsible for ensuring that state land is managed for the benefit of the people of Queensland by having regard to the principles of:

- **Sustainability:** sustainable resource use and development to ensure existing needs are met and the State's resources are conserved for the benefit of future generations
- **Development:** allocating land for development in the context of the state's planning framework and applying contemporary best practice in design and land management
- **Community purpose:** if land is needed for community purposes, the retention of the land for the community in a way that protects and facilitates the community purpose
- **Protection:** protection of environmentally and culturally valuable and sensitive areas and features.

6.2.3 Department of Housing and Public Works

The Department of Housing and Public works are the lead agency for social housing services in QLD. The *Public Health Act 2005* does not bind the crown in relation to prescribed pests such as mosquitoes, therefore enforcement action cannot be taken against the owner of the property if a property suspected of breeding mosquitoes is vacant. There are provisions to commence enforcement action with an occupier of the property under the *Public Health Act 2005.*

Furthermore, tenants of social housing have obligations under the *Residential Tenancies and Rooming Accommodation Act 2008,* including but not limited to - not causing a nuisance, or to interfere with the reasonable peace, comfort or privacy of neighbours and to keep the premises clean, having regard to their condition at the start of the tenancy.

Enquiries regarding disruptive behaviour or a risk to public health are encouraged to contact the local Housing Service Centre. Below are current details for Rockhampton and Gladstone offices. Any enforcement action undertaken with an occupier of social housing will be referred to the Department for consideration.

Rockhampton Housing Service Centre:	**Gladstone Housing Service Centre:**
Address: Level 3, State Government Building 209 Bolsover Street Rockhampton Qld 4700 **Email:** rockhamptonhsc@housing.qld.gov.au **Phone:** • 07 4848 7000	**Address:** Level 2, 20-22 Herbert Street Gladstone Qld 4680 **Email:** gladstonehsc@housing.qld.gov.au **Phone:** • 07 4899 2400

• 1800 801 176 (toll free within area) • 1800 817 029 (maintenance enquiries) • 1800 808 107 (emergency maintenance after hours) **Opening hours** • Monday: 8:30am–4:30pm • Tuesday: 8:30am–4:30pm • Wednesday: 8:30am–4:30pm • Thursday: 8:30am–4:30pm • Friday: 8:30am–4:30pm	• 1800 266 807 (toll free within area) • 1800 817 029 (maintenance enquiries) • 1800 808 107 (emergency maintenance after hours) **Opening hours** • Monday: 8:30am–4:30pm • Tuesday: 8:30am–4:30pm • Wednesday: 8:30am–4:30pm • Thursday: 8:30am–4:30pm • Friday: 8:30am–4:30pm

7.0 Complaints

When mosquitoes are abundant, BSC may receive complaints regarding nuisance biting in residential or recreational areas. These complaints may provide information on areas where mosquito impacts are greatest. However, the tolerance of individuals to mosquitoes varies greatly and the number of complaints within and between seasons may not be directly related to actual mosquito populations. There are several factors that will influence an individual's sensitivity to mosquitoes and their likelihood of making a complaint to BSC.

Ongoing surveillance and data monitoring should be used alongside complaints received by BSC to measure mosquito activity more effectively. The quantity and frequency of complaints may, at times, be due to factors such as increased publicity regarding mosquitoes and other arboviruses in the media or within local action groups, and not an actual substantial increase in mosquito abundance. However, if some significant linkage can be established, then a public complaint 'threshold' can be a useful trigger for further investigation or intervention.

When a complaint is made to BSC, it is important that it is directed to the Environmental Health Officers administering mosquito management. Banana Shire Council maintains a database of complaints and, Council's Environmental Health professionals will triage requests from the public and determine a threat level as outlined in Table 4. These investigations will provide BSC with an excellent opportunity to increase awareness within the local community of the mosquito management plan and to efficiently and effectively respond appropriately to threat levels.

Threat Level	Trigger Conditions	Management Actions
Level 1 - Low	• Customer requests and data determine there is no indication of a high-risk season. • No additional surveillance or control measures are necessary to reduce the risk of human cases of infection	Information displays, public notices, and communication to the community. Review and update website information Review previous management actions and mosquito season and update management

		actions. Maintain standard monitoring of larvae and adults.
Level 2 - Medium	• Breeding identified on private land • New sites identified on Council land • Number of larval or adult mosquitoes increasing • Customer requests increasing	Enforcement under *Public Health Act 2005* Identification, investigation, larviciding if appropriate, and records updated. Refer for physical control if relevant. Coordinated larviciding to commence at known breeding locations on Council controlled land. Public notifications on larviciding areas to be posted and signage incorporated at areas. Information displays, public notices, and communication to the community.
Level 3 - High	Level 3 will be triggered where one of the following items is met: • There is more than 8 CRM/ month for Biloela; or • There is more than 5 CRM/ month for Moura; or • There is more than 4 CRM/ month for other regions; or • Number of mosquitoes caught at a single location in a single carbon dioxide baited trap exceeds 300 of a known vector of disease over a normal sampling period (i.e. 12 – 18 hours); or • Disease risk	Information displays, public notices, and communication to the community. Mosquito breeding areas to be identified and coordinated larviciding to commence at known breeding locations on Council controlled land. Public notifications on larviciding areas to be posted and signage incorporated at areas. Barrier treatment first option - high mosquito numbers and high facility usage e.g. an event. Can't be used on plants while flowering (check with Beekeepers) Adulticiding (misting/fogging) - high mosquito numbers and risk of disease, last resort. Public notification and signage at areas to be incorporated.
Level 4 - Natural Disaster Event	Level 4 will be triggered where one of the following items is met: • Natural Disaster Event; or • Public Health Emergency; or • Biosecurity Emergency; or • Incursion of an Exotic Vector of Public Health and Agricultural Significance; or	Information displays, public notices, and communication to the community. Mosquito breeding areas to be identified and coordinated larviciding to commence at known breeding locations on Council controlled land. Public notifications on larviciding areas to be posted and signage incorporated at areas. Adulticide misting commencement at public spaces, known problem drain locations and parklands by licensed pest management

	• Notifiable Disease Outbreak (vector and disease must be present)	technicians. Adulticide misting commencement in residential streets in all major urban centres. Adulticide residual spraying of public and residential infrastructure where deemed appropriate. Public notification and signage at areas to be incorporated. Engage possible assistance from the Central Queensland Public Health Unit or Darling Downs Public Health Unit (Taroom Only) and other Local Government Mosquito Management teams.

Table 4: Mosquito Management Response Hierarchy

8.0 Climate Change

Mosquitoes and mosquito-borne disease are often discussed as a major concern should climate change result in global warming. The greatest concern is that, with increased temperatures, the geographic range of pest and vector species will increase, and with it, the risk of human disease, particularly “tropical” diseases such as malaria and dengue fever will increase.

However, there are many factors besides temperature, including the availability of suitable habitats and short-term changes in rainfall, urbanisation and mosquito control programs, that influence the distribution and abundance of mosquitoes as well as the incidence of human disease.

While the risks of mosquito-borne diseases such as dengue fever or malaria are unlikely to change with predicted climate change, there may be local increases in the risk of RRV and BFV. With overall warmer temperatures, there may be a decrease in the incubation period (the time between when a mosquito ingests a virus and when it can transmit the virus to humans) of the viruses in local vector species. This will mean that a potentially greater proportion of mosquitoes can transmit RRV or BFV in the local area. In addition, the warmer weather may not increase the magnitude of populations, but it may extend the period of mosquito activity, extending nuisance-biting and potential public health risks into the spring and late autumn.

While there is no specific prediction of rainfall change in the Banana Shire Council region associated with climate change, there is the prediction that there may be a greater frequency of extreme weather events and increases in rainfall intensity. These factors may contribute to increased mosquito prevalence throughout the shire with current activity strongly influenced by rainfall patterns between January and March each year. While major outbreaks of mosquito-borne disease do not necessarily follow increased mosquito populations, abundant mosquito populations are typically associated with a rise in local disease cases.

It is important to remember that the risks of mosquito-borne disease are influenced by a range of factors, not only mosquito populations. The activity of vertebrate reservoir hosts (e.g. birds, macropods) is an important factor and how these populations are influenced by changes in rainfall and temperature (as well as urban development) will influence mosquito borne disease risks into the future.

9.0 Resource Requirements

Operating and implementing an effective mosquito management program is dependent on ongoing human and operational resources. Resource requirements will fluctuate significantly depending on the severity of the mosquito-breeding season, which is largely dependent on environmental variables.

Environmental Health staff are primarily responsible for implementing this MMP. However, mosquito management is only a small part of Council's Environmental Health responsibilities and assistance is required from other staff. This can include assistance with monitoring activities, physical control activities or application of larvicide or adulticide. Staff that are applying pesticides are required to hold a current Pest Management Technician Licence. A 4WD vehicle is also required for mosquito management work.

Contributions toward chemicals is dependent upon Council's own budget allocation. This money can be utilised in years when mosquito-borne disease risk/nuisance is greater than normal.

10.0 Annual Review & Report

Good record keeping practices are crucial for the continuation of this Management Plan and retention of knowledge within the organisation. The following list includes the minimum required records to be kept on the Council's record management system:

- Records of complaints
- RRV/BFV/MVE notifications and follow-up documentation
- Adult trapping results
- Larval survey results
- Chemical treatments
- Vector Control maps
- Chemical product labels and MSDS
- Media releases

This plan will be reviewed annually by the Environmental Health team with information included in the Banana Shire Council's annual report. It is important to assess effectiveness of the surveillance program and the overall control program to allow for continuous review for improvement opportunities.

An ongoing surveillance program will assess whether the mosquito populations are being reduced and if the control program is achieving reductions in pest problems or mosquito borne disease. Banana Shire Council will also continue to liaise with relevant stakeholders and research the most up to date treatment and prevention methods for mosquito management within the Banana Shire.

11.0 Reference Sources

Local Government Association of Queensland (LGAQ) 2012, Code of practice: mosquito management, viewed 9 August 2021, https://lgonline.lgaq.asn.au/documents/10136/5f9164dea975633311e59614b40102d8

Queensland Health 2019, *Mosquito borne diseases*, viewed 9 August 2021, https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/diseases-infection/diseases/mosquito-borne

World Health Organization (WHO) 2020, *Vector-borne diseases,* viewed 9 August 2021, https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases

University of Sydney and Westmead Hospital 2010, *Department of medical entomology*, viewed 9 August 2021, https://medent.usyd.edu.au/

NSW Government Health 2016, *Vector borne diseases*, viewed 9 August 2021, https://www.health.nsw.gov.au/environment/pests/vector/Pages/default.aspx

Appendix A: Arbovirus Sentinel Surveillance Passive Box Trap Guideline

Arbovirus Sentinel Surveillance Passive Box Trap Guidelines

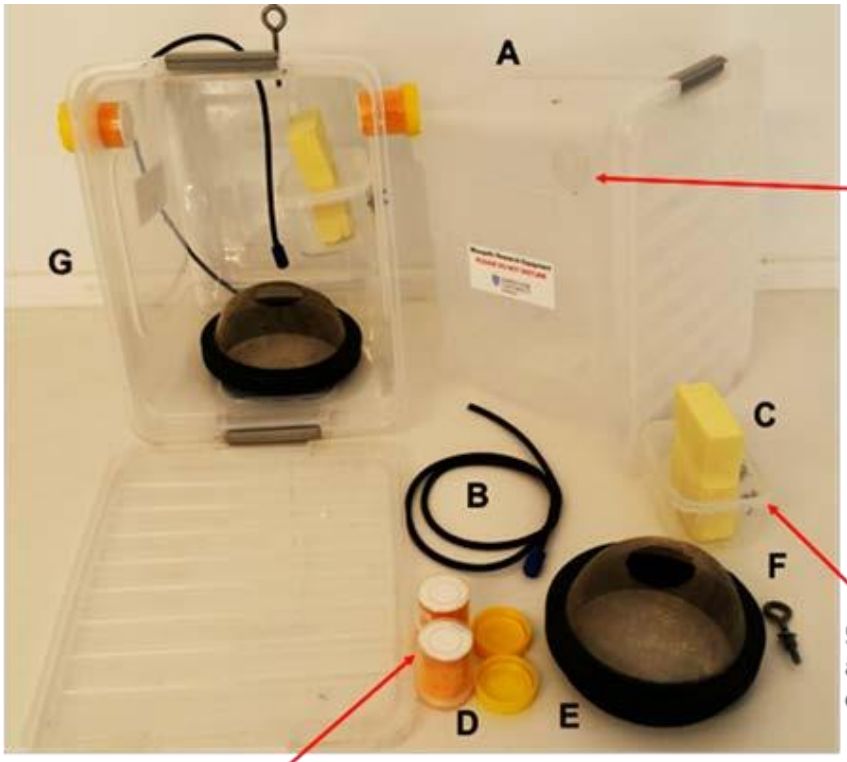
2020

Acknowledgements

The Communicable Diseases Branch QLD Dept. of Health would like to acknowledge the assistance provided by Forensic and Scientific Services, QLD Dept. of Health and James Cook University in the preparation of these guidelines.

Passive box trap description

Individual trap components: (a) 20 L clear plastic tub with lid, (b) 5 mm gas tubing with air stone, (c) 500 ml water reservoir and chamois sponge, (d) FTA collection pots with FTA cards visible, (e) 180 mm sieve entry, (f) eye bolt from which the trap is hung, and (g) a fully assembled trap.



44 mm diameter hole for collection pot. Positioned 35 mm from the front of the trap and 20 mm from the top of the trap

500 ml container with a 30 x 100 mm opening in the lid

Hole in bottom of 70 ml collection pot: 35 mm diameter
FTA card dimension: 40 mm diameter

Passive box trap assembly

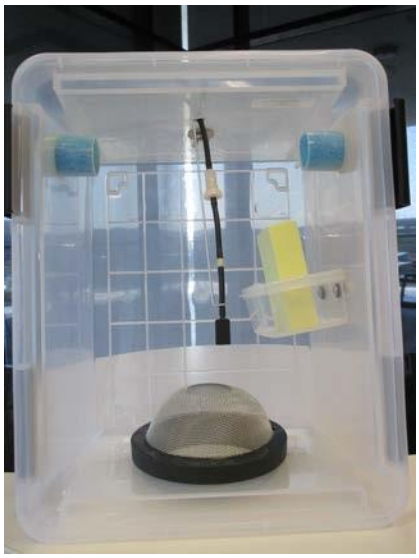
1: PBT and CO_2 delivery components.

2: Fit water reservoir.

3: Fit lid and slurpex sponge to water reservoir.

4: Fit eye bolt to centre hole in top of the trap and CO_2 tubing to front hole. Feed CO_2 tubing from inside the trap and ensure the wire support is pulled to the top of the trap.

5: Fit gauze dome to base of trap from inside the trap and secure with wire key.



6: Fit specimen containers to each hole at the top of the trap and place the lid of the trap.

7: Fit new battery in the timer and set CO_2 release times (4 hours in the evening from one hour before sunset and in the morning from one hour before first light, see below). Place timer in timer box and attach CO_2 tubing from the CO_2 regulator and PBT. Place lid on timer box firmly. The PBT is now ready to be deployed in the field.

Trap field deployment

- The traps should be positioned out of direct sunlight, preferably in a vegetated area, e.g. near sewage ponds with grassy edges, rubbish tips (preferably near wetlands), or lakes with sheltered woodlands nearby.
- Sites need to be secure.
- Traps should be set so that the bottom of the trap is 1m from the ground.
- Ensure the hanging cord/wire for the trap is strong enough to withstand adverse weather conditions.

Figure 4: Base of trap approx. 1m from ground level

- An exterior lid of at least 50cm diameter (large plastic pot plant base) can be attached to the hanging chord/wire to serve as a rain cover if required.
- Apply a very thin layer of Tanglefoot to the CO_2 tubing where it enters the trap and timer box, and the exterior surface of the trap entrance, to prevent insects from entering the trap (Tanglefoot can be removed with Mineral Turpentine.

- The end of the CO_2 supply tube in the trap should be positioned 5 to10 cm above the top of the trap entry sieve. Place a small bulldog clip around the CO_2 tubing where it enters the exterior surface on the top of the trap to stop the tubing falling further down into the trap.

- CO_2 supply is via VT size 10 kg CO_2 cylinders (BOC Australia).

- To achieve a CO_2 flow rate of 500ml per minute, the gauge on the *new* CO_2 regulators needs to be set at 1.5 kg per day.

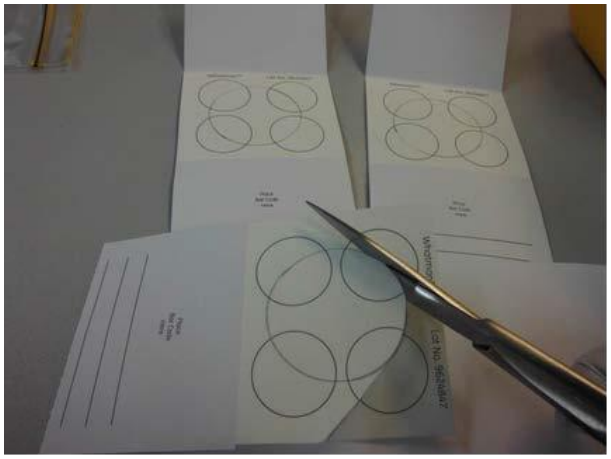
- When in the field attached regulator to CO_2 bottle, do not over tighten.

- When the trap is attached to the CO_2 cylinder, spray all gas connections with a light soap and water mixture to test for CO_2 leaks. If leaks are found re-check all connections and retighten.

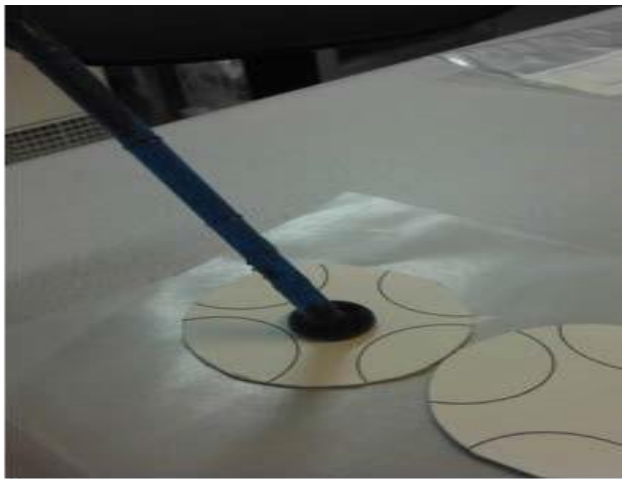
Trap Servicing

- Take a photo of the number of mosquitoes in the trap.
- Take a specimen pot full of mosquitoes from the trap and keep the pot in the fridge (do not freeze) in case of a detection.
- If there is a detection the regional Medical Entomologist may ask for the photo and mosquitoes to help inform if further action is necessary.

1: Use a clean sample collection pot as a guide to draw circle on FTA card.



2: Cut out circle from FTA card with clean scissors.



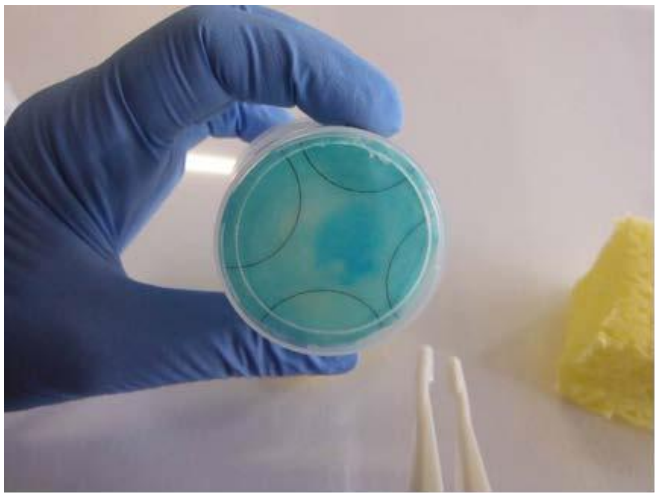
FTA card preparation:

N. B ALWAYS WEAR CLEAN GLOVES

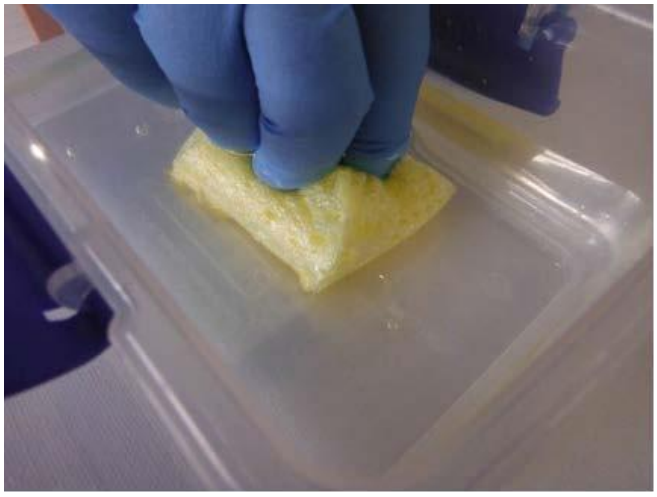
3: Apply approx. 1 mL of honey to FTA card, allow soaking overnight.

4: Assemble collection pot, sponge, honey impregnated FTA card, using clean disposable forceps and gloves.

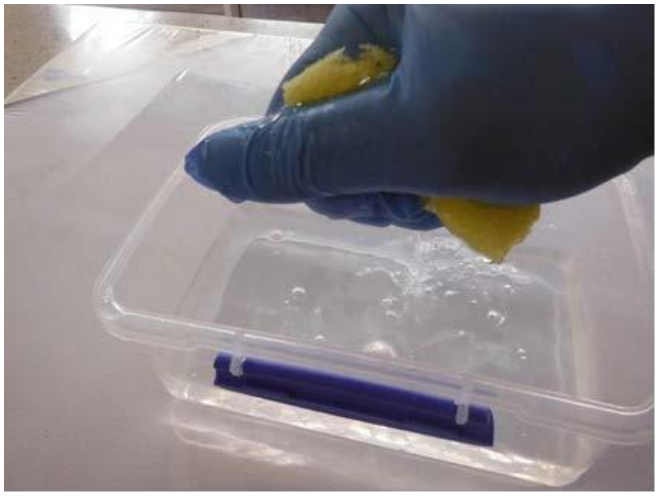
5: With disposable forceps, gently place FTA card into collection pot.



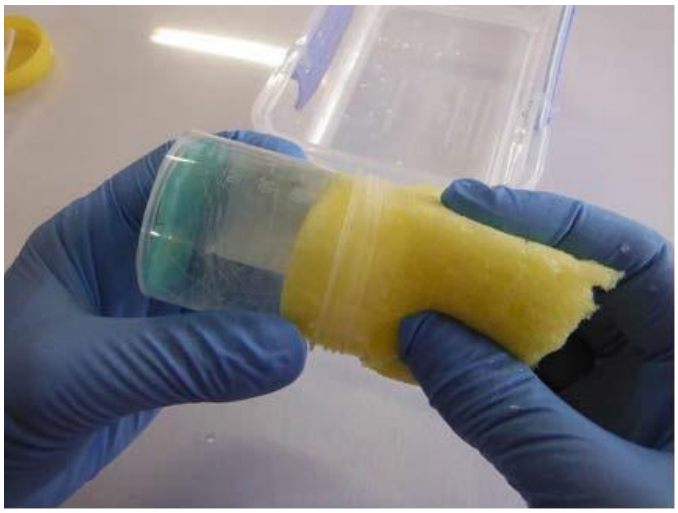
6: Gently push down with forceps so FTA card sits neatly on rim at bottom of collection pot.



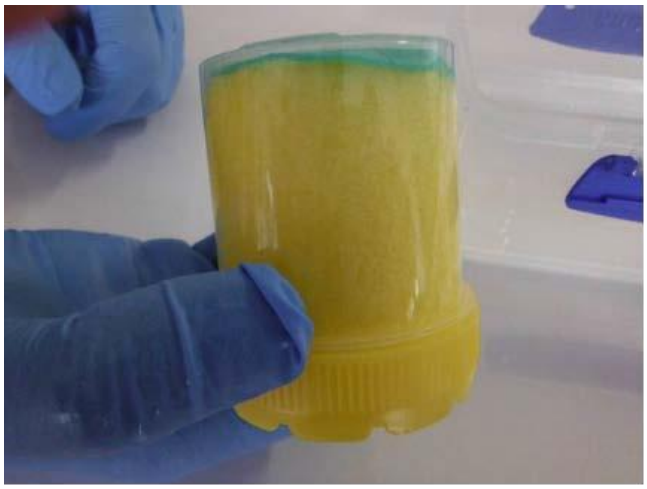
7: Wet the backing sponge with clear water.



8: Squeeze out ALL excess water completely.



9: Fit backing sponge into collection pot on top of FTA card.

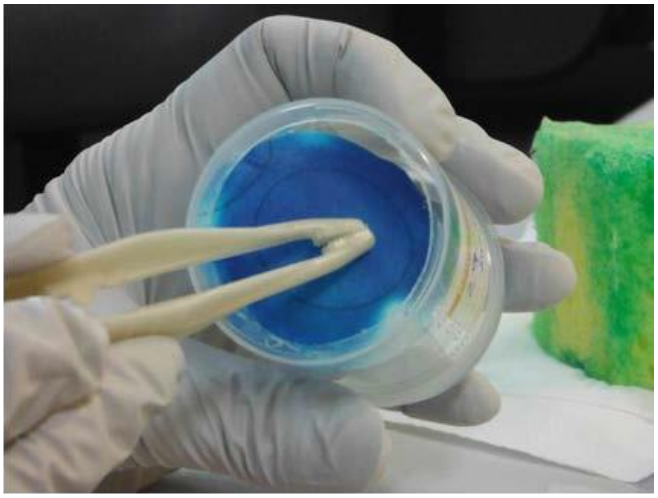


10: Fit lid onto collection pot, the pot is now ready to place in the passive box trap.

FTA card collection, packing and postage:

N. B always wear clean gloves

1: Remove lid and sponge.



2: With clean disposable forceps gently bend FTA card towards inside of collection pot and remove.

3: Place FTA cards from each trap into a separate clean plastic zip-lock bag.

IMPORTANT: label each plastic bag with surveillance period, collection date and trap location and complete the FTA card submission form (appendix 1) and email to FSS and CDB.

CO_2 timer set up

Product components

The BG-CO_2 Timer consists of a body with a display and buttons to set up the release times, two connections to the CO_2 tubes and a 9V battery.

Connection to CO_2 tube to CO_2 source

Buttons to set up release times

Display

Connection to CO_2 tube to trap

4

Switch on / Set current time

Switch on the display by pressing button 3. 3 short

To set the current time press button 3 for two seconds. 3 2 sec.

To adjust the current time use button 1 to increase and button 2 to decrease the time. 1 + 2 −

8

Start time 1

1 Increase time

2 Decrease time

3 Start set-up of start time 1

After setting up the current time press button 3. „S1" (Start time 1) appears in the display. 3

Set the first start time with buttons 1 and 2 as described previously. 1 + 2 −

9

End time 1

1 Increase time

2 Decrease time

3 Start set-up of end time 1

After setting up the first start time press button 3. „E1" (End time 1) appears in the display. 3

Set the end time with buttons 1 and 2 as described previously. 1 + 2 −

10

Option 1: Permanent CO_2

1 Switch on CO_2 permanently

To run the CO_2 continuously and not use the timer, change the mode to "Always CO_2". Press button 1 for two seconds. With an audible click, "A" will appear in the display along with a down arrow showing that CO_2 is now emitted continuously. 1 2 sec.

To cancel the "Always CO_2" mode, press button 1 again. 1 short

12

Option 2: Switch off CO_2

2 Switch off CO_2 permanently

To switch off the CO_2 permanently, press button 2 for two seconds. An "A" without down arrow will appear in the display to show that CO_2 flow is switched off permanently. 2 2 sec.

To switch back to the timer mode press button 2 again. 2 short

13

*****

Start and end time 2

To set up a second start and end time, press button 3 after setting up the first end time. "S2" (Start time 2) appears in the display. Set the time with buttons 1 and 2 as described previously. To set the second end time press button 3. "E2" will appear in the display. Set time with buttons 1 and 2. After the second end time is entered, press button 3. Now the timer is running, shown by a „R" in the display. **NOTE:** if a second start/end time cycle is not required, set both the second start and end time to one minute after the end of the first cycle above.

11

Appendix B: FTA card submission form

Organisation:		Contact Number:		
Trap location e.g. *Mt Isa trap 1*	Date of trap deployment	Date of trap servicing	Date cards sent to QHFSS	Details/comments *e.g. mosquito numbers in trap, trap/card issues etc.*

Please email this form to QHFSS and Communicable Diseases Branch when FTA cards are posted:

FSS_VirologyMBD@health.qld.gov.au

NDPC@health.qld.gov.au

NOTE: Please ensure trap location, deployment and service dates are written on the plastic bag containing the FTA cards prior to posting.

Appendix C: CO_2 MSDS

BOC
A Member of The Linde Group

SAFETY DATA SHEET

 # 030

Product Name CARBON DIOXIDE CYLINDER, GAS AND LIQUID WITHDRAWAL

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**BOC LIMITED (AUSTRALIA)**
Address	10 Julius Avenue, North Ryde, NSW, AUSTRALIA, 2113
Telephone	131 262, (02) 8874 4400
Fax	132 427 (24 hours)
Emergency	1800 653 572 (24/7) (Australia only)
Web Site	http://www.boc.com.au/
Synonym(s)	030 - SDS NUMBER · 206, 207, 261 · CARBON DIOXIDE, COMPRESSED · FOGG GAS · PRODUCT CODES: 080, 081, 082, 083, 084, 086, 131, 176, 200 · REFRIGERANT 744
Use(s)	DISPENSING GAS · INERT GAS · SHIELDING GAS
SDS Date	09 March 2012

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

None allocated

SAFETY PHRASES

None allocated

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN Number	1013	**DG Division**	2.2
Packing Group	None Allocated	**Subsidiary Risk(s)**	None Allocated
Hazchem Code	2T		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	Cas No.	Content (v/v)
CARBON DIOXIDE	C-O2	124-38-9	99.9%

4. FIRST AID MEASURES

Eye	Cold burns: Immediately flush with tepid water or with sterile saline solution. Hold eyelids apart and irrigate for 15 minutes. Seek medical attention.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator or Self Contained Breathing Apparatus (SCBA). Apply artificial respiration if not breathing. Give oxygen if available. For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor.
Skin	Cold burns: Remove contaminated clothing and gently flush affected areas with warm water (30°C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns, immerse in warm water for 15 minutes. DO NOT apply any form of direct heat. Seek immediate medical attention.
Ingestion	Due to product form and application, ingestion is considered unlikely.
Advice to Doctor	Treat for asphyxia and cold burns.

5. FIRE FIGHTING MEASURES

Flammability Non flammable. Exposure to fire may cause containers to rupture/explode.

Fire and Explosion Temperatures in a fire may cause cylinders to rupture. Cool cylinders or containers exposed to fire by applying water from a protected location. Do not approach cylinders or containers suspected of being hot. Remove cool cylinders from the path of the fire. Evacuate the area if unable to keep cylinders cool. Ensure work area is thoroughly ventilated before re-entry.

Extinguishing Stop flow of gas if safe to do so, such as by slowly closing the cylinder valve.

Hazchem Code 2T

2 Water Fog (or fine water spray if fog unavailable)
T Self Contained Breathing apparatus and protective gloves.

6. ACCIDENTAL RELEASE MEASURES

Spillage If the cylinder is leaking, evacuate area of personnel. Inform manufacturer/supplier of leak. Use personal protective equipment. Carefully move material to a well ventilated remote area, then allow to discharge. Do not attempt to repair leaking valve or cylinder safety devices.

7. STORAGE AND HANDLING

Storage Do not store near incompatible materials. Cylinders should be stored below 45°C in a secure area, upright and restrained to prevent cylinders from falling. Cylinders should also be stored in a dry, well ventilated area constructed of non-combustible material with firm level floor (preferably concrete), away from areas of heavy traffic and emergency exits.

Handling Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Do not drag, drop, slide or roll cylinders. The uncontrolled release of a gas under pressure may cause physical harm. Use a suitable hand truck for cylinder movement.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m³	ppm	mg/m³
Carbon dioxide	SWA (AUS)	5000	9000	30000	54000
Carbon dioxide in coal mines	SWA (AUS)	12500	22500	30000	54000

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain vapour levels below the recommended exposure standard.

PPE

Eye / Face Wear safety glasses.

Hands Wear leather or cotton gloves.

Body Wear safety boots.

Respiratory Where an inhalation risk exists, wear Self Contained Breathing Apparatus (SCBA) or an Air-line respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance COLOURLESS GAS
Odour ODOURLESS
Flammability NON FLAMMABLE
Flash point NOT RELEVANT

Boiling point	NOT AVAILABLE
Melting point	NOT AVAILABLE
Evaporation rate	NOT APPLICABLE
pH	NOT APPLICABLE
Vapour density	NOT AVAILABLE
Specific gravity	NOT APPLICABLE
Solubility (water)	0.759 cm^3/cm^3
Vapour pressure	6300 kPa @ 25°C (Approximately)
Upper explosion limit	NOT RELEVANT
Lower explosion limit	NOT RELEVANT
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Partition coefficient	NOT AVAILABLE
% Volatiles	100 %
Critical pressure	7,380 kPa (Approximately)
Critical temperature	31°C (Approximately)
Sublimation temperature	-78°C (Approximately)
Cylinder pressure (when full)	6300 kPa @ 25°C (Approximately)
Density	1.53 (Air = 1)

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended conditions of storage.
Conditions to Avoid	Avoid shock, friction, heavy impact, heat, sparks, open flames and other ignition sources.
Material to Avoid	Moist carbon dioxide is corrosive, hence acid resistant materials are required (stainless steel). Certain properties of some plastics and rubbers may be affected by carbon dioxide, ie. embrittlement, leaching of plasticisers, etc. Dust of aluminium, chrome and manganese ignite and explode when heated in carbon dioxide. Incompatible with acrylaldehyde, aziridine, metal acetylides, sodium peroxide. Corrosive when moist.
Hazardous Decomposition Products	May evolve toxic gases if heated to decomposition.
Hazardous Reactions	Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Asphyxiant gas. Severe frost-bite burns may result from exposure to cold vapour or liquid. Carbon dioxide concentrations of 3-5 % in air cause increased respiration and headache. Concentrations of 8-15% cause headache, nausea and vomiting which may lead to unconsciousness if not moved to open air and given oxygen. Inhalation of a mixture containing no oxygen may result in unconsciousness from the first breath and death may follow in minutes. Adverse health effects to long term exposure to carbon dioxide have not been reported. However, in environments such as submarines where exposure to levels of 0.5-1.0% may occur, specialist medical opinion should be sought on the effects of long term exposure.
Eye	Direct contact with evaporating liquid may result in cold burns, similar to frostbite injury, with possible permanent damage. Contact with dry ice powder could result in frostbite or cold burns.
Inhalation	Asphyxiant. Effects are proportional to oxygen displacement. Acts as a simple asphyxiant by displacing oxygen in the lungs thereby diminishing the supply of oxygen to the blood and tissues.
Skin	Direct contact with the liquefied material or escaping compressed gas may cause cold burns similar to frostbite injury. Skin contact with dry ice powder could result in frostbite or cold burns.
Ingestion	Ingestion is considered unlikely due to product form. Ingestion will cause severe cold burns to mouth and throat.
Toxicity Data	CARBON DIOXIDE (124-38-9) LC50 (inhalation) 470000 ppm/30M (rat) LCLo (inhalation) 9 pph/5M (human)

12. ECOLOGICAL INFORMATION

Environment	When discharged to the atmosphere, carbon dioxide may contribute to the greenhouse effect.
Ecotoxicity	When discharged to the atmosphere in large quantities, carbon dioxide may contribute to the greenhouse effect.

Persistence/Degradability Not applicable.
Mobility Not applicable.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Cylinders should be returned to the manufacturer or supplier for disposal of contents.
Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
UN Number	1013	-	-
Proper Shipping Name	CARBON DIOXIDE	-	-
DG Class/ Division	2.2	-	-
Subsidiary Risk(s)	None Allocated	-	-
Packing Group	None Allocated	-	-
GTEPG	2C1		
Hazchem Code	2T		

Other Information Ensure cylinder is separated from driver and that outlet of relief device is not obstructed. Refer to Commonwealth, State and Territory Dangerous Goods Legislation which contain requirements which affect gas storage and transport.

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP)

Inventory Listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

16. OTHER INFORMATION

Additional Information The storage of significant quantities of gas cylinders must comply with AS4332 The storage and handling of gases in cylinders.

APPLICATION METHOD: Gas withdrawal: gas regulator of suitable pressure and flow rating fitted to cylinder or manifold with low pressure gas distribution to equipment. Liquid withdrawal: may be used as liquid or vapourised for pressure regulated gas distribution.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this ChemAlert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
GHS	Globally Harmonized System
IARC	International Agency for Research on Cancer
mg/m³	Milligrams per Cubic Metre
PEL	Permissible Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TLV	Threshold Limit Value
TWA/OEL	Time Weighted Average or Occupational Exposure Limit

Revision History

Revision	Description
1.0	Standard SDS Review

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared By

Risk Management Technologies
5 Ventnor Ave, West Perth
Western Australia 6005
Phone: +61 8 9322 1711
Fax: +61 8 9322 1794
Email: info@rmt.com.au
Web: www.rmt.com.au

Revision: 1
SDS Date: 09 March 2012

End of SDS

Appendix D: Tanglefoot MSDS

MATERIAL SAFETY DATA SHEET

The Tanglefoot Company

Emergency Phone: 800-215-0938
The Tanglefoot Company
Grand Rapids MI 49504

Date of Preparation: 03/01/07

TANGLEFOOT®
Tangle-Trap™ Insect Trap Coating Brushable

SECTION I: IDENTIFICATION

MANUFACTURER: **THE TANGLEFOOT COMPANY**
314 STRAIGHT ST. SW
GRAND RAPIDS, MI 49504

PHONE: 616/459-4139
FAX: 616/459-4140
E-MAIL: INFO@TANGLEFOOT.COM

TRADE NAME: Tanglefoot® Tangle-Trap™ Insect Trap Coating
IDENTITY: Tangle-Trap™ Brushable Formula

CHEMICAL FAMILY: Petro Chemical

HAZARD CLASSIFICATION:

HEALTH	1
FIRE	2
REACTIVITY	0

SECTION II: HAZARDOUS INGREDIENTS

Hazardous components (Specific Chemical Identity; Common Names(s))		OSHA PEL	ACGIH TLV
Synthetic Isoparaffinic Hydrocarbon	CAS No. 64742-48-9	N/A	N/A

SECTION III; PHYSICAL DATA

BOILING POINT:	Not Determined	**SPECIFIC GRAVITY** (H_20 = 1):	0.89
VAPOR PRESSURE (MM Hg):	N/A	**MELTING POINT:**	Not Determined
VAPOR DENSITY (AIR = 1):	N/A	**EVAPORATION RATE**	Not Determined
SOLUBILITY IN WATER:	Negligible	**% VOLATILE:**	Negligible
APPEARANCE AND ODOR:	Clear gel with slight rubber odor	**Bulk Density:**	N/A

SECTION IV: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: **156.2**°F. / 69.°C Penske Martin CCT **FLAMMABLE LIMITS:** UEL: N/A LEL N/A

EXTINGUISHING MEDIA: Foam, CO_2, dry chemical, water- apply to burning area.

SPECIAL FIRE FIGHTING PROCEDURES: Material will flow when hot. Contain material to reduce spreading. Firefighters should wear self-contained breathing apparatus. If leak / spill has not ignited use water spray to disperse any possible vapors.

UNUSUAL FIRE & EXPLOSION HAZARDS: Respiratory and eye protection is required.

SECTION V: HEALTH HAZARD DATA & EMERGENCY FIRST AID PROCEDURES

ROUTES OF ENTRY: **Eyes:** Yes **SKIN:** Yes **INHALATION:** No **INGESTION:** Yes

HEALTH HAZARDS (Acute and Chronic): No significant health hazards exist. Redness and irritation may occur on contaminated skin and eye contact may be slightly irritating, but product does not cause long-term adverse health effects. For hot product, cool immediately and treat as a burn.

MATERIAL SAFETY DATA SHEET

The Tanglefoot Company

Emergency Phone: 800-215-0938
The Tanglefoot Company
Grand Rapids MI 49504

Date of Preparation: 03/01/07

TANGLEFOOT®
Tangle-Trap™ Insect Trap Coating Brushable

SECTION V: HEALTH HAZARD DATA & EMERGENCY FIRST AID PROCEDURES (continued)

CARCINOGENICITY - No **NTP** - No **SKIN -** No **OSHA Regulated? -** No

EYES:	**Effect:**	May be slightly irritating but does not injure eye tissue.
	First Aid:	Flush with water. If irritation continues, seek medical attention.
	Protection:	None required; however, use of eye protection is good practice.
SKIN:	**Effect:**	None. If irritation develops obtain medical attention
	First Aid:	To remove, wash skin with waterless hand cleaner. then wash with soap and water.
	Protection:	None required; however, use of protective gloves/clothing is good practice.
INHALATION:	**Effect:**	No significant health hazards identified.
	First Aid:	If breathing becomes difficult, move to fresh air, seek medical attention.
	Protection:	None required; use in ventilated area.
INGESTION:	**Effect:**	No significant health hazards identified.
	First Aid:	If large amount is swallowed, get medical attention.

SECTION VI: REACTIVITY DATA

STABILITY: Stable **CONDITIONS TO AVOID:** Open flames or direct ignition.
HAZARDOUS DECOMPOSITION PRODUCTS: May form toxic gases if exposed to open flame.
HAZARDOUS POLYMERIZATION: Will not occur

SECTION VII: SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED OR RELEASED: Contain with an absorbent material. Remove all ignition sources.
WASTE DISPOSAL METHOD: Dispose of waste material in sanitary landfill unless otherwise directed by applicable ordinances.

SECTION VIII: REGULATORY INFORMATION

OSHA Hazard Communication Standard: Fire Hazard. Contains component defined as a fire hazard in 29 CFR1910.1200.
SARA Title III Section 302 Extremely Hazardous Substances (40 CFR Part 355) None
SARA Title III Section 311/312 Hazardous Categorization (40 CFR Part 370) None
SARA Title III Section 313 (40 CFR Part 372) None.
CERCLA Sections 102A/103 Hazardous Substances (40 CFR Part 302.4). None

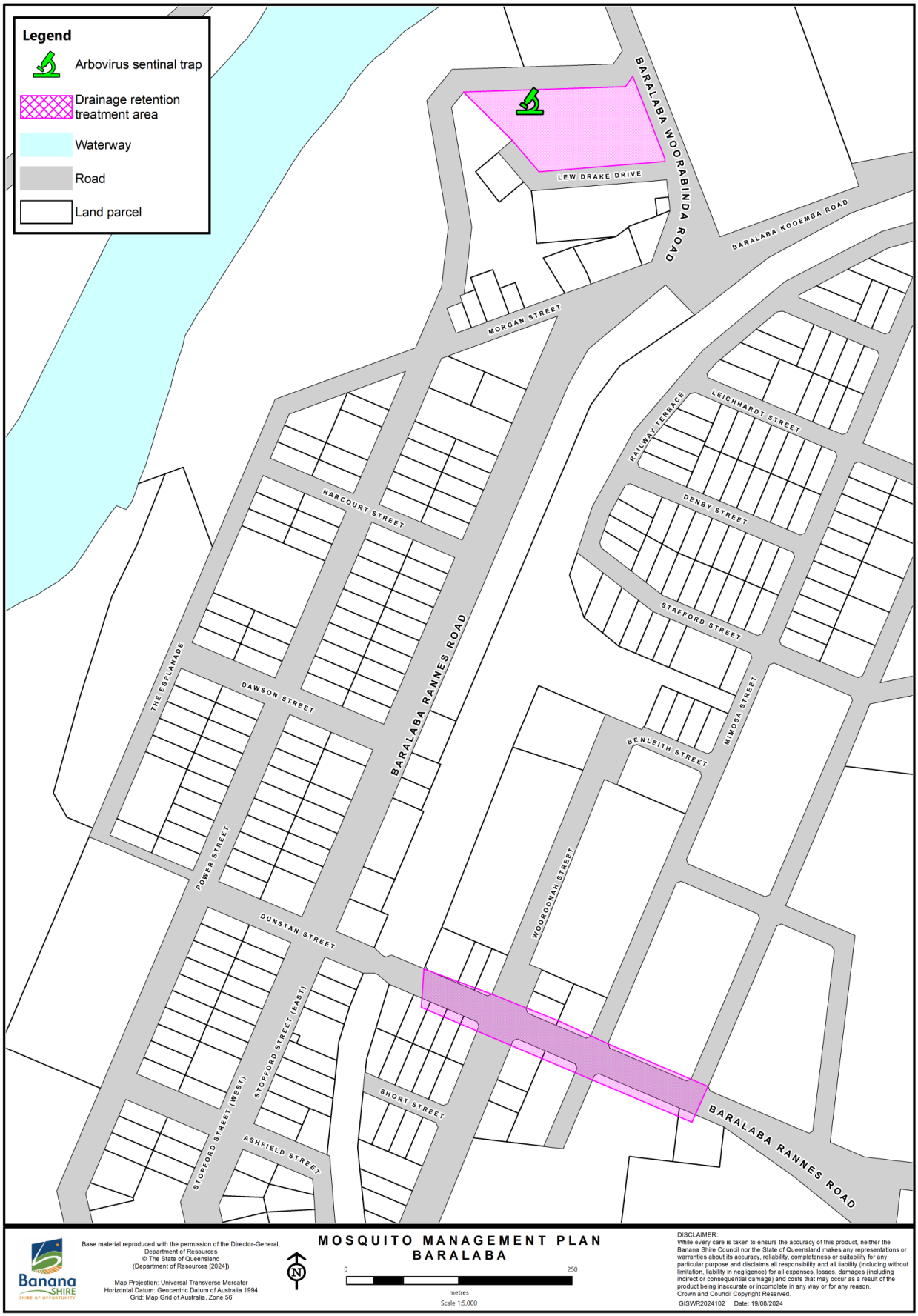
SECTION IX: SHIPPING INFORMATION

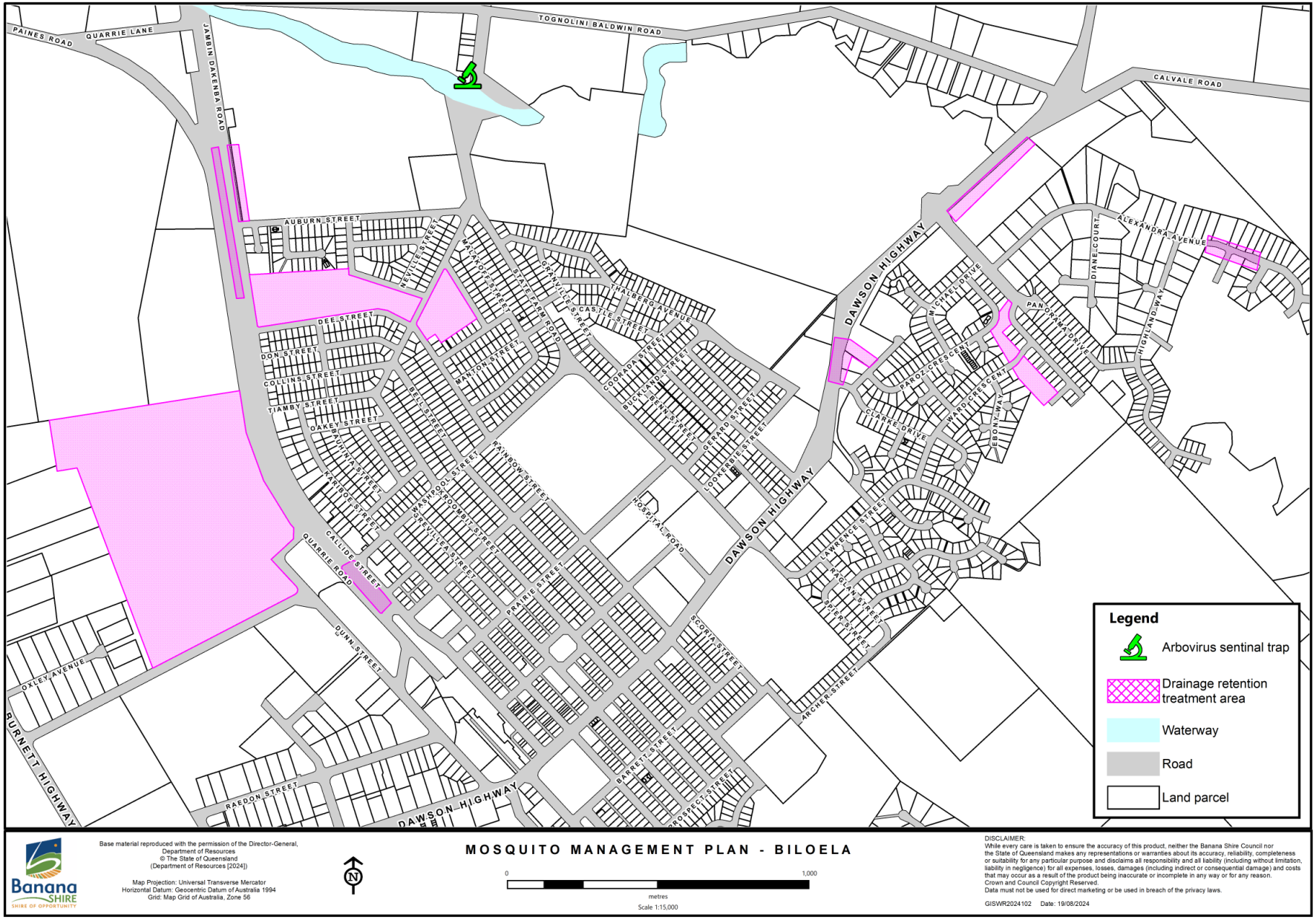
DOT CLASSIFICATION: Not Regulated.
BILL OF LADING DESCRIPTION: Adhesives, NOI, Sub 5, and Class 60
UN IDENTIFICATION NO: UN1268

SECTION X: DISCLAIMER AND/OR COMMENTS

This information in this MSDS was obtained from sources, which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied, regarding its accuracy or corrections. The conditions of handling storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, and use of disposal of the product.

Appendix E: Historically Treated Drainage/Detention Areas & Arbovirus Sentinel Surveillance Locations (By Town)


Legend
Arbovirus sentinal trap
Drainage retention treatment area
Waterway
Road
Land parcel
BARALABA WOORABINDA ROAD
LEW DRAKE DRIVE
BARALABA KOOEMBA ROAD
MORGAN STREET
RAILWAY TERRACE
LEICHHARDT STREET
DENBY STREET
STAFFORD STREET
HARCOURT STREET
THE ESPLANADE
DAWSON STREET
BARALABA RANNES ROAD
MIMOSA STREET
BENLEITH STREET
POWER STREET
WOORONAH STREET
DUNSTAN STREET
STOFFORD STREET (EAST)
STOFFORD STREET (WEST)
SHORT STREET
ASHFIELD STREET
BARALABA RANNES ROAD
Banana SHIRE
SHIRE OF OPPORTUNITY
Base material reproduced with the permission of the Director-General, Department of Resources
© The State of Queensland
(Department of Resources [2024])
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56
N
0
250
metres
Scale 1:5,000
MOSQUITO MANAGEMENT PLAN
BARALABA
DISCLAIMER:
While every care is taken to ensure the accuracy of this product, neither the Banana Shire Council nor the State of Queensland makes any representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs that may occur as a result of the product being inaccurate or incomplete in any way or for any reason.
Crown and Council Copyright Reserved.
GISWR2024102 Date: 19/08/2024



Banana SHIRE
SHIRE OF OPPORTUNITY

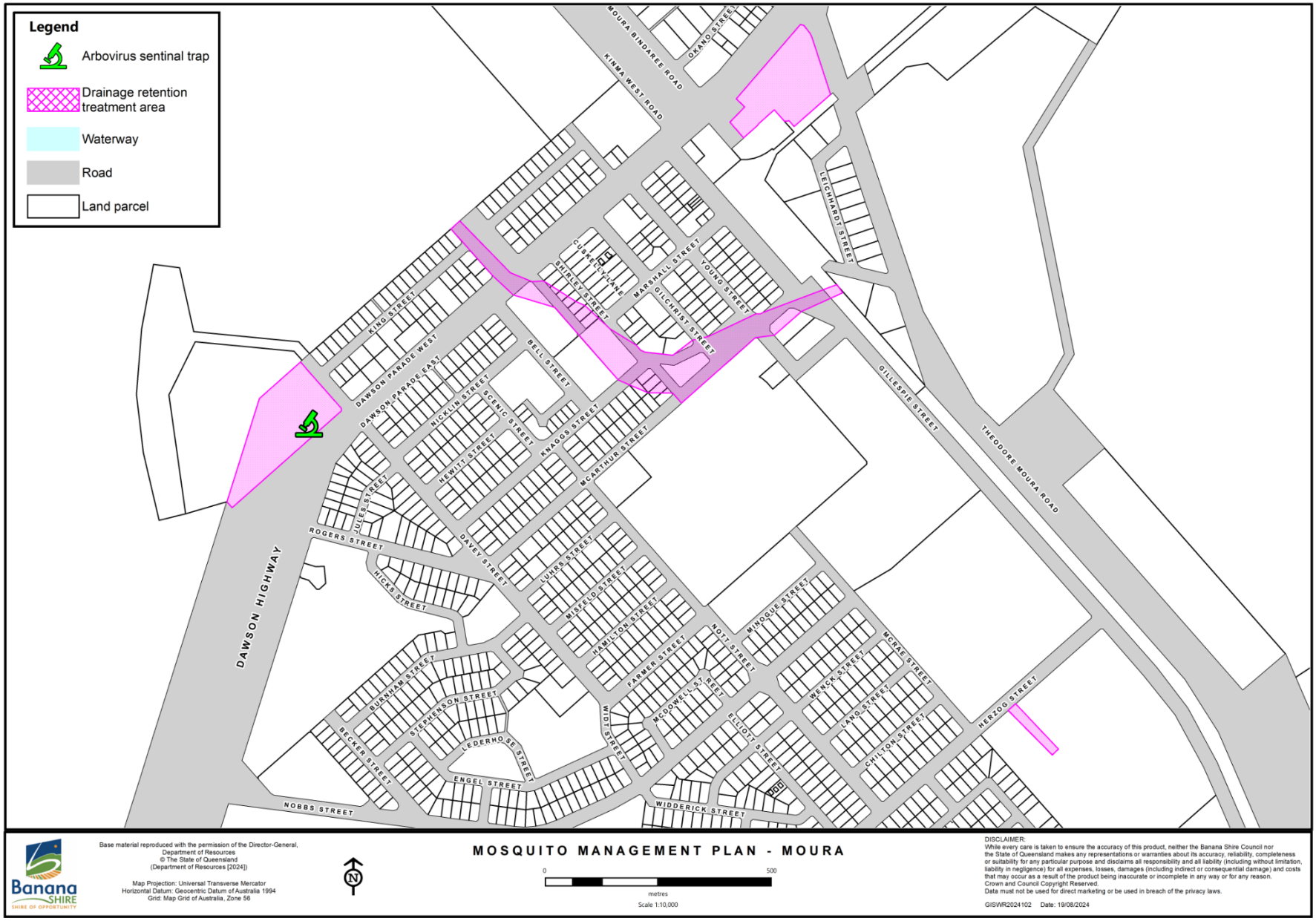
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

N

MOSQUITO MANAGEMENT PLAN - BILOELA

0 1,000
metres
Scale 1:15,000

GISWR2024102 Date: 19/08/2024



Banana SHIRE
SHIRE OF OPPORTUNITY

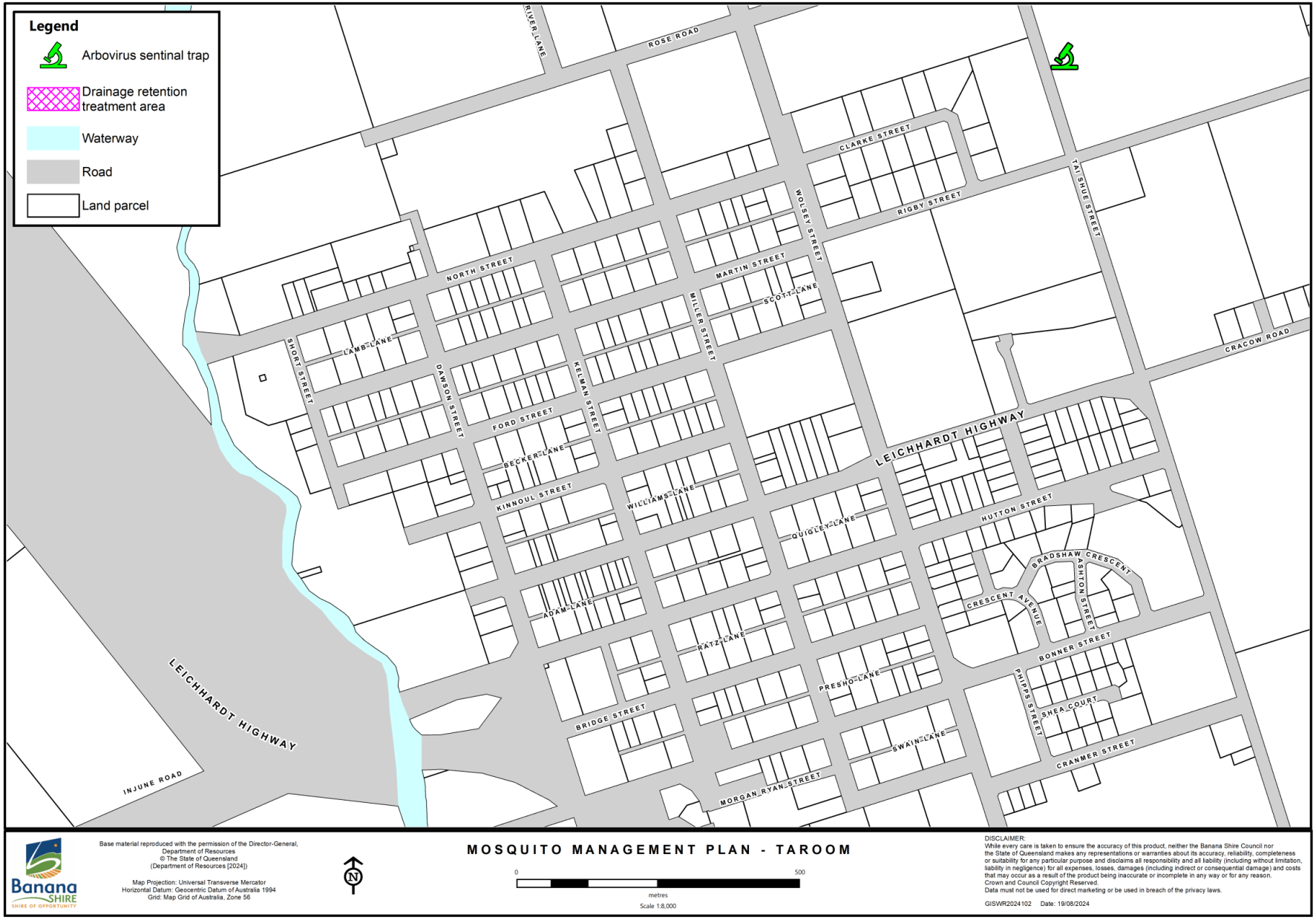
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56

N

MOSQUITO MANAGEMENT PLAN - MOURA

0 500
metres
Scale 1:10,000

GISWR2024102 Date: 19/08/2024


Legend
Arbovirus sentinal trap
Drainage retention treatment area
Waterway
Road
Land parcel
ROSE ROAD
RIVER LANE
CLARKE STREET
RIGBY STREET
TAI SHUE STREET
WOLSEY STREET
MARTIN STREET
SCOTT LANE
NORTH STREET
MILLER STREET
CRACOW ROAD
LAMB LANE
SHORT STREET
DAWSON STREET
KELMAN STREET
FORD STREET
BECKER LANE
KINNOUL STREET
WILLIAMS LANE
LEICHHARDT HIGHWAY
HUTTON STREET
QUIGLEY LANE
BRADSHAW CRESCENT
ASHTON STREET
CRESCENT AVENUE
BONNER STREET
ADAM LANE
RATZ LANE
PRESHO LANE
PHIPPS STREET
SHEA COURT
CRANMER STREET
BRIDGE STREET
SWAIN LANE
MORGAN RYAN STREET
LEICHHARDT HIGHWAY
INJUNE ROAD
Banana SHIRE
SHIRE OF OPPORTUNITY
Base material reproduced with the permission of the Director-General, Department of Resources
© The State of Queensland
(Department of Resources [2024])
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56
N
MOSQUITO MANAGEMENT PLAN - TAROOM
0
500
metres
Scale 1:8,000
DISCLAIMER:
While every care is taken to ensure the accuracy of this product, neither the Banana Shire Council nor the State of Queensland makes any representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs that may occur as a result of the product being inaccurate or incomplete in any way or for any reason.
Crown and Council Copyright Reserved.
Data must not be used for direct marketing or be used in breach of the privacy laws.
GISWR2024102 Date: 19/08/2024

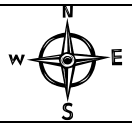
Appendix F – Advice/Record of a Pest Control Activity

Banana SHIRE SHIRE OF OPPORTUNITY	*Biloela Administration Office* *62 Valentine Plains Road* *Biloela QLD 4715* *Telephone Number: 07 4992 9500* *Email: enquiries@banana.qld.gov.au*

Advice / Record of a Pest Control Activity
Section 46 Medicines and Poisons (Pest Management Activities) Regulation 2021

DATE	**START TIME**	**FINISH TIME**	
PMT Name		PMT Licence No.	
PMT Name		PMT Licence No.	
Vehicle Registration No.			
Address where activity carried out			
Owner/Occupier Name		Telephone No.	

TYPE OF PREMISES: **Residential (single)** **Commercial** **Hotel/Motel**
Residential (Multi level) **Other (specify)----------**

Pesticide	**Active Constitute**	**Rate**		**Quantity Used**	
DILUTANT:	**Water**	**Hydrocarbon**	**Nil**	**Other:**	
EQUIPMENT USED:	**Fogger**	**ULV**	**Spray Tank**	**Hand Rega**	**Spreader**
AREA TREATED:	**Dense**	**Scattered**	**Sparse**	**Plants/trees**	**Regrowth**
	Grass	**Water**	**Rock Wall**	**River bank**	**Structure**
METHOD OF APPLICATION	**High Volume**	**Low Volume**	**Long Hose**	**Boom**	**Fogger**
	ULV	**Aerial**	**Hand**	**Other**	
WIND SPEED	**0 - 10km/hr**	**11 – 20km/hr**	**21 – 30km/hr**	**WIND DIRECTION (indicate on diagram)**	
WEATHER CONDITIONS	**Fine**	**Showers**	**Humid**	**Overcast**	**Cool**
	Warm	**Hot**	**Other:**		
PURPOSE	**Mosquito Control**		**Black Fly Control**		
SIGNATURE (Licensed PMT)			***SIGNATURE (Licensed PMT)***		

Appendix G – Larval Collection Sheet Example

DATA SHEET – LARVAL COLLECTION											
Date:	**Time:**			**Collector:**							
Site No.:	**GPS:**			**Rain (mm)**				**High Tides**			
Street:	**Map Ref:**			**Previous 24hrs:**				**Previous 24hrs:**			
Photograph:				**Previous week:**				**Previous week:**			
Breeding Site characteristics (circle the relevant descriptors):											
Site type	Size class	Water	Vegetation	**Bottom**	**Shade**						
Swamp	< 5m^2	Fresh	Fringing	Organis	Exposed						
Marsh	>5 – 10m^2	Saline	Emergent	Mud	½ Shade						
Permanent pond	>10 – 20m^2	Running	Floating	Sand	Deep shade						
Temporary pool/depression	>20-50m^2	Stagnant	Algal mat	Rocks							
Natural/semi natural drain	>50-100m^2	Clear	Other	Concrete							
Artificial drain	>100-200m^2	Turbid		Other							
Tyre track	>200-500m^2	Foul									
Container	>500-1000m^2										
Other (specify)	>1000-5000m^2										
	>0.5-1ha										
	>1ha										
	Other										
Surrounding vegetation, within 50M (circle the relevant description)											
Protective foliage cover of tallest stratum											
Tallest stratum	Dense (70-100%)	Mid dense (30 – 70 %)		Sparse (10 – 30 %)	Very sparse (<10%)						
Trees >30m	Tall closed forest	Tall open forest		Tall woodland	Tall open woodland						
Trees 10–30m	Closed forest	Open forest		Woodlland	Open woodland						
Trees 5-10m	Low closed forest	Low open forest		Low woodland	Low open woodland						
Shrubs 2-8m	Closed scrub	Open scrub		Low scrubland	Low open scrubland						
Shurbs <2m	Closed hearth	Open hearth		Low shrubland	Low open shrubland						
Herbs/grasses (<2m)	Closed grassland	Grassland		Open grassland	Low open grassland						
Larval collections:											
Dip	No.	Instar	Pupae	Dip	No.	Instar	Pupae	Dip	No.	Instar	Pupae
1				6				11			
2				7				12			
3				8				13			
4				9				14			
5				10				15			
Species											
Sketch map of site on back of sheet											

Appendix H – Adult Trapping Data Set

Adult Trapping Data																
Trap No.	Location: Date: Time Out: Time In:	*Aedes aegypti*	*Aedes alternans*	*Aedes vittiger*	*Anopheles annulipes*	*Culex annulirostris*	*Coquillettidia xanthogaster*	*Mansonia uniformis*	*Ochlerotatus notoscriptus*	*Culex halifaxii*	*Culex quinuefasciatus/fatigans*	*Mimomyia elegans*	*Toxorhynchites*	Damaged	Male	Total Number per Trap	Comments
BSC 001																	
BSC 002																	
BSC 003																	
BSC 004																	
BSC 005																	
BSC 006																	
Weekly Total:																	

Weather Conditions					
	Fine	Scattered Cloud	Overcast	Light Rain	
	Temperature	Min:	Max:	Wind Speed:	Wind Direction:
	Tides	Low:	High:		Overnight Rainfall:
	Moon Phase:		Humidity:		Weekly Rainfall: