Mosquito and Biting Midge Impact Assessment

Lot 157 Creek Street
Hastings Point
Tweed Sire Council
For
Walter Elliott Holdings Pty Ltd

Prepared by

Darryl McGinn
Director and Principal Entomologist
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Mosquito Consulting Services Pty Ltd
ACN 095 739 067
PO Box 339, Mt Ommaney 4074
Ph./Fax: (07) 33761856
Mobile: 0404043867
e-Mail: mosquitosi@iprimus.com.au
ABN: 16 095 739 067

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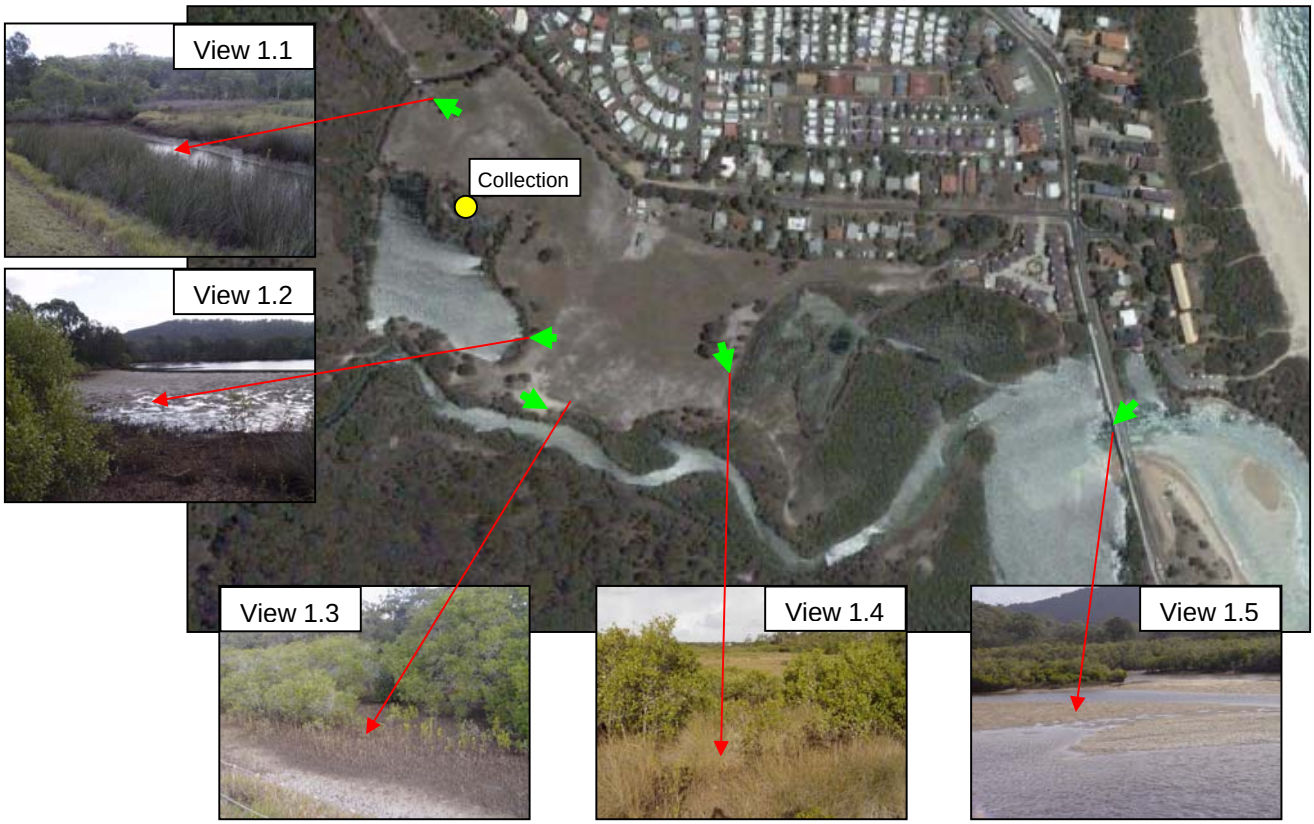
1.0 Introduction

In May 2008, Walter Elliot Holdings Pty Ltd engaged Mosquito Consulting Services Pty Ltd to conduct a mosquito and biting midge impact assessment on its development at Lot 156 Creek Street Hastings Point. The impact assessment addresses Tweed Shire Council's Development Control Plan (DCP) Section A6 – Biting Midge and Mosquito Control.

An inspection of potential mosquito and biting midge breeding; and collection of biting insects was conducted on the development site in May 2008. Adult biting midge landing to blood feed were sampled for identification. The proposed urban design of the development was reviewed for likely exposure to mosquitoes and biting midge and how it addresses risk management strategies recommended within the DCP.

2.0 Site Inspection and Collection Methodology

Plate 1: Aerial Photograph of Site Location and Ground Views (Point of View)



The site was inspected on 22 May 2008. Plate 1 shows an aerial view of the site location with ground level views of typical presentation of the estuarine habitat. A brief biting insect landing collection was undertaken by the author. Two X 20 minute collections were undertaken at the point indicated on Plate 1. The first collection was from 16:00 hrs to 16:20 hrs and the second from 16:25 hrs to

16:45 hrs. Further collections were abandoned due to heavy rain starting at around 16:40 hrs. Wind speed, temperature and relative humidity were recorded during the collections using a hand held weather meter (Kestrel Weather Australia model 2500). Biting insects landing on the author, seated in shaded harbourage, were collected into 70 % ethanol using a damp fine artists brush. Collected insects were returned to the laboratory for identification under microscopy using wing pictures by Dyce et al. (2007).

Plate 1 shows a number of ground level views of potential biting midge breeding habitat (at about the time of low water spring tide height) and characterised as follows:

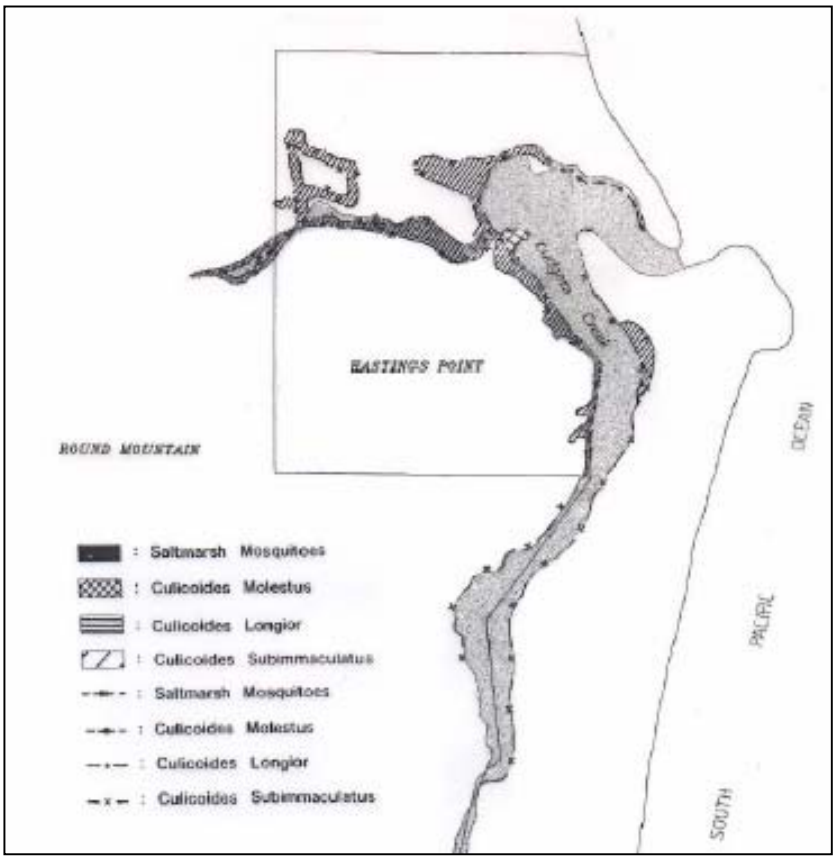
- View 1.1: Old constructed drains subject to tidal action with muddy sand substrate. Crab burrows are evident. A short network of drains occurs in the western portion of the site.
- View 1.2: Exposed sandy mud around the margins of a shallow tidal lagoon.
- View 1.3: Typical view of the margin of Christies Creek (at or near the junction with Cudgera Creek) showing mangrove (*Avicennia marina*) pneumatophores penetrating muddy sand and numerous crab holes.
- View 1.4: Salt-marsh and mangrove lined drainage lines.
- View 1.5: View from Cudgera Ck bridge overlooking the estuary and exposed clean sand-banks (foreground) and mangrove forest in muddy sand (background).

2.1 Tweed Shire Council Identified Biting Midge Habitat.

Council's Development Control Plan Section A6 provides mapping information on the location of salt-marsh mosquito and biting midge breeding habitats with in Tweed Shire. Figure 1 is reproduced from the DCP.

This map shows the margin of the estuary at Hastings Point as containing breeding habitat for the biting midge species *Culicoides subimmaculatus*. This mapping shows breeding habitat extending to the margins of the tidal lagoon and creek margins adjoining the development site.

Figure 1: Hastings Point Biting Midge and Mosquito Breeding Site Map



3.0 Results and Discussion on Site Inspection relative to the DCP

Inspection of the site on 22 May 2005 reviled that the estuary contains typical breeding habitat for biting midge species including *Culicoides subimmaculatus* as anticipated from the DCP mapping (Fig. 1). In addition to *C. subimmaculatus* habitat the estuary near the road bridge contained clean exposed sand-banks somewhat typical of breeding habitat for *Culicoides molestus*.

Given the proximity of the development site to the estuary, it would be expected that it would be exposed to biting midge when they emerge. The biting activity peak for *C subimmaculatus* is generally around the half moon corresponding to neap tides. *C molestus* biting activity is generally within the week following full and new moon (spring tides).

Biting insect landing collections conducted on site produced both *C molestus* (total of 4) and *C subimmaculatus* (total of 1). Collecting conditions for the two periods 16:00 hr – 16: 20 hr and 16:25 hr – 16:45 hr for maximum wind speed, temperature and relative humidity were 3 kts and 2.1 kts; 19 ^{0}C and 19 ^{0}C; 64% and 65% respectively. Wind gusts during collecting on site were low with a maximum of 3 kts recorded.

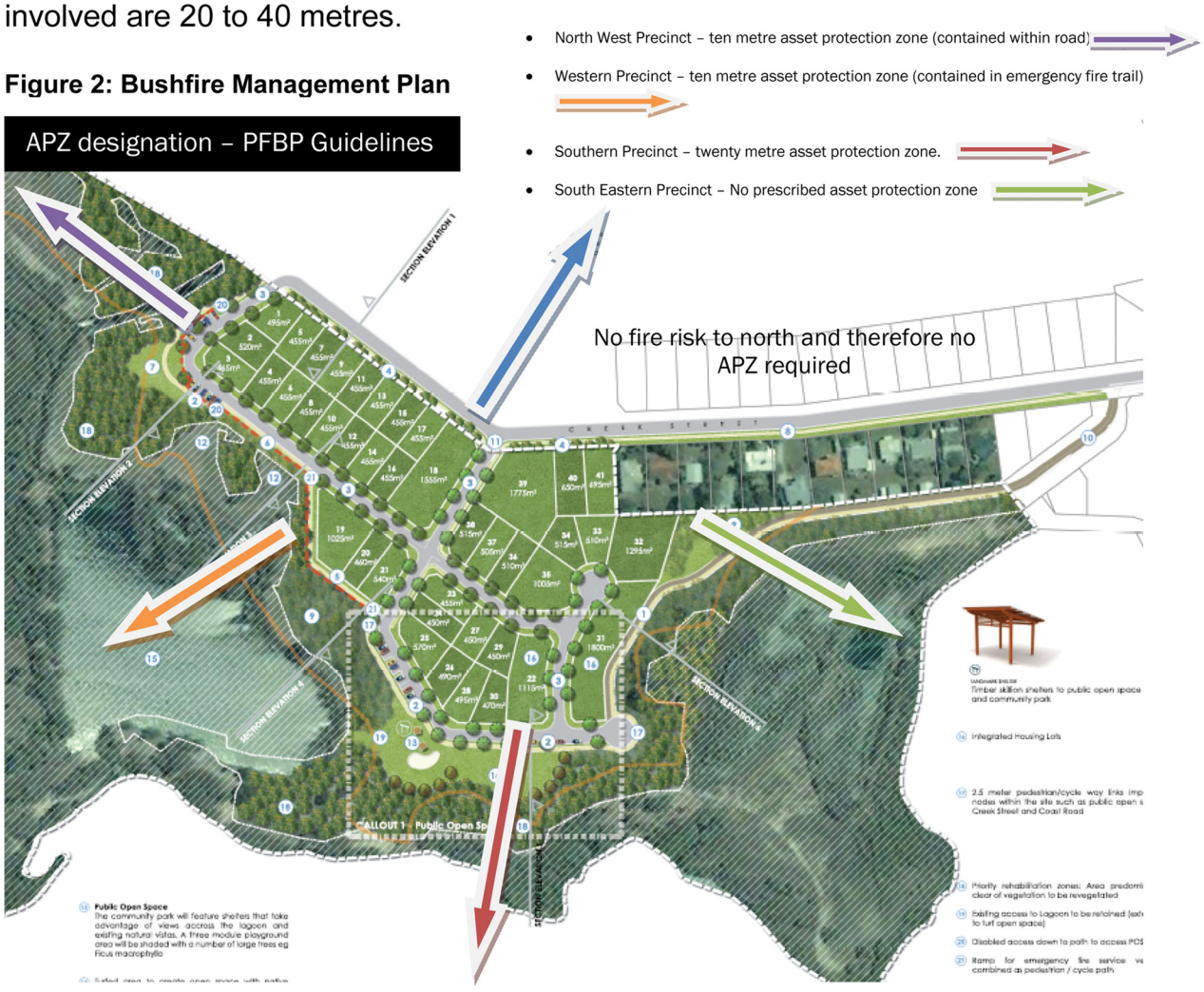
As a result of the known potential for biting midge breeding as mapped by Council's DCP and from confirmation by the author's site survey and biting insect landing collections, it should be assumed that the development site will be exposed to *C subimmaculatus* and *C molestus* following emergence around new, half and full moon tides. Precautions should be followed that help minimise exposure to future residents to biting midge that do not rely on control of breeding sites. In natural estuarine habitat there are no techniques for controlling biting midge breeding currently (or in the foreseeable future) available.

The proposed development should include buffer zones and breeze-ways of open space as its primary method of managing passage of biting midge from estuarine breeding sites to residential allotments. Dwellings should be fitted with midge proof insects screens to prevent entry through external windows and doorways.

4.0 Assessment of Proposed Development

Figure 2 reproduces the bushfire management plan drawing for the Concept Plan. It shows the alignment of an asset protection zone extending outward to varying distances from proposed allotment boundary alignments. The distances involved are 20 to 40 metres.

Figure 2: Bushfire Management Plan



It is expected that within the asset protection zone, there will be minimal vegetation for the purpose of fire protection. The presence of this zone may also serve to minimise passage of biting midge from identified estuarine breeding habitats. The general placement of the asset protection zone into the prevailing easterly and south-easterly wind would create a breeze-way that would help disrupt biting midge flight. Other open space areas should also be considered beneficial in providing breeze-ways.

The area of open space identified on Figure 2 that is south west of the asset protection zone should be maintained in a relatively clear state with mown grass and hard surface finishes predominating. It should contain no or minimal harbourage vegetation. According to Council DCP mapping (Figure 1), the development does not appear subject to significant exposure to salt-marsh mosquitoes. Buffers and breeze-ways of relatively narrow (minimum 20m) dimension may therefore be adequate to manage the existing biting midge dispersal. During periods of calm weather however, biting midge dispersal across the open space may at times, cause discomfort to residents. Reliance on midge proof screening and personal protection will be necessary at such times. Screening with midge proof material should be required at the individual Building Application stage.

5.0 Conclusions and Recommendations

Development within the general location of coastal estuarine habitat increases risk of exposure to biting midge species breeding within the intertidal zone. Through its' Development Control Plan Section A6 Biting Midge and Mosquito Control, Council has identified the Christies and Cudgera Creeks as producing two biting midge species, *Culicoides subimmaculatus* and *Culicoides molestus*. Field investigation by the author in May 2008 has confirmed Council's advice on presence of these two species both in terms of nearby available habitat and as found in biting adult collections. It would be expected that biting midge nuisance would be experienced around the development site locality following their emergence. During the warmer months of November to April, exposure would likely be greatest following new and full moon tides that stimulate emergence of *C subimmaculatus* with a secondary emergence of *C molestus* around the half moon tides.

Assessment of the proposed development plan has shown that bush fire asset protection zones will provide breeze-ways and buffering (Figure 2) of between 20 to 40 meters orientated windward of the development. Other open space is indicated beyond the asset protection zone that if maintained with minimal harbourage, will enhance the total buffer and breeze-way effect using the prevailing east to south-east winds. From time to time however when wind strength could be said to be calm, the breeze-way effect will fail to suppress biting midge dispersal and some level of biting impact may be experienced within

the development. At such times reliance on biting midge proof screening and personal protection will be required.

The following recommendations are made in relation to the nomination, nature and maintenance of biting midge buffer and breeze-ways relevant to approving this application; and, for provision of biting midge proof screening relevant to Building Application approvals in due course.

Recommendations:

1. The proposed bush fire asset protection zone and additional open space identified on Figure 2 of this report should be regarded also as a biting midge buffer and breeze-way.

2. The biting midge buffer and breeze-way should be established and maintained free of vegetation likely to provide harbourage to biting insects. It should predominately contain mown grass.

3. Biting midge proof screening should be required to be fitted to external windows and doorways for all dwellings within the development.

By accepting these recommendations, the reader should not exclude the possibility that, from time to time, biting midge activity within the development will be felt by residents. However, within the context of this development, by following these recommendations, the possible impacts should be minimised.

Darryl McGinn
Entomologist and Director
Mosquito Consulting Services Pty Ltd
30 May 2008

References:

Dyce, A.L., Bellis, G.A., Muller, M.J. 2007. Pictorial Atlas of Australasian *Culicoides* Wings (Diptera: Ceratopogonidae). ABRS, Canberra.