TriCare Hastings Point
Biting Insect Impact Assessment

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Prepared by

Darryl McGinn
Director and Medical Entomologist

Mosquito Consulting Services Pty Ltd
ACN 095 739 067
PO Box 339, Mt Ommaney 4074
Mobile: 0404043867
e-Mail: Darryl.McGinn@mcspty.com
ABN: 16 095 739 067

1.0 Introduction

In March 2024, TriCare (Hastings) Limited commissioned Mosquito Consulting Services Pty Ltd to undertake a Biting Insect Impact Assessment at its proposed further development at Tricare Hastings Point. The subject site is located at 87-89 Tweed Coast Road, Hastings Point.

The biting insect assessment was undertaken within the context of providing an entomological report that addresses Tweed Shire Council's Development Control Plan, Part 6 – Biting Midge and Mosquito Management.

In May 2025, this report was updated following a review of the landscape plan by Arcadia and Restoration Management Plan by Cumberland Ecology. These plans are reviewed in section 5 of this report, Mosquito Risk Assessment.

1.1 Site Locality

The proposed development site is located at 87-89 Tweed Coast Road, and described as Lot 1 on DP 786570, comprising a single 37, 970m^2 allotment bound by Cudgera Creek to the west, council reserves to the north and south and Tweed Coast Road to the east.

Figure 1 shows an aerial view of the development site.

Figure 1: Aerial view of development site

2.0 Biting Insect Survey Methodology

Adult biting midges and mosquitoes were collected using a combination of specifically designed light traps and human bait sweep net. One light trap was deployed over two nights and was baited with carbon dioxide gas emitted at 350ml/min and the chemoattractant, Octenol (1-octen-3-ol). The light trap was located within the remnant coastal forest (under a large Moreton Bay Fig) as marked on Figure 2 of the site and operated between 16:00 hrs and 09:00 hrs the following day. Figure 3 shows a mosquito trap and typical overnight collection from this site 13-14 March and 8-9 April 2024 respectively. A planned biting insect collection night on 20 March was abandoned due to high winds.

Sweep netting of biting insects using human bait was also undertaken on those dates. Subject to the abundance of biting insect activity sweep netting is usually conducted between 5 and 20 minutes per collection. In this instance, collection time was 20 minutes.

Figure 2: Biting insect collecting locations on site.

Figure 3: Mosquito trap deployed on site 13 March and collection recovered 14 March 2024.

Collected adult mosquitoes were returned to the laboratory for microscope identification to species and counting.

3.0 Biting Insect Survey Results TriCare Hastings Point March/April 2024

The adult mosquito traps and sweep netting collected mosquitoes from three genera and five species. Three species of biting midges were collected. The collection results are presented in Table 1 below.

Table 1: Mosquitoes 2024

Species	13-14 March	8-9 April	Species total
Aedes procax	7	12	**19**
Aedes vigilax	18	24	**42**
Culex annulirostris	16	14	**30**
Culex sitiens	3	8	**11**
Verrallina funerea	27	37	**64**
Total mosquitoes	**71**	**95**	**166**

Table 2: Biting Midges 2024

Sub sample x 4	13-14 March	8-9 April	Species total
C. mamoratus	212	104	**316**
C. molestus	268	248	**516**
C. subimmaculatus	500	668	**1,168**
Total biting midges	**980**	**1,020**	**2,000**

4.0 Survey Discussion

The TriCare site biting insect collections are considered consistent with other collections of biting insects conducted in the general locality of Cudgera Creek (in particular at Creek Street in early 2024). The overall numbers of biting insects is regarded as relatively low in comparison to collections made in other locations including River Heads, Harvey Bay, Queensland by the author where light traps routinely collect > 10,000 biting midges per trap per night.

Biting midge production and abundance in this locality should remain reasonably consistent due to predictable tide cycles triggering adult emergence for their estuarine breeding habitats, in this case, clean sand bars and sandy mud creek banks. Mosquito populations are more influenced by weather causing flooding of freshwater and brackish water breeding habitat. There is little saltmarsh available for production of the saltmarsh mosquito, *Aedes vigilax* at this locality. Presence of this important pest biting species in the TriCare collections is most likely due to its wide dispersal from coastal saltmarsh breeding habitats associated more with the Tweed River estuary.

The proposal incorporates four (4) new buildings, which comprise of independent living units (Figure 5 is the indicative concept plan), as well as amenities including a pool pavilion and bowling green. The buildings are proposed at three

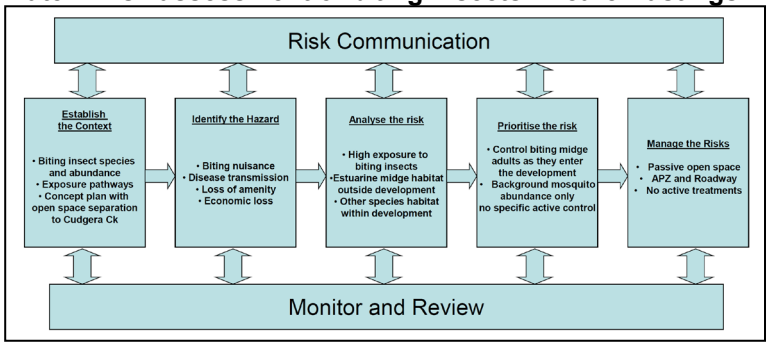
(3) storeys, with underground basement parking. The built portion of the proposed development is separated from Cudgera Creek by landscape features providing open space that will serve as an effective mosquito and biting midge buffer including, (4) communal green spaces, (5) emergency vehicle access and pedestrian path as indicated in Fig 5. The vehicle access roadway is also designated for the Asset Protection Zone.

Figure 5: Proposed Landscape Master Plan (ARCADIA)

5.0 Mosquito Risk Assessment

Analysis of mosquito risk management needs for the TriCare Hastings Point site are based on the methodology contained within AS/NZS ISO 31000 of 2009, itself developed from the previous standard AS/NZS 4660:2004. In this methodology, risk is communicated in terms of hazards in a specific context of likely human impacts, in this case from exposure to mosquitoes. Plate 7 is a graphical overview of an analysis of mosquito related risk at the Tricare Hastings Point site using this methodology.

Plate 7 Risk assessment of biting insects Tricare Hastings Point



The site is near areas of biting midge breeding habitat associated with Cudgera Creek and referenced in Tweed Shire Council's DCP mapping of mosquito and biting midge breeding habitats. However, the site collections of biting insects shows that biting midge abundance is relatively low and reflects somewhat the limited tidal range in the creek at this distance from its mouth. The amount of clean sand banks and creek bank is relatively small and production of biting midges adjacent to the site is not extensive. The only hazard is the potential of biting midge to cause nuisance biting to future residents of the site if there were ready dispersal of biting midges from the creek sand bank and muddy edge breeding habitat into residential living units and occupied community facilities.

Tweed Shire Council Development Control Plan, Section A6, Biting Midge and Mosquito Control. Section 6.3.2 of the DCP calls for a number of controls to minimise nuisance and disease risk from mosquitoes and biting midges and includes the suggested considerations:

a. 50-100m buffer zones.
b. Elimination (if possible) of standing water impoundments into potential mosquito breeding areas.
c. Drains should be free draining.

Controls b. and c., in this context are not relevant and not further addressed in this assessment.

The proposed development provides for some revegetation in the core rehabilitation zone and residual outer rehabilitation area. Biting insect intrusion will be minimised via the Asset Protection Zone and will comprise a minimum 15% tree canopy cover and a maximum of 10% shrub ground cover (ARCADIA Key Area Summary). The proposed plantings for the APZ (Zones 3a, 3b and 3c) (Cumberland Restoration Management Plan, Table 20 Proposed planting list) have been reviewed and are considered consistent with the function of the mosquito and biting midge buffer.

As such, that APZ provides an effective biting insect buffer in the context of the recorded low abundance of mosquitoes and biting midges at the development site. In the paragraph specifying the buffer zone range of 50-100m, the Tweed Shire Council's DCP also includes the qualification:

> ***This zone will vary widely with circumstances, from as little as 50m to 1km. This zone can usually be determined by a field survey during the warmer months of the year and by consulting the attached biting insect breeding area distribution maps.***

The range of 50m to 1km is somewhat anecdotal and a general rule of thumb. It is not based on any objective scientific studies. This impact assessment is informed by a field survey conducted (as specified by Council) during March and early April and in consultation with Council's biting midge breeding habitat

mapping. This assessment is also informed by many impact assessments conducted since 2001 using the same methodology in several northern NSW local government areas including Tweed, Ballina, and Byron and in southeast Queensland Sunshine Coast. In the case of Ballina, Mosquito Consulting Services Pty Ltd undertook mosquito dispersal studies over open space buffers that concluded typical APZ dimensions were also an optimal buffer to minimise short-range mosquito movements, including for *Verrallina funerea,* dispersing from harbourage vegetation to residential allotments. In the Queensland Sunshine Coast, APZ buffers were also shown to be effective for minimising passage of biting midges from harbourage vegetation to residential allotments. This standard has been widely applied to biting insect buffer zone specifications for development applications informed by biting insect impact assessment completed by a qualified and experienced medical entomologist.

8.0 Conclusions

The results of this mosquito and biting midge impact assessment should provide Tweed Shire Council with confidence that the proposed development meets the expectation of its Development Control Plan part A6 and has addressed its expectations regarding biting insect management in aged care facilities. The abundance of biting midges at this site is low due to the relatively small areas of potential breeding sites. Mosquito exposure at the development site is also low and amounts to background abundance and will also be controlled by inclusion of the open space acting as an effective biting insect buffer including the communal green space transitioning inwardly to the emergency vehicle access (including the APZ) with plantings considered acceptable to allow for breezeway minimising biting insect dispersal.

It is our conclusion that the proposed development meets the expectations of the part A6 Biting Midge and Mosquito Control provisions of Tweed Shire Council's Development Control Plan.

Darryl McGinn
Mosquito Consulting Services Pty Ltd.
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