

# MARIN/SONOMA MOSQUITO & VECTOR CONTROL DISTRICT

NORTHWEST MOSQUITO, VECTOR AND DISEASE CONTROL  
ASSESSMENT (ASSESSMENT No. 2)



## FINAL ENGINEER'S REPORT

FISCAL YEAR 2017-18

JULY 2017

PURSUANT TO THE GOVERNMENT CODE, HEALTH AND SAFETY CODE  
AND ARTICLE XIID OF THE CALIFORNIA CONSTITUTION

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## MARIN/SONOMA MOSQUITO & VECTOR CONTROL DISTRICT

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## INTRODUCTION

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The Marin/Sonoma Mosquito and Vector Control District (“District”) is a special district that up to the year 2005 provided mosquito, vector and disease control services over an area encompassing approximately one-third of the total area of Marin and Sonoma Counties. The District included approximately 960 square miles and served over 650,000 residents.

Up to 2005, the District was responsible for mosquito and vector-borne disease surveillance services in the eastern, more densely populated areas of Marin and Sonoma Counties, including the cities of Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Novato, Ross, Sausalito, San Anselmo, San Rafael, and Tiburon in Marin County, and Cotati, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, and Windsor in Sonoma County, as well as surrounding unincorporated areas. Services in these areas are funded by an existing benefit assessment, property tax revenues, service contracts, grants, and civil liabilities. The District maintains service contracts with some large landowners and/or water dischargers, and solicits grants for research and interagency habitat management projects. In some cases, the District accepts civil liability settlements from the Marin or Sonoma County District Attorney or the California Department of Fish and Game when these settlements are directed at habitat management projects consistent with the District’s mission.

In 2004 the District proposed to expand its service area by annexing the areas in Marin and Sonoma Counties that did not receive its mosquito abatement or insect/rodent disease surveillance and abatement services (“unserved areas,” “Annexation Areas,” “Unprotected Areas” or “Service Area”), and proposed a new assessment on all specially benefiting properties within these Annexation Areas. Neither the District or any other public agency, provided mosquito control and vector-borne disease protection and prevention services in these areas that were outside of the District’s existing jurisdictional boundaries. In other words, the “baseline” level of services in the coastal, western and northern areas of Marin and Sonoma Counties (that was outside the District’s existing boundaries) was essentially zero.

The District is governed by a Board of Trustees, with one board member representing each of the twenty cities located within its service area and two board members selected by each County Board of Supervisors to represent each County at large.

This Engineer’s Report (“Report”) defines the benefit assessment that provides funding for the services in the Annexation areas of Marin and Sonoma Counties. As used within this Report and the benefit assessment ballot proceeding, the following terms are defined:

*“Vector” means any animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including, but not limited to, mosquitoes, flies, mites, ticks, other arthropods, and small mammals and other vertebrates (Health and Safety Code Section 2002(k)).*

*“Vector Control” shall mean any system of public improvements or services that is intended to provide for the surveillance, prevention, abatement, and control of vectors as defined in subdivision (k) of Section 2002 of the Health and Safety Code (Government Code Section 53750(l)).*

In order to best provide comprehensive services to both entire counties for mosquito and vector control services, the District considered the annexation of the unserved remainder areas of both Marin and Sonoma Counties for some time. In 1983 the Marin County Local Agency Formation Commission (LAFCo) adopted a resolution establishing a sphere of influence for the Marin/Sonoma Mosquito and Vector Control District “to encompass the current District territory adding incorporated villages in West Marin which are not currently served and all of Sonoma County.” No further action was taken in 1983 and the District’s boundaries were not changed. The District once again formally commenced the annexation process in calendar year 2004. The Sonoma County LAFCo, as lead county in the annexation process, approved this annexation in late 2004, subject to a LAFCo protest hearing and a successful outcome on a benefit assessment ballot proceeding which would provide ongoing funding for the services in the annexation area.

The area proposed for annexation included all property within Marin and Sonoma Counties that were outside of the District’s jurisdictional boundaries (“Annexation Area”) in 2004. The Annexation Area was narrowly drawn to include the incorporated cities of Healdsburg and Cloverdale; the unincorporated communities of Fallon, Tomales, Marshall, Inverness, Inverness Park, Drakes Beach, Tocaloma, Point Reyes Station, Olema, Nicasio, Bolinas, Stinson Beach, Muir Beach, Preston, Asti, Skaggs Springs, Cozzens Corner, Geyserville, Geysers Resort, Jimtown, Kellog, Lytton, Annapolis, Sea Ranch, Stewarts Point, Shingle Mill, Soda Springs, Las Lomas, Plantation, Walsh Landing, Timber Cove, Fort Ross, Cazadero, Rio Nido, Guerneville, Monte Rio, Sheridan, Jenner, Duncans Mills, Bridge Haven, Ocean View, Sereno del Mar, Carmet, Salmon Creek, Bodega Bay, Bodega, Valley Ford, Occidental, Bloomfield, Two Rock, and Freestone; and other lands in both counties. This annexation was to bring over 72,000 additional residents into the District. The proposed annexation area included only properties that, if the assessment was approved, may request and receive direct service, that are located within the scope of the vector surveillance area, that are located within flying or traveling distance of mosquitoes from potential vector sources monitored by the District, and that would benefit from a reduction in the amount of mosquitoes and vectors reaching and impacting the property and its residents as a result of

the vector surveillance and control. The Assessment Diagram included in this Report shows the boundaries of the Annexation Areas.<sup>1</sup>

Accordingly, the District's Board of Trustees ("Board") determined that additional funding was needed to support services in the Annexation Area and intended to provide the same level of service in the Annexation Area as it did within its current boundaries. Hence, the Northwest Mosquito, Vector and Disease Control Assessment would provide funding for services within the Annexation Area. The cost of these services also included capital costs for equipment, capital improvements and services and facilities necessary and incidental to vector control programs.

The following is an outline of the primary services that are provided within the current boundaries and that were to be also provided in the Annexation Area:

- Mosquito control
- Surveillance for vector-borne diseases
- Mosquito inspections
- Response to service requests
- Mosquitofish for backyard fish ponds and other appropriate habitats
- Identification of mosquitoes, ticks and other arthropods

The District is controlled by the state Mosquito Abatement and Vector Control District Law. Following are excerpts from the Mosquito Abatement and Vector Control District Law of 2002, codified in the Health and Safety Code, Section 2000, et seq. which serve to summarize the State Legislature's findings and intent with regard to mosquito abatement and other vector control services:

2001. (a) The Legislature finds and declares all of the following:
- (1) *California's climate and topography support a wide diversity of biological organisms.*
  - (2) *Most of these organisms are beneficial, but some are vectors of human disease pathogens or directly cause other human diseases such as hypersensitivity, envenomization, and secondary infections.*
  - (3) *Some of these diseases, such as mosquitoborne viral encephalitis, can be fatal, especially in children and older individuals.*
  - (4) *California's connections to the wider national and international economies increase the transport of vectors and pathogens.*
  - (5) *Invasions of the United States by vectors such as the Asian tiger mosquito and by pathogens such as the West Nile virus underscore the vulnerability of humans to uncontrolled vectors and pathogens.*

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<sup>1</sup>. Note that the assessment area boundaries were drawn narrowly to include lands and property that in 2004 did not receive mosquito control and vector-borne disease prevention services.



*(b) The Legislature further finds and declares:*

*(1) Individual protection against the vectorborne diseases is only partially effective.*

*(2) Adequate protection of human health against vectorborne diseases is best achieved by organized public programs.*

*(3) The protection of Californians and their communities against the discomforts and economic effects of vectorborne diseases is an essential public service that is vital to public health, safety, and welfare.*

*(4) Since 1915, mosquito abatement and vector control districts have protected Californians and their communities against the threats of vectorborne diseases.*

*(c) In enacting this chapter, it is the intent of the Legislature to create and continue a broad statutory authority for a class of special districts with the power to conduct effective programs for the surveillance, prevention, abatement, and control of mosquitoes and other vectors.*

*(d) It is also the intent of the Legislature that mosquito abatement and vector control districts cooperate with other public agencies to protect the public health, safety, and welfare. Further, the Legislature encourages local communities and local officials to adapt the powers and procedures provided by this chapter to meet the diversity of their own local circumstances and responsibilities.*

Further the Health and Safety Code, Section 2082 specifically authorizes the creation of benefit assessments for vector control, as follows:

*(a) A district may levy special benefit assessments consistent with the requirements of Article XIID of the California Constitution to finance vector control projects and programs.*

## **LEGISLATIVE ANALYSIS**

### **PROPOSITION 218**

This assessment was to be formed consistent with Proposition 218, The Right to Vote on Taxes Act, which was approved by the voters of California on November 6, 1996, and is now Article XIIC and XIID of the California Constitution. Proposition 218 provides for benefit assessments to be levied to fund the cost of providing services, improvements, as well as maintenance and operation expenses to a public improvement which benefits the assessed property.

Proposition 218 describes a number of important requirements, including a property-owner balloting, for the formation and continuation of assessments, and these requirements are satisfied by the process used to establish this proposed assessment. When Proposition 218 was initially approved in 1996, it allowed for certain types of assessments to be

“grandfathered” in, and these were exempted from the property-owner balloting requirement.

Beginning July 1, 1997, all existing, new, or increased assessments shall comply with this article. Notwithstanding the foregoing, the following assessments existing on the effective date of this article shall be exempt from the procedures and approval process set forth in Section 4:

*(a) Any assessment imposed exclusively to finance the capital costs or maintenance and operation expenses for sidewalks, streets, sewers, water, flood control, drainage systems or vector control.*

Vector control was specifically “grandfathered in,” underscoring the fact that the drafters of Proposition 218 and the voters who approved it were satisfied that funding for vector control is an appropriate use of benefit assessments, and therefore confers special benefit to property.

**SILICON VALLEY TAXPAYERS ASSOCIATION, INC. V SANTA CLARA COUNTY OPEN SPACE AUTHORITY (2008) 44 CAL.4TH 431**

On July 14, 2008, the California Supreme Court issued its ruling on the Silicon Valley Taxpayers Association, Inc. v. Santa Clara County Open Space Authority (“*Silicon Valley*” or “SVTA”). This ruling is the most significant court case in further legally clarifying the substantive assessment requirements of Proposition 218. Several of the most important elements of the ruling included further emphasis that:

- Benefit assessments are for special benefits to property, not general benefits <sup>2</sup>
- The services and/or improvements funded by assessments must be clearly defined
- Special benefits are directly received by and provide a direct advantage to property in the Assessment District
- All public improvements or services provide some level of general benefit
- If a district is narrowly drawn, the fact that a benefit is conferred throughout the district does not make it general

This Engineer’s Report, and the process used to establish this proposed assessment are consistent with the SVTA decision.

**DAHMS V. DOWNTOWN POMONA PROPERTY (2009) 174 CAL.APP.4TH 708**

On June 8, 2009, the 4th Court of Appeal amended its original opinion upholding a benefit assessment for property in the downtown area of the City of Pomona (“*Dahms*”). On July 22, 2009, the California Supreme Court denied review. On this date, Dahms became good

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<sup>2</sup> Article XIII D, § 2, subdivision (d) of the California Constitution states defines “district” as “an area determined by an agency to contain all parcels which would receive a special benefit from the proposed public improvement or property-related service.”

law and binding precedent for assessments. In *Dahms* the Court upheld an assessment that was 100% special benefit (i.e. 0% general benefit) on the rationale that the services and improvements funded by the assessments were directly provided to property in the assessment district. The Court also upheld discounts and exemptions from the assessment for certain properties.

**BONANDER V. TOWN OF TIBURON (2009) 46 CAL. 4TH 646**

On December 31, 2009, the 1st District Court of Appeal overturned a benefit assessment approved by property owners to pay for placing overhead utility lines underground in an area of the Town of Tiburon (“*Bonander*”). The Court invalidated the assessments on the grounds that the assessments had been apportioned to assessed property based in part on relative costs within sub-areas of the assessment district instead of proportional special benefits.

**BEUTZ V. COUNTY OF RIVERSIDE (2010) 184 CAL. APP. 4TH 1516**

On May 26, 2010, the 4th District Court of Appeal issued a decision on the Steven Beutz v. County of Riverside appeal (“*Beutz*”). This decision overturned an assessment for park maintenance in Wildomar, California, primarily because the general benefits associated with improvements and services were not explicitly calculated, quantified and separated from the special benefits.

**GOLDEN HILL NEIGHBORHOOD ASSOCIATION V. CITY OF SAN DIEGO (2011) 199 CAL. APP. 4TH 416**

On September 22, 2011, the San Diego Court of Appeal issued a decision on the Golden Hill Neighborhood Association v. City of San Diego appeal (“*Greater Golden Hill*”). This decision overturned an assessment for street and landscaping maintenance in the Greater Golden Hill neighborhood of San Diego, California. The court described two primary reasons for its decision. First, like in *Beutz*, the court found the general benefits associated with services were not explicitly calculated, quantified and separated from the special benefits. Second, the court found that the City had failed to record the basis for the assessment on its own parcels.

**COMPLIANCE WITH CURRENT LAW**

This Engineer’s Report is consistent with the requirements of Article XIII C and XIII D of the California Constitution and with the *SVTA* decision because the Services to be funded are clearly defined; the Services are available to and will be directly provided to all benefiting property in the Assessment District; and the Services provide a direct advantage to property in the Assessment District that would not be received in absence of the Assessments.

This Engineer’s Report is consistent with *Dahms* because, similar to the Downtown Pomona assessment validated in *Dahms*, the Services will be directly provided to property in the Assessment District. Moreover, while *Dahms* could be used as the basis for a finding of 0% general benefits, this Engineer’s Report establishes a more conservative measure of general benefits.

The Engineer's Report is consistent with *Bonander* because the Assessments have been apportioned based on the overall cost of the Services and proportional special benefit to each property. Finally, the Assessments are consistent with *Beutz* and *Greater Golden Hill* because the general benefits have been explicitly calculated and quantified and excluded from the Assessments.

## ASSESSMENT PROCESS

In order to allow property owners to ultimately decide whether the District should be expanded to cover the previously unserved areas of Marin and Sonoma Counties and whether a local funding source should be created in the annexation area for the services summarized above, the Board authorized the initiation of proceedings for a benefit assessment in 2004. This Engineer's Report ("Report") was prepared by SCI Consulting Group ("SCI") to describe the vector control services to be funded by this assessment, to establish the estimated costs for those services, to determine the special benefits and general benefits received by property from the services and to apportion the assessments to lots and parcels within the District's Annexation Area based on the estimated special benefit each parcel receives from the services funded by the benefit assessment.

Following submittal of this Report to the Board for preliminary approval, the Board on September 15, 2004, by Resolution No. 04/05 04, called for an assessment ballot proceeding and public hearing on the proposed establishment of assessments for the Northwest Mosquito, Vector and Disease Control Assessment ("Assessment" or "Assessment No. 2"). After the Board's approval of this resolution calling for the mailing of notices and ballots, a notice of assessment and assessment ballot was mailed to property owners within the Annexation Area on October 7, 2004. Such notice included a description of the proposed assessments as well as an explanation of the method of voting on the assessments. Each notice included a ballot on which the property owner could mark his or her approval or disapproval of the proposed assessments and a postage-prepaid ballot return envelope.

After the ballots were mailed to property owners in the Annexation Area, the required 45-day time period was provided for the return of the assessment ballots. Following this 45-day time period, a public hearing was held on November 22, 2004 at 7:00 p.m. at the Marin/Sonoma Mosquito and Vector Control District office, for the purpose of allowing public testimony regarding the proposed assessments. At this hearing, the public had the opportunity to speak on this issue and a final opportunity to submit ballots. After the conclusion of the public input portion of the hearing, the hearing was continued to November 29, 2004 to allow time for the tabulation of ballots.

With the passage of Proposition 218 on November 6, 1996, The Taxpayers Right to Vote on Taxes Act, now Article XIIC and XIID of the California Constitution, the proposed assessments can be levied for fiscal year 2005-06, and future years only if the ballots submitted in favor of the assessments are greater than the ballots submitted in opposition to the assessments. (Each ballot is weighted by the amount of proposed assessment for the property that it represents).

After the conclusion of the public input portion of the public hearing held on November 22, 2004, all valid received ballots were tabulated by C.G. Uhlenberg, LLP, an independent accounting and auditing firm. At the continued public hearing on November 29, 2004, after the ballots were tabulated, it was determined that the assessment ballots submitted in opposition to the assessments did not exceed the assessment ballots submitted in favor of the assessments (with each ballot weighted by the proportional financial obligation of the property for which the ballot was submitted). The final balloting result was 61.22% weighted support from ballots returned.

As a result, the Board gained the authority to approve the levy of assessments for fiscal year 2005-06 and future years. The Board took action, by Resolution No. 04/05 05, passed on November 29, 2004, to approve and order the levy of the assessments commencing in fiscal year 2005-06.

The authority granted by the ballot proceeding was for a maximum assessment rate of \$19.00 per single family home, increased each subsequent year by the San Francisco Bay Area CPI (Consumer Price Index) not to exceed 5% per year. In the event that the annual change in the CPI exceeds 5%, any percentage change in excess of 5% can be cumulatively reserved and can be added to the annual change in the CPI for years in which the CPI change is less than 5%.

Since the assessments were confirmed and approved, the District commenced in fiscal year 2005-06 to expand its program and services, including operational facilities, equipment, supplies and staff. The expansion of services continued for several years and the range of services offered by the District is now stable.

## **ENGINEER'S REPORT AND CONTINUATION OF ASSESSMENTS**

In each subsequent year for which the assessments will be continued, the Board must preliminarily approve at a public meeting a budget for the upcoming fiscal year's costs and services, an updated annual Engineer's Report, and an updated assessment roll listing all parcels and their proposed assessments for the upcoming fiscal year. At this meeting, the Board will also call for the publication in a local newspaper of a legal notice of the intent to continue the assessments for the next fiscal year and set the date for the noticed public hearing. At the annual public hearing, members of the public can provide input to the Board prior to the Board's decision on continuing the services and assessments for the next fiscal year.

The 2017-18 budget includes outlays for capital equipment, supplies, disease testing programs, vector control programs and contract abatement services, as well as funding for programs to test for, control, monitor and/or abate West Nile virus and other viruses, tick-borne diseases, and mosquitoes that are needed to provide additional vector control and public health protection services. If the Board approves this Engineer's Report for fiscal year 2017-18 and the continuation of the assessments by resolution, a notice of assessment levies will be published in a local paper at least 10 days prior to the date of the public hearing.

Following the minimum 10-day time period after publishing the notice, a public hearing will be held for the purpose of allowing public testimony about the proposed continuation of the assessments for fiscal year 2017-18. At this hearing, the Board will consider approval of a resolution confirming the continuation of the assessments for fiscal year 2017-18. If so confirmed and approved, the assessments will be submitted to the Marin and Sonoma County Auditors for inclusion on the property tax rolls for Fiscal Year 2017-18.

## GENERAL DESCRIPTION OF THE DISTRICT AND SERVICES

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### ABOUT THE DISTRICT

The Marin/Sonoma Mosquito and Vector Control District is an independent special district (not part of any county or city), that protects the usefulness, utility, desirability and livability of property and the inhabitants of property within its jurisdictional area by controlling and monitoring disease-carrying insects such as mosquitoes and ticks, and other harmful pests such as yellow jackets. The District protects the health and comfort of the public through the surveillance and/or control of vertebrate and invertebrate vectors. The District strives for excellence and leadership and embraces transparency and accountability in its service to residents and visitors. In addition, the District regularly tests for diseases carried by insects and small mammals and educates the public about how to protect themselves from vector borne diseases.

The Marin Mosquito Control District was the first in California, officially created on November 6, 1915 after the passage of the Mosquito Abatement Act in 1915. The Marin Mosquito Control District increased its service area by merging with a portion of Sonoma County in 1976. In 1982 the District annexed the City of Sonoma Mosquito Abatement District, to become the Marin/Sonoma Mosquito and Vector Control District, which included about 960 square miles serving approximately 650,000 residents. In 1996, the District formed a Benefit Assessment District (“Assessment District #1” or “Assessment #1”), in order to retain the ability to continue funding the program within its original jurisdictional boundaries at the level necessary to protect the public’s health and to maintain the living standard of property owners and residents. The District’s headquarters facility moved from San Rafael to Petaluma in 1981 and to Cotati in December 2000.

Prior to 2004 the District covered approximately a third of the total area of the two counties and was able to provide a relatively high level of services within its existing boundaries with the resources and staffing available at the time. However, as previously stated, as of 2004 there were no baseline services in the Annexation Areas. The Northwest Mosquito, Vector and Disease Control Assessment was enacted to provide funding for the Services to and for the benefit of the lands in the Annexation Areas.

The agency is governed by a Board of Trustees with 24 members: one representing each of the twenty cities located within the two entire two county area serviced by the District (Belvedere, Corte Madera, Cotati, Fairfax, Larkspur, Mill Valley, Novato, Petaluma, Rohnert Park, Ross, San Anselmo, San Rafael, Santa Rosa, Sausalito, Sebastopol, Sonoma, Tiburon, Windsor, Cloverdale and Healdsburg. Two Trustees are appointed by each County Board of Supervisors to represent each county at large. The Board’s regular meetings are held at 7:00 PM on the 2nd Wednesday of every month (unless cancelled) and public attendance is welcomed.



## MOSQUITOES AND VECTOR-BORNE DISEASES IN THE ANNEXATION AREAS

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### INTRODUCTION

Following are the proposed Services, and resulting level of service, for the Annexation Areas. As previously noted, as of 2004 there was no regular mosquito control services provided in the Annexation Areas. These proposed Services were over and above the existing zero-level baseline level of service. The formula below describes the relationship between the final level of service, the existing baseline level of service, and the enhanced level of service to be funded by the proposed assessment.

<b>Final Level of Service</b>	=	<b>Baseline Level of Service</b>	+	<b>Enhanced Level of Service</b>
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In this case, the baseline level of service provided before 2004 annexation was nil, and the final level of service was precisely the enhanced level of service funded by the assessment. Since the annexation was completed, the Services have been provided continuously to the annexed areas.

### SUMMARY OF SERVICES

The purpose of the Marin/Sonoma Mosquito and Vector Control District is to reduce the risk of vector-borne disease and mosquito nuisance to the residents and visitors within the District. Besides being nuisances by disrupting human activities and the use and enjoyment of public and private areas, certain insects and animals may transmit a number of diseases.

The Marin/Sonoma Mosquito and Vector Control District utilizes an Integrated Vector Management Program (IVMP) to manage vector populations (e.g., mosquitoes) and minimize the risk of vector-borne disease. For example, the District monitors and manages mosquito populations to minimize the risk of pathogen transmission (e.g., West Nile virus), disruption of human activities and the enjoyment of public and private areas, as well as the injury and discomfort that can occur to residents and livestock due to populations of biting mosquitoes. The pathogens currently of most concern are those that cause Western Equine Encephalitis (WEE), St. Louis Encephalitis (SLE), West Nile virus (WNV), dog Heartworm, Malaria, Chikungunya, Dengue Fever and Yellow Fever, which are transmitted by mosquitoes; Plague and Murine Typhus transmitted by fleas; Leptospirosis and Hantavirus Pulmonary Syndrome associated with rats and other rodents; and Lyme disease, spotted fever group Rickettsia, Babesiosis, Anaplasmosis, Borrelia miyamotoi, tularemia and Ehrlichiosis transmitted by ticks.

The spread of these pathogens and the diseases they cause is minimized through ongoing vector surveillance activities, source reduction, source treatment, abatement, and educational outreach. These efforts also minimize the secondary impacts vectors can have on residents, such as pain, allergic reactions, and discomfort from mosquito and yellowjacket bites. To fulfill this purpose, the District may take any and all necessary steps to control



mosquitoes, monitor rodents and other vectors, and perform other related vector control services.

The services within the Annexation Area are provided at generally the same service level as is provided in the Assessment No. 1 area. Specifically, the assessment provides an adequate funding source for the continuation of the projects and programs for surveillance, prevention, abatement, and control of vectors within the Annexation Area. Such mosquito abatement and vector control projects and programs include, but are not limited to, public education, surveillance, source reduction, biological control, larvicide and adulticide applications, disease monitoring, reporting, accountability, research and interagency cooperative activities, as well as capital costs, maintenance, and operation expenses (collectively "Services"). The cost of these services also includes capital costs comprised of equipment, capital improvements and facilities necessary and incidental to the vector control program.

The Services are further defined as follows:

- Response to mosquito problems as well as other pestiferous or disease transmitting organisms.
- Control of mosquito larvae in sources such as catch basins, industrial drains, agricultural sources, ditches, drain lines, vaults, wastewater treatment plants, under buildings, residences, horse troughs, freshwater marshes, salt marshes, creeks, septic systems and other sources.
- Control of rodents through public education, exclusionary methods and information dissemination.
- Monitoring of Hantavirus-bearing rodents, and other harmful vectors, such as Wood Rats, Deer Mice, Harvest Mice, and Meadow Voles, through property inspection, recommendations for exclusion, control, and public education.
- Surveying and analyzing mosquito larvae population data to assess public health risks and allocate control efforts.
- Monitoring of mosquito populations using various types of adult mosquito traps.
- Monitoring for pathogens carried and transmitted by mosquitoes and other arthropods, such as Encephalitis and West Nile viruses.
- Deploying sentinel chicken flocks, testing of mosquito pools, and assisting State and local public health agencies with blood analytical studies.
- Distributing printed material, brochures, social media messaging, media materials that describe what residents, employees and property owners can do to keep their homes and property free of mosquitoes and other vectors.
- Cooperating with the California Department of Public Health Services and State Universities to survey and identify arthropod-borne pathogens such as Lyme disease and Plague found in parks, on trails and other locations frequented by property owners and residents.
- Facilitating testing and monitoring for pathogens carried and transmitted by ticks, such as Lyme disease, Ehrlichiosis, spotted fever group Rickettsia, and Babesiosis.

- Monitoring and/or advising residents on controlling other potentially hazardous organisms and vectors such as ticks, mites, and fleas.
- Educating property owners and residents about the risks of diseases transmitted by insects and small mammals and how to better protect themselves and their pets.
- Assisting government agencies and universities in testing for Hantavirus, Arenavirus, Plague and other pathogens carried by small mammal populations.
- Monitoring of new and emerging vectors such as the Asian Tiger mosquito and Yellow fever mosquito.
- Testing for and control of new and emerging pathogens.

The District protects the public from vector-borne pathogens and injury and discomfort caused by mosquitoes in an environmentally compatible manner, through a coordinated set of activities and methods collectively known as the Integrated Vector Management Program (IVMP) as mentioned earlier. For all vector species, pathogens, and disease, public education is a primary control and prevention strategy. In addition, the District determines the abundance of vectors and the risk of vector-borne pathogen transmission or discomfort through evaluation of public service requests, communication with the public and agencies, and field and laboratory surveillance activities. If mosquito populations, for example, exceed or are anticipated to exceed predetermined guidelines, District staff employs the most efficient, effective, and environmentally sensitive means of control for the situation. Where feasible, water management or other source reduction activities (e.g., physical control) are instituted to reduce vector production. In some circumstances, the District also uses biological control such as the planting of mosquitofish. When these approaches are not effective or are otherwise inappropriate, pesticides are used to treat specific vector producing or vector-harboring areas.

### **NEW ZONE OF BENEFIT WITHIN THE ANNEXATION AREAS (WEST MARIN)**

At its meeting on May 11, 2016, the District's Board ratified a four-year agreement between the District and the West Marin Mosquito Council. The agreement specifies and emphasizes certain approaches to mosquito control that are consistent with the District's IVMP, although certain methods are emphasized over others and some materials are not applied within this area. Other materials, such as Merus 2.0 mosquito adulticide, are used exclusively within the area. The differences in the manner in which the services are provided are considered worthy of recognition with a new zone of benefit to be known as West Marin Zone of Benefit. The geographic areas covered by the agreement includes the areas of Marin County that are within the boundaries of the Annexation Areas. The "Zones of Benefit" section in this Report includes more information about the District's Zones of Benefit.

### **VECTORS AND VECTOR-BORNE DISEASES IN THE DISTRICT SERVICE AREA**

The District undertakes activities through its Integrated Vector Management Program designed to control the following vectors of pathogens and disease (as well as discomfort and injury) within the District:

## MOSQUITOES

Certain species of mosquitoes found in Marin and Sonoma Counties can transmit Malaria, St. Louis Encephalitis, Western Equine Encephalomyelitis, West Nile virus, and other encephalitis viruses. Several species of mosquitoes found locally are also capable of transmitting dog heartworm. Although some species of mosquitoes have not been shown to transmit pathogens, all species can cause human discomfort when the female mosquito bites to obtain blood. Reactions range from irritation in the area of the bite, to severe allergic reactions or secondary infections resulting from scratching the irritated area. Additionally, an abundance of mosquitoes can cause economic losses, and a reduction in the use or enjoyment of recreational, agricultural, or industrial areas.

Of the world's 3,000 mosquito species, more than 50 live in California, and 23 have been identified in Marin and Sonoma Counties. Continuous surveillance and special control efforts are aimed at the most problematic species including: *Aedes dorsalis*, *Aedes squamiger*, *Aedes sierrensis*, *Culex pipiens*, and *Culex tarsalis*. The following table displays the most common mosquitoes in the District.

Mosquito	Common Name	Larval Habitats	Biting Behavior		Approximate Flight Ranges	Medical Importance/Vector Issues
			Host(s)	Time of Day		
<i>Aedes dorsalis</i>	Pale marsh mosquito	Coastal salt marshes, inland alkaline areas	• Large and likely small mammals • Humans	Day and night	20 miles	• Western equine encephalitis • Vector – Aggressive biter of humans, pain, discomfort, allergic reactions • Livestock health issues
<i>Aedes sierrensis</i>	Western treehole mosquito	Treeholes, tires, containers	• Small mammals • Humans	Dusk and day	Less than 1 mile	• Dog heartworm • Vector – Aggressive biter of humans, pain, discomfort, allergic reactions
<i>Aedes squamiger</i>	California salt marsh mosquito	Coastal salt marshes	• Humans • Large mammals	Dusk and day	10 – 20 miles	• Vector – Aggressive biter of humans, pain, discomfort, allergic reactions
<i>Aedes washinoi</i>	Flood water mosquito	Coastal ground pools, inland shaded pools, flooded habitats	• Humans • Large mammals	Dusk and day	Less than 1 mile	• Vector – Aggressive biter of humans, pain, discomfort, allergic reactions
<i>Culex tarsalis</i>	Western encephalitis mosquito	Agricultural, commercial, man-made or natural sources	• Birds • Mammals • Humans	Dusk and dawn	10 – 15 miles	• St. Louis encephalitis • Western equine encephalitis • West Nile virus
<i>Culex pipiens</i>	House mosquito	Polluted water, septic tanks, catch basins, residential and commercial sources	• Birds • Mammals • Humans	Night	Less than 1 mile	• St. Louis encephalitis • West Nile virus • Vector – Can be an aggressive biter of humans, pain, discomfort, allergic
<i>Culex erythrorhax</i>	Tule mosquito	Ponds, lakes, and marshes with tules and cattails	• Birds • Humans	Dusk and day (shaded areas)	Less than 2 miles	• West Nile virus • Vector – Aggressive biter of humans, pain, discomfort, allergic reactions
<i>Culex stigmatosoma</i>	Banded foul water mosquito	Polluted water, dairy ponds, sewer ponds, log ponds	• Birds • Humans	Night	Less than 10 miles	• St. Louis encephalitis • West Nile virus
<i>Anopheles freeborni</i>	Western malaria mosquito	Irrigation ditches, rain pools, margins of lakes and streams, rice fields	• Large mammals • Humans	Dusk and dawn	10 miles	• Malaria • Vector – Can be an aggressive biter of humans, pain, discomfort, allergic reactions
<i>Anopheles punctipennis</i>	Woodland malaria mosquito	Cool, shaded, grassy pools in streams and creeks	• Large mammals	Dusk and day	More than 1 mile	• Malaria
<i>Anopheles franciscanus</i>	- none -	Shallow, sunlit pools with algae	• Large mammals	Dusk and dawn	Less than 1 mile	• Vector – Large adult populations can result in the biting of humans
<i>Culiseta incidens</i>	Cool-weather mosquito	Shaded, clear, natural or man-made sources	• Large mammals • Humans	Dusk and dawn	Less than 5 miles	• Vector – human pain, discomfort, allergic reactions
<i>Culiseta inornata</i>	Large winter mosquito	Sunlit ground pools or man-made sources	• Large mammals • Humans	Dusk and dawn	Less than 5 miles	• Vector – Can be an aggressive biter of humans pain, discomfort, allergic reactions
<i>Culiseta particeps</i>	none	Freshwater marshes, ponds and creeks, woodland pools	• Large mammals • Humans	Dusk and dawn	Less than 3 miles	• Vector – human pain, discomfort, allergic reactions

### **GROUND-NESTING YELLOWJACKETS**

Ground-nesting yellowjackets have a painful sting and bite, can fly moderate distances, and are found throughout the District. More significantly, yellowjacket stings can result in anaphylactic shock and rapid death for the approximately 0.5% of the public with severe allergies.

### **RODENTS**

Rodents are present in the District including the Dusky-footed Wood Rat (*Neotoma fuscipes*), the Norway Rat (*Rattus norvegicus*), the Roof Rat or Black Rat (*Rattus rattus*) and the Deer Mouse (*Peromyscus maniculatus*), and are subjects of District action. In addition to being unsanitary, rodents harbor and transmit a variety of organisms that infect humans. Rats are hosts to the worm that causes trichinosis in humans. Humans may become infected when they eat poorly cooked meat from a pig that has eaten an infected rat. Rodent urine may contain the bacterium that causes Leptospirosis, and their feces may contain Salmonella bacteria. Infected rat fleas may transmit Bubonic Plague and Murine Typhus. Rat bites may cause Bacterial Rat-bite Fever or infection. *P. maniculatus* can transmit Hantavirus through bodily excretions. Gnawing by rats causes damage to woodwork and electrical wiring, resulting in short circuits and potential fires. Additionally, an abundance of rats can cause economic losses, loss of use of public recreational areas, and loss of the enjoyment of property. Dusky-footed Wood Rats carry bacterial infections that may be passed on to humans, horses, and domestic pets by the bite of tick vectors. Diseases of concern include Lyme Borreliosis (i.e. Lyme disease), Babesiosis, spotted fever group *Rickettsia*, and Ehrlichiosis.

### **OTHER ANIMALS OF IMPORTANCE**

Although certain animal species such as bats, ground squirrels, fleas, ticks, opossums, wood rats and house mice would not be regularly controlled, these animals play important roles in the transmission of Plague, Murine Typhus, Hantavirus, or Lyme disease and may be surveyed for pathogens. The District routinely provides education and consulting services to the public about disease risk associated with these vectors and appropriate measures to protect human health. In extreme cases where the transmission of a pathogen or the occurrence of disease is likely, as with the other District activities, control efforts may be employed. Control of these animals would be done in consultation with the California Department of Public Health, Marin and Sonoma County Public Health Departments, Marin and Sonoma County Animal Control Departments, Marin and Sonoma County Agricultural Commissioner's Offices, and other State and local agencies.

Most of the vectors mentioned above are extremely mobile and cause the greatest hazard or discomfort away from their breeding site. Each of these potential vectors has a unique life cycle and most of them occupy different habitats. In order to effectively control these vectors, an Integrated Vector Management Program must be employed. District policy is to identify those species that are currently vectors, to recommend techniques for their prevention and control, and to anticipate and minimize any new interactions between vectors and humans.

## INTEGRATED VECTOR MANAGEMENT

The Integrated Vector Management Program of the Marin/Sonoma Mosquito and Vector Control District (also generally referred to as Integrated Pest Management or IPM) is a long-standing, ongoing program of surveillance and control of mosquitoes and other vectors of human disease and discomfort. The program consists of six types of activities:

1. Surveillance for vector populations, vector habitats, disease pathogens, and public distress associated with vectors; this includes trapping and laboratory analysis of vectors to evaluate populations and disease threats, direct visual inspection of known or suspected vector habitats, the use of all-terrain vehicles and boats to access remote areas, maintenance of access paths, and public surveys.
2. Public education to encourage and assist reduction or prevention of vector habitats and prevent human vector interaction on private and public property.
3. Management of vector habitat, especially through water control and maintenance or improvement of channels, tide gates, levees, and other water control facilities, etc. (i.e., Source Reduction/Physical Control).
4. Vegetation management to improve surveillance and/or reduce vector populations.
5. Rearing, stocking, and provision to the public of the mosquitofish *Gambusia affinis*; application of mosquito larvicides, such as materials containing the bacterium *Bacillus sphaericus* or *Bacillus thuringiensis israelensis* (i.e., Bti); and possibly the use of other predators or pathogens of vectors (“Biological Control”).
6. Application of non-persistent selective insecticides to reduce populations of larval or adult mosquitoes and other invertebrate threats to public health (“Chemical Control”).

The District’s activities address two basic types of vectors – mosquitoes and other insects, and rodents – but both share general principles and policies including identification of vector problems; responsive actions to control existing populations of vectors, to prevent new sources of vectors from developing, and to manage habitat to minimize vector production; education of landowners and others (e.g., agencies) on measures to minimize vector production or interaction with vectors; and provision and administration of funding and institutional support necessary to accomplish these goals.

In order to accomplish effective and environmentally sound vector management, the manipulation and control of vectors must be based on careful surveillance of their abundance, distribution, habitat (potential abundance), pathogen load, and potential contact with people; the establishment of treatment guidelines; and appropriate selection from a wide range of control methods. This dynamic combination of surveillance, treatment guidelines, and use of multiple control activities in a coordinated program is generally known as Integrated Pest Management (IPM).

The District's Integrated Vector Management Program, like any other IPM program, by definition involves procedures for minimizing potential environmental impacts. The District's program employs IPM principles by first determining the species and abundance of vectors through evaluation of public service requests and field surveys of immature and adult vector populations, and then, if the populations exceed predetermined guidelines, using the most efficient, effective, and environmentally compatible means of control. For all vector species, public education is an important control strategy, and for some vectors (rodents, ticks) it is the District's primary control method. In some situations, water management or other physical control activities (historically known as source reduction) can be instituted to reduce vector habitat and production. The District also uses biological control such as the planting of mosquitofish in some settings. When these approaches are not effective or are otherwise inappropriate, pesticides are used to treat specific vector-producing or vector-harboring areas.

In June 2016, after four years of work, the District certified a comprehensive Programmatic Environmental Impact Report that assessed the District's IVMP. This document incorporates many best management practices and is available on the District's website. The PEIR serves as a valuable technical resource and guide for staff, local, state and federal agencies as well as for the general public.

In order to maximize familiarity by the operational staff with specific vector sources in the project area, the District is divided into operational zones. Most zones have assigned to them a full-time vector control technician, and sometimes a vector control aide on a seasonal basis. These staff member's responsibilities include public and agency communication and education, minor physical control, inspection and treatment of known vector sources, finding and controlling new sources, and responding to service requests from the public.

Vector control activities are conducted at a wide variety of sites throughout the District's project area. These sites can be roughly divided into natural type (e.g., natural, restored, enhanced, or manmade simulating natural) sites such as vernal pools and other seasonal wetlands, tidal marshes creeks, diked marshes etc., or anthropogenic type sources such as, storm water detention basins, flood control channels, spreading grounds, street drains and gutters, wash drains, irrigated pastures, septic systems, swimming pools, tire piles, ornamental ponds and agricultural ditches, etc.

## **SURVEILLANCE AND SITE ACCESS**

Prior to the annexation there was no surveillance in the Annexation Areas. The assessment provides for establishment and continuation of a surveillance program within and proximate to the properties in the Annexation Areas. Surveillance is conducted in a manner based upon equal spread of resources throughout the District boundaries, focusing on areas of likely sources. Treatment strategies are based upon the results of the surveillance programs, and are specifically designed for individual areas.

Based on a preliminary investigation of the Annexation Areas, the District found mosquito sources and potential sources scattered throughout the area. All properties within the



Annexation Areas are within mosquito-flying range of one or more mosquito sources. Furthermore, prior to the annexation, the area suffered from the presence of mosquitoes, with a large number of sources and the lack of any organized mosquito control efforts or program.

In addition to the disruption of human activities and causing our environment to be uninhabitable, certain insects and animals may transmit a number of pathogens. The pathogens of most concern in Marin and Sonoma Counties are West Nile virus, St. Louis Encephalitis (SLE) and Western Equine Encephalomyelitis (WEE) transmitted by mosquitoes; Rabies transmitted by skunks; Plague and Murine Typhus transmitted by fleas; Leptospirosis and Hantavirus Pulmonary Syndrome associated with rats and other rodents; and Lyme Disease, Babesiosis, and Ehrlichiosis transmitted by ticks.

Mosquito populations are surveyed using a variety of field methods and traps. Small volume mosquito “dippers” (e.g., small cup of approximately 12 ounces attached to a wooden or aluminum pole) and direct observation are used to evaluate larval populations. Staff also respond to service requests from the public, make field landing counts, deploy light traps, host seeking traps and oviposition traps to evaluate adult mosquito populations. In 2013, using BG-Sentinel traps, the District began surveillance for the invasive species of *Aedes* mosquitoes (*aegypti* and *albopictus*) that have become established in twelve counties of California. In 2014, the surveillance program was refined and modified to use ovicups and Autocidal Gravid Ovitrap. To date the invasive species have not been detected within the District’s service area. These mosquitoes are capable of transmitting the pathogens that cause Zika, dengue fever, Chikungunya, Japanese Encephalitis, Yellow Fever and other diseases. In coordination with the County Health Officers, the District prepared a Zika virus response plan during 2016. An Invasive *Aedes* Response Plan is also in place.

Mosquito-borne pathogens are also surveyed using adult mosquitoes, and wild birds. Adult mosquitoes are collected and tested for infection with West Nile virus, SLE and WEE. Collection is made with small light, host seeking, or oviposition traps. Host seeking traps are typically baited with carbon dioxide in the form of dry ice. Although traps are typically placed in vegetated areas, care is taken to ensure that placement of traps does not significantly damage any vegetation.

Surveillance also is conducted to determine vector habitat (e.g., standing water) and the effectiveness of control operations. Inspections are conducted using techniques to minimize the potential for environmental impacts. Staff routinely uses pre-existing access points such as roadways, open areas, walkways, and trails. Vegetation management (e.g., trimming trees and vines, clearing paths through brush) is conducted where overgrowth precludes safe and efficient access. All of these actions only result in a temporary/localized physical change to the environment with regeneration/regrowth occurring within a short period of time.

In order to access various sites throughout the District for surveillance and for control, District staff utilizes specialized equipment such as light trucks, all-terrain vehicles, boats, and



helicopters. District policies on use of this equipment are designed to avoid environmental impact.

The District currently participates in a dead bird surveillance program managed by the California Department of Public Health (CDPH). Dead birds that are discovered by the public are reported to CDPH and screened for potential testing. If the bird is found to be suitable for testing, the District is notified. It then collects and processes the bird before shipping it to an authorized laboratory (e.g., U.C. Davis Center for Vector-Borne Disease, now known by the acronym DART) for testing.

The District's jurisdictional powers allow for testing for the presence of Plague and Murine Typhus by collecting ground squirrels, wild rodents, opossums, and fleas. Historically the District has partnered with other public health agencies (e.g., CDPH) to perform this work. (Currently the District does not anticipate it would provide this service due to a lack of staffing and certified specialists to perform the work.) Testing for the presence of Hantavirus Pulmonary Syndrome can be conducted by collecting wild rodents. Small animals can be trapped using live traps baited with food. The traps would be set in the afternoon and would be collected within 24 hours. The animals would be anesthetized and blood, tissue, and/or flea samples would be obtained. Threatened and endangered species and other legally protected animals that might become trapped would be released immediately and would not be used in these tests.

## **EDUCATION**

The primary goals of the District's activities are to minimize vector populations, the potential for pathogen transmission, and the occurrence of disease by managing vector habitat while protecting habitat values for their predators and other beneficial organisms. Vector prevention for example, is accomplished through public education, including site-specific recommendations on water and land use, and by physical control (discussed in a later section).

The District's education program teaches school age students, property owners, residents and agencies how to recognize, prevent, and suppress vector production and harborage on their properties. This part of the District's Services is accomplished through the distribution of brochures, fact sheets, newsletters, participation in local fairs and events, presentations to community organizations, contact with technicians in response to service requests, social media, public service announcements and news releases. Public education also includes a K-12 school program to teach children about vector biology, how to responsibly eliminate vector-breeding sources or reduce vector-human interaction, and to educate their parents or guardians about the District's services.

## **CONTROL OF MOSQUITOES**

The District's objective is to provide an area-wide level of consistent mosquito control such that all properties will benefit from reduced levels of mosquitoes. Surveillance and monitoring are provided on a District wide basis.

Mosquito control is based upon and driven by vector biology and surveillance. When a mosquito source produces mosquitoes in significant numbers, a technician will generally work with landowners or responsible agencies to reduce the habitat value of the site for mosquitoes (source reduction/physical control). If this is ineffective, not immediately obtainable, or inappropriate for the given site, the technician will determine the best method of treatment, including biological control and chemical control.

#### **PHYSICAL CONTROL**

The District physically manipulates and manages mosquito habitat areas (breeding sources) when appropriate to reduce mosquito production. This may include removal of containers and debris, removing standing water from unmaintained swimming pools and spas, removal of vegetation or sediment interrupting water flow, rotating stored water, pumping and/or filling sources, improving drainage and water circulation systems, breaching or repairing levees, and installing, improving, or removing culverts, tide gates, and other water control structures in wetlands. Mosquito source reduction and physical manipulation carried out in sensitive habitats is performed in consultation with the appropriate regulatory agencies.

#### **BIOLOGICAL CONTROL**

The mosquitofish, *Gambusia affinis*, is the District's primary biocontrol agent used against mosquitoes. Mosquitofish are not native to California, but have been widely established in the state since the early 1920's, and now inhabit most natural and constructed water bodies. The District maintains mosquitofish in large tanks. District technicians place mosquitofish in contained man-made settings where either previous surveillance has demonstrated a consistently high production of mosquitoes, or where current surveillance indicates that mosquito populations would likely exceed chemical control guidelines without prompt action. Mosquitofish are also made available to property owners and residents to control mosquito production in artificial containers, such as ornamental fishponds, water plant barrels, horse troughs, and abandoned swimming pools.

#### **CHEMICAL CONTROL (FOR MOSQUITOES AND OTHER VECTORS)**

Since many mosquito-breeding sources cannot be adequately controlled with physical control measures or mosquitofish, the District also uses biological materials and chemical insecticides approved by the US Environmental Protection Agency, the California Department of Pesticide Regulation, and other environmental agencies, to control mosquito production where observed mosquito production exceeds District guidelines. When field inspections indicate the presence of vector populations that meet District guidelines for chemical control (including abundance, density, species composition, proximity to human settlements, water temperature, presence of predators, and so forth), District staff applies these materials to the site in strict accordance with the label instructions. The primary types of materials used against mosquitoes are selective larvicides. In addition, if large numbers of adult mosquitoes are present and potential public health issue or actual public health issue exists, the District may apply low persistence aerosol adulticides utilizing ultra-low volume fogging methods to obtain control.

Mosquito Larvicides: Depending on time of year, water temperature, organic content, mosquito species present, larval abundance and density, and other variables, larvicide applications may be repeated at any site at recurrence intervals ranging from annually to weekly. Larvicides routinely used by the District include methoprene (e.g., Altosid and MetaLarv) and Bti (*Bacillus thuringiensis israelensis*) and Bs (*Bacillus sphaericus*).

1. Methoprene is a biochemical, synthetic juvenile hormone designed to disrupt the transformation of a juvenile mosquito into an adult. It is applied either in response to observed populations of mosquito larvae at a site, and/or as a sustained-release product that can persist for up to four months. Application can be by hand, ATV, watercraft or aircraft (e.g., helicopter).
2. In past years the District has used Agnique, which is the trade name for a surface film larvicide, comprised of ethoxylated alcohol. The District has almost completely exhausted its stocks of this product, and as it is no longer manufactured the District now uses larvicide oils such as CoCoBear and BVA2 oils as larvicides and pupicides.
3. Bti (*Bacillus thuringiensis israelensis*) is a bacterium that is ingested by larval mosquitoes and disrupts their gut lining, leading to death before pupation. Bti is applied by the District as a liquid or bonded to inert substrate (e.g., sand, corncob granules) to assist penetration of vegetation. Persistence is low in the environment, and efficacy depends on careful timing of application relative to the larval instar. Therefore, use of Bti requires frequent inspections of larval sources during periods of larval production, and may require frequent applications of material. Application can be made by hand, ATV, watercraft or aircraft (e.g., helicopter).
4. *Bacillus sphaericus*, which has been renamed *Lysinibacillus sphaericus*. is another biological larvicide. The mode of action is similar to that of Bti. *B. sphaericus* is better suited for use at sites with higher levels of organic content in the water.

Mosquito Adulticides: In addition to chemical control of mosquito larvae, the District also performs ultra-low volume applications of mosquito control materials for control of adult mosquitoes - if thresholds are met, including species composition, population density (as measured by landing count or trapping of adult mosquitoes), proximity to human populations, and/or potential for the transmission of a pathogen and/or occurrence of disease (i.e. injury and discomfort). As with larvicides, adulticides are applied in strict conformance with label requirements.

Other Insecticides: In addition to direct chemical control of mosquito populations, the District also applies insecticides to control ground-nesting yellowjackets that pose an imminent threat to humans, pets, or livestock. This activity is triggered by a public request for assistance, rather than in response to direct population monitoring. Drione®, DeltaDust® and Wasp-Freeze® are insecticides used by the District to control ground-nesting yellowjackets. The potential environmental impacts of these materials is minimal because (1) their active ingredients include pyrethrins, deltamethrin, allethrin, and phenothrin, (2) the

application rates are minimal, and (3) the mode of application, into underground nests, further limits the potential for environmental exposure from these materials.

## **CONTROL OF OTHER VECTORS**

### **STINGING INSECT CONTROL**

Ground-nesting yellowjackets that pose an imminent threat to humans, livestock or pets are controlled by the District. However, the District does not control any yellowjackets that are located inside or on a structure. Aerial yellowjacket nests are treated to protect the health and safety of District residents under special circumstances. If a technician finds that a stinging insect hive is located inside a structure or above ground, the resident is given a copy of a referral list which contains the names of pest control companies and Bee Keeper's Associations in Marin and Sonoma County that are certified for structural control or removal of stinging insects. If a District technician elects to treat stinging insects, he or she would apply an insecticide directly to the insect nest, in accordance with District policies and the product label to avoid any unwanted drift and harm to other organisms, or place tamper-resistant traps or bait stations, selective for the target insect, in the vicinity of the problem insects. Bee swarms located by District technicians are referred to Bee Keepers in Marin or Sonoma County for removal.

### **RODENT CONTROL**

The District's Rodent Prevention and Control Program is designed to provide detailed information and guidance to the public. The program is based on the principles of exclusion, and the implementation of best management practices to control rat and mice populations inside and outside of the home or business. In providing information to the public, District staff stresses the importance of preventing rodent access into the building, and property management and maintenance designed to preclude the presence of rodent habitat.

Rat control can often be necessary at the community and neighborhood levels and require cooperation and collaboration amongst neighbors. The District offers and makes staff available for informational presentations to communities in these situations. District staff works with other local government agencies to provide information to the public and assist in remedying especially problematic situations.

### **RODENT PREVENTION AND CONTROL PROGRAM OPERATIONS OVERVIEW**

District staff answers phone calls and take inquiries from the public regarding rats. General information regarding rodent issues is provided through the recently updated District website and printed literature.

Specific issues and service provision are handled by a full-time Rodent Control Specialist, who answers phone calls/requests for information from members of the public or agencies with specific issues or problematic situations.

The Rodent Control Specialist provides information regarding rodent control, prevention, exclusion, and vector-borne disease. If deemed necessary and appropriate, a service

request is made for an onsite visit. Subsequently, a rodent inspection is performed with an accompanying report. If applicable, information is provided regarding:

- Rodent habitat
- Property maintenance/BMPs
- Exclusion
- Trapping
- Disinfection
- Disposal
- Community/neighborhood presentation

District staff provides community outreach and educational materials and information regarding rodent issues at public events, special presentations held throughout the year, and when communicating with the public in the field.

#### **CONTROL OF OTHER ANIMALS**

The District may control other animals, such as ground squirrels and fleas, in response to the threat of disease transmission to humans. These animals would only be controlled after consultation with local and State health officials. In specific situations, control of other vectors will be considered either as policy of the Board of Trustees or as directed by management.

#### **SERVICE REQUESTS**

Prior to 2004 the District did not respond to service requests originating from outside of its existing boundaries. After the assessment was approved in 2004, the District has responded to service requests originating within the Annexation Areas, providing the same level of service as the pre-existing District jurisdiction. Any property owner, business or resident in the District's Service Area can contact the District to request vector control related services or inspections, and a District field technician will respond as promptly as possible to the property to evaluate the situation and to perform appropriate surveillance and control services. The District responds to all service requests in as timely a manner as possible, regardless of location.

## ESTIMATE OF COST

FIGURE 1 – ESTIMATE OF COST, FISCAL YEAR 2017-18

<b>Vector Control Services and Related Expenditures</b>			
Salaries, Wages and Benefits			\$748,321
Services and Supplies			\$300,187
Capital Replacement			\$9,247
			<u>\$1,057,755</u>
<b>Less:</b>			
<b>District Contribution for General Benefit &amp; Other Revenue Sources<sup>1</sup></b>			
Ad Valorem Taxes			(\$131,606)
Interest Earned			\$0
Misc. Income / Contracts			\$0
Transfer from Reserves			\$0
			<u>(\$131,606)</u>
			<u><u>\$926,149</u></u>
<b>Total Vector Control Services</b>			<b>\$926,149</b>
(Net Amount to be Assessed)			
<b>Budget Allocation to Property</b>			
	Total SFE Units <sup>2</sup>	Asmt / SFE <sup>3</sup>	Total Assessment <sup>4</sup>
Marin County - Zone West Marin	5,817	\$25.64	\$149,148
Sonoma County - Zone A	30,087	\$25.64	\$771,419
Sonoma County - Zone B	228	\$24.52	\$5,582
	<u>36,131</u>		<u>\$926,149</u>

### Notes to Estimate of Cost:

- As determined in the following section, at least 5% of the cost of the Services paid by the assessments must be funded from other funding sources to cover any general benefits from the improved Services. Therefore, out of the total cost to provide the improved Services of \$926,149, the District must contribute at least \$46,307 (5%) from sources other than the assessments. The District will

contribute \$131,606, which is 14% of the total cost of providing the improved Services. This contribution covers any general benefits from the Services.

2. SFE Units means Single Family Equivalent benefit units. See the section "Assessment Apportionment" for further definition.
3. The assessment rate per SFE is the total amount of assessment per Single Family Equivalent benefit unit.
4. The proceeds from the assessments will be deposited into a special fund for the Assessment. Funds raised by the assessment shall be used only for the purposes stated within this Report. Any balance remaining at the end of the fiscal year, June 30, must be carried over to the next fiscal year. The Total Assessment Budget is the sum of the final property assessments rounded to the lower penny to comply with the County Auditors' levy submission requirements. Therefore, the total assessment amount for all parcels subject to the assessments may vary slightly from the net amount to be assessed.

## HISTORICAL SUMMARY OF ASSESSMENTS BY COUNTY – ASSESSMENT No. 2

The figure below depicts a historical summary of the Assessment No. 2 annual rates, the number of SFE (Single Family Equivalent) units, total assessment and the increase on assessment compared to the year before for Marin and Sonoma Counties.

FIGURE 2 – ASSESSMENT No. 2 HISTORY

MS-MVCD Assessment No.2		Marin County			Sonoma County		
Fiscal Year	Asmt / SFE	SFE Units	Total Assessment	Increase from prior year	SFE Units	Total Assessment	Increase from prior year
2005-06	\$19.00	5,559	\$105,627	\$105,627	29,412	\$558,736	\$558,736
2006-07	\$19.36	5,602	\$108,448	\$2,821	29,588	\$572,826	\$14,091
2007-08	\$19.36	5,596	\$108,341	(\$108)	29,631	\$573,660	\$834
2008-09	\$19.36	5,668	\$109,730	\$1,389	29,808	\$577,087	\$3,427
2009-10	\$19.36	5,701	\$110,370	\$640	29,992	\$580,644	\$3,557
2010-11	\$19.36	5,781	\$111,917	\$1,547	30,018	\$580,959	\$315
2011-12	\$19.36	5,758	\$111,473	(\$444)	29,954	\$579,709	(\$1,250)
2012-13	\$19.92	5,759	\$114,720	\$3,247	29,977	\$596,957	\$17,248
2013-14	\$20.88	5,767	\$120,424	\$5,704	29,998	\$626,146	\$29,189
2014-15	\$21.68	5,770	\$125,099	\$4,675	30,078	\$651,882	\$25,737
2015-16	\$22.24	5,792	\$128,823	\$3,724	30,131	\$669,885	\$18,003
2016-17	\$24.76	5,809	\$143,836	\$15,013	30,278	\$749,433	\$79,548
2017-18	\$25.64	5,817	\$149,148	\$5,312	30,314	\$777,001	\$27,568

The Total Assessment per parcel is rounded to the lower even penny to comply with the Marin & Sonoma County Auditors' levy submission requirements.



## SUMMARY OF ASSESSMENTS BY COUNTY FOR FISCAL YEAR 2017-18

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The figure below reflects the Assessment No. 2 summaries for Marin and Sonoma Counties for fiscal year 2017-18: total number of parcels in each county, number of parcels assessed, SFE unit count, and the total assessment to be placed on assessable parcels in each county for fiscal year 2017-18.

**FIGURE 3 – ASSESSMENT SUMMARY – FISCAL YEAR 2017-18**

<b>Fiscal Year 2017-18 Assessment No. 2</b>	<b>Parcels in Assessment No.2</b>	<b>Parcels Assessed</b>	<b>SFE Units</b>	<b>Assessment</b>
Marin County - West Marin	6,531	5,667	5,817	\$149,148
Sonoma County - Zone A	35,046	30,301	30,087	\$771,419
Sonoma County - Zone B	396	363	228	\$5,582
Total SFE	41,973	36,331	36,131	\$926,149

## METHOD OF ASSESSMENT

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This section of the Report explains the benefits to be derived from the Services provided by the District, and the methodology used to apportion the total assessment to properties within the Northwest Mosquito, Vector and Disease Control Assessment Annexation Area.

The Northwest Mosquito, Vector and Disease Control Assessment Annexation Area consists of all assessor parcels as defined by the approved boundary description, covering generally the North and West/coastal areas of Sonoma County and the West/coastal areas of Marin County as defined within the area of the boundary diagram included within this Engineer's Report (see the assessment roll for a list of all the parcels included in the proposed Mosquito and Disease Control Assessment).

The Marin/Sonoma Mosquito and Vector Control District's boundary is coterminous with the counties of Marin and Sonoma now that the annexation has been accomplished. Prior to the annexation in 2004, mosquito abatement programs, projects and services were not provided in the Annexation Area by the Marin/Sonoma Mosquito and Vector Control District or any other public agency. The proposed assessments now allow the District to provide its vector abatement and disease control services throughout the Annexation Area.

The method used for apportioning the assessment is based upon the proportional special benefits to be derived by the properties in the Annexation Areas over and above general benefits conferred on real property in the assessment area or to the public at large. Special benefit is calculated for each parcel in the Annexation Areas.

1. Identification of total benefit to the properties derived from the Services
2. Calculation of the proportion of these benefits that are special vs. general
3. Determination of the relative special benefit within different areas within the Annexation Areas
4. Determination of the relative special benefit per property type and property characteristic
5. Calculation of the specific assessment for each individual parcel based upon special vs. general benefit; location, property type and property characteristics,

### DISCUSSION OF BENEFIT

In summary, the assessments can only be levied based on the special benefit to property. This special benefit is received by property over and above any general benefits from the proposed Services. With reference to the engineering requirements for property related assessments, under Proposition 218 an engineer must determine and prepare a report evaluating the amount of special and general benefit received by property within the Unprotected Area as a result of the improvements or services provided by a local agency. The special benefit is to be determined in relation to the total cost to that local entity of providing the service and/or improvements.

Proposition 218 as described in Article XIID of the California Constitution has confirmed that assessments must be based on the special benefit to property:

*"No assessment shall be imposed on any parcel which exceeds the reasonable cost of the proportional special benefit conferred on that parcel."*

The benefit factors discussed in the following sections, when applied to property in the Annexation Areas confer special benefits to property and ultimately improve the safety, utility, functionality and usability of property in the Annexation Areas. These are special benefits to property in the Annexation Areas in much the same way that storm drainage, sewer service, water service, sidewalks and paved streets enhance the utility and functionality of each parcel of property served by these services and improvements, providing them with more utility of use and making them safer and more usable for occupants.

It should also be noted that Proposition 218 includes a requirement that existing assessments in effect upon its effective date were required to be confirmed by either a majority vote of registered voters in the assessment area, or by weighted majority property owner approval using the new ballot proceeding requirements. However, certain assessments were excluded from these voter approval requirements. Of note is that in California Constitution Article XIID Section 5(a) this special exemption was granted to assessments for sidewalks, streets, sewers, water, flood control, drainage systems and vector control. The Howard Jarvis Taxpayers Association explained this exemption in their Statement of Drafter's Intent:

*"This is the "traditional purposes" exception. These existing assessments do not need property owner approval to continue. However, future assessments for these traditional purposes are covered."*<sup>3</sup>

Therefore, the drafters of Proposition 218 acknowledged that vector control assessments were "traditional" and therefore acknowledged and accepted use.

Since all assessments, existing before or after Proposition 218 must be based on special benefit to property, the drafters of Proposition 218 by implication found that vector control services confer special benefit on property. Moreover, the statement of drafter's intent also acknowledges that any new or increased vector control assessments after the effective date of Proposition 218 would need to comply with the voter approval requirements it established. This is as an acknowledgement that additional assessments for such "traditional" purposes would be established after Proposition 218 was in effect. Therefore, the drafters of Proposition 218 clearly recognized vector assessments as a "traditional" use of assessments, acknowledged that new vector assessments may be formed after Proposition

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<sup>3</sup> Howard Jarvis Taxpayers Association, "Statement of Drafter's Intent", January 1997.

218 and by implication were satisfied that vector control services confer special benefit to properties.

The Legislature also made a specific determination after Proposition 218 was enacted that vector control services constitute a proper subject for special assessment. Health and Safety Code section 2082, which was signed into law in 2002, provides that a district may levy special assessments consistent with the requirements of Article XIID of the California Constitution to finance vector control projects and programs. The intent of the Legislature to allow and authorize benefit assessments for vector control services after Proposition 218 is shown in the Assembly and Senate analysis the Mosquito Abatement and Vector Control District Law where it states that the law:

*Allows special benefit assessments to finance vector control projects and programs, consistent with Proposition 218.<sup>4</sup>*

Therefore the State Legislature unanimously determined that vector control services are a valuable and important public service that can be funded by benefit assessments. To be funded by assessments, vector control services must confer special benefit to property.

### **MOSQUITO AND VECTOR CONTROL IS A SPECIAL BENEFIT TO PROPERTIES**

As described below, this Engineer's Report concludes that mosquito and vector control is a special benefit that provides direct advantages to property in the Annexation Areas. For example, the assessment provides for 1) surveillance throughout the Annexation Areas to measure and track the levels and sources of mosquitoes and other vectors impacting property in the area and the people who live and work on the property, 2) mosquito and vectors control and source control, treatment and abatement throughout the Annexation Areas such that all property in the area benefits from a comparable reduction of the levels of mosquito and other vectors, 3) monitoring throughout the Annexation Areas to evaluate the effectiveness of District treatment and control and to ensure that all properties are receiving the equivalent level of mosquito and vector reduction benefits, and 4) the properties in the Annexation Areas are eligible for service requests which result in District staff directly visiting, inspecting and treating property. Moreover, the Services funded by the Assessments would reduce the level of mosquitoes and vectors arriving at and negatively impacting properties within the Assessment area.

The following section, Benefit Factors, describes how the Services specially benefit properties in the Assessment Area. These benefits are particular and distinct from its effect on property in general or the public at large.

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<sup>4</sup> Senate Bill 1588, Mosquito Abatement and Vector Control District Law, Legislative bill analysis

## BENEFIT FACTORS

In order to allocate the proposed assessments, the engineer identified the types of special benefit arising from the Services that would be provided to property within the Annexation Area. These types of special benefit are as follows:

### **REDUCED MOSQUITO AND VECTOR POPULATIONS ON PROPERTY AND AS A RESULT, ENHANCED DESIRABILITY, UTILITY, USABILITY AND FUNCTIONALITY OF PROPERTY IN THE ANNEXATION AREAS**

The proposed assessments would provide new and enhanced services for the control and abatement of nuisance and disease-carrying mosquitoes and other vectors. These Services would materially reduce the number of vectors on properties throughout the Annexation Areas. The lower mosquito and vector populations on property in the Annexation Areas is a direct advantage to property that serves to increase the desirability and usability of property. Clearly, properties are more desirable and usable in areas with lower mosquito populations and with a reduced risk of vector-borne disease. This is a special benefit to residential, commercial, agricultural, industrial and other types of property because all such properties would directly benefit from reduced mosquito and vector populations and properties with lower vector populations are more usable, functional and desirable.

Excessive mosquitoes and other vectors in the area can materially diminish the utility and usability of property. For example, prior to the commencement of mosquito control and abatement services, properties in many areas in the State were considered to be nearly uninhabitable during the times of year when the mosquito populations were high.<sup>5</sup> The prevention or reduction of such diminished utility and usability of property caused by mosquitoes is a clear and direct advantage and special benefit to property in the Annexation Areas.

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<sup>5</sup> Prior to the commencement of modern mosquito control services, areas in the State of California such as the San Mateo Peninsula, Napa County and areas in Marin and Sonoma Counties had such high mosquito populations that they were considered to be nearly unlivable during certain times of the year and were largely used for part-time vacation cottages that were occupied primarily during the months when the natural mosquito populations were lower.

The State Legislature made the following finding on this issue:

*“Excess numbers of mosquitoes and other vectors spread diseases of humans, livestock, and wildlife, reduce enjoyment of outdoor living spaces, both public and private, reduce property values, hinder outdoor work, reduce livestock productivity; and mosquitoes and other vectors can disperse or be transported long distances from their sources and are, therefore, a health risk and a public nuisance; and professional mosquito and vector control based on scientific research has made great advances in reducing mosquito and vector populations and the diseases they transmit.”<sup>6</sup>*

Mosquitoes and other vectors emerge from sources throughout the Annexation Areas, and with an average flight range of two miles, mosquitoes from known sources can reach all properties in the Annexation Areas. These sources include standing water in rural areas, such as marshes, pools, wetlands, ponds, drainage ditches, drainage systems, tree holes and other removable sources such as old tires and containers. The sources of mosquitoes also include numerous locations throughout the urban areas in the Annexation Areas. These sources include underground drainage systems, containers, unattended swimming pools, leaks in water pipes, tree holes, flower cups in cemeteries, over-watered landscaping and lawns and many other sources. By controlling mosquitoes at known and new sources, the Services materially reduce mosquito populations on property throughout the Annexation Areas.

A recently increasing source of mosquitoes is unattended swimming pools:

*“Anthropogenic landscape change historically has facilitated outbreaks of pathogens amplified by peridomestic vectors such as Cx. pipiens complex mosquitoes and associated commensals such as house sparrows. The recent widespread downturn in the housing market and increase in adjustable rate mortgages have combined to force a dramatic increase in home foreclosures and abandoned homes and produced urban landscapes dotted with an expanded number of new mosquito habitats. These new larval habitats may have contributed to the unexpected early season increase in WNV cases in Bakersfield during 2007 and subsequently have enabled invasion of urban areas by the highly competent rural vector Cx. tarsalis. These factors can increase the spectrum of competent avian hosts, the efficiency of enzootic amplification, and the risk for urban epidemics.”<sup>7</sup>*

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<sup>6</sup> Assembly Concurrent Resolution 52, chaptered April 1, 2003

<sup>7</sup> Riesen Wouldiam K. (2008). Delinquent Mortgages, Neglected Swimming Pools, and West Nile Virus, California. Emerging Infectious Diseases. Vol. 14(11).

The Services include the monitoring and treatment of neglected pools throughout the Assessment Areas.

#### **INCREASED SAFETY OF PROPERTY IN THE ANNEXATION AREAS**

The Assessments provide year-round proactive Services to control and abate mosquitoes and other vectors that otherwise would occupy properties throughout the Annexation Areas. Mosquitoes and other vectors are transmitters of diseases, so the reduction of mosquito populations makes property in the Annexation Areas safer for use and enjoyment. In absence of the assessments, these Services would not be provided, so the Services funded by the assessments make properties in the Annexation Areas safer, which is a distinct special benefit to property in the Annexation Areas.<sup>8</sup> This is not a general benefit to property in the Annexation Areas or the public at large, because the Services are tangible mosquito and disease control services that are provided directly to the properties in the Annexation Areas, and the Services are over and above what otherwise would be provided by the District or any other agency.

This finding was confirmed in 2003 by the State Legislature:

*“Mosquitoes and other vectors, including but not limited to ticks, Africanized Honey Bees, rats, fleas, and flies, continue to be a source of human suffering, illness, death and a public nuisance in California and around the world. Adequately funded mosquito and vector control, monitoring and public awareness programs are the best way to prevent outbreaks of West Nile Virus and other diseases borne by mosquitoes and other vectors.”<sup>9</sup>*

Also, the Legislature, in Health and Safety Code Section 2001, finds that:

*“The protection of Californians and their communities against the discomforts and economic effects of vectorborne diseases is an essential public service that is vital to public health, safety, and welfare.”*

#### **REDUCTIONS IN THE RISK OF NEW DISEASES AND INFECTIONS ON PROPERTY IN THE ANNEXATION AREAS**

Mosquitoes have proven to be a major contributor to the spread of new diseases such as West Nile Virus, among others. A highly mobile population combined with migratory bird patterns can introduce new mosquito-borne diseases into previously unexposed areas.

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<sup>8</sup> By reducing the risk of disease and increasing the safety of property, the proposed Services would materially increase the usefulness and desirability of properties in the Annexation Areas.

<sup>9</sup> Assembly Concurrent Resolution 52, chaptered April 1, 2003.



*“Vector-borne diseases (including a number that are mosquito-borne) are a major public health problem internationally. In the United States, dengue and malaria are frequently brought back from tropical and subtropical countries by travelers or migrant laborers, and autochthonous transmission of malaria and dengue occasionally occurs. In 1998, 90 confirmed cases of dengue and 1,611 cases of malaria were reported in the USA and dengue transmission has occurred in Texas.”<sup>10</sup>*

*“During 2004, 40 states and the District of Columbia (DC) have reported 2,313 cases of human WNV illness to CDC through ArboNET. Of these, 737 (32%) cases were reported in California, 390 (17%) in Arizona, and 276 (12%) in Colorado. A total of 1,339 (59%) of the 2,282 cases for which such data were available occurred in males; the median age of patients was 52 years (range: 1 month–99 years). Date of illness onset ranged from April 23 to November 4; a total of 79 cases were fatal.”<sup>11</sup> (According to the Centers for Disease Control and Prevention on January 19, 2004, a total of 2,470 human cases and 88 human fatalities from WNV have been confirmed).*

A study of the effect of aerial spraying conducted by the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) to control a West Nile Virus disease outbreak found that the SYMVCD's mosquito control efforts materially decreased the risk of new diseases in the treated areas:

*After spraying, infection rates decreased from 8.2 (95% CI 3.1–18.0) to 4.3 (95% CI 0.3–20.3) per 1,000 females in the spray area and increased from 2.0 (95% CI 0.1–9.7) to 8.7 (95% CI 3.3–18.9) per 1,000 females in the untreated area. Furthermore, no additional positive pools were detected in the northern treatment area during the remainder of the year, whereas positive pools were detected in the untreated area until the end of September (D.-E.A Elnaiem, unpub. data). These independent lines of evidence corroborate our conclusion that actions taken by SYMVCD were effective in disrupting the WNV transmission cycle and reducing human illness and potential deaths associated with WNV.<sup>12</sup>*

The Services funded by the assessments help prevent, on a year-round basis, the presence of vector-borne diseases on property in the Annexation Areas. This is another tangible and

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<sup>10</sup> Rose, Robert. (2001). Pesticides and Public Health: Integrated Methods of Mosquito Management. Emerging Infectious Diseases. Vol. 7(1); 17-23.

<sup>11</sup> Center for Disease Control. (2004). West Nile Virus Activity --- United States, November 9--16, 2004. Morbidity and Mortality Weekly Report. 53(45); 1071-1072.

<sup>12</sup> Carney, Ryan. (2008), Efficiency of Aerial Spraying of Mosquito Adulticide in Reducing the Incidence of West Nile Virus, California, 2005. Emerging Infectious Diseases, Vol 14(5)



direct special benefit to property in the Annexation Areas that would not be received in the absence of the assessments.

#### **PROTECTION OF ECONOMIC ACTIVITY ON PROPERTY IN THE ANNEXATION AREAS**

As demonstrated by the SARS outbreak in China and outbreaks of Avian Flu, outbreaks of pathogens can materially and negatively impact economic activity in the affected area. Such outbreaks and other public health threats can have a drastic negative effect on tourism, business and residential activities in the affected area. The assessments help to prevent the likelihood of such outbreaks in the Annexation Areas.

Prior to the commencement of the mosquito and vector control services provided by the District in its previous service areas, mosquitoes hindered, annoyed and harmed residents, guests, visitors, farm workers, and employees to a much greater degree. A vector-borne disease outbreak and other related public health threats would have a drastic negative effect on agricultural, business and residential activities in the Annexation Areas.

The economic impact of diseases is well documented. According to a study prepared for the Centers for Disease Control and Prevention, economic losses due to the transmission of West Nile virus in the US was estimated to cost over \$778 million from 1999 to 2012:

*There are no published data on the economic burden for specific West Nile virus (WNV) clinical syndromes (i.e., fever, meningitis, encephalitis, and acute flaccid paralysis [AFP]). We estimated initial hospital and lost-productivity costs from 80 patients hospitalized with WNV disease in Colorado during 2003; 38 of these patients were followed for 5 years to determine long-term medical and lost-productivity costs. Initial costs were highest for patients with AFP (median \$25,117; range \$5,385–\$283,381) and encephalitis (median \$20,105; range \$3,965–\$324,167). Long-term costs were highest for patients with AFP (median \$22,628; range \$624–\$439,945) and meningitis (median \$10,556; range \$0–\$260,748). Extrapolating from this small cohort to national surveillance data, we estimated the total cumulative costs of reported WNV hospitalized cases from 1999 to 2012 to be \$778 million (95% confidence interval \$673 million–\$1.01 billion). These estimates can be used in assessing the cost-effectiveness of interventions to prevent WNV disease.<sup>13</sup>*

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<sup>13</sup> Initial and Long-Term Costs of Patients Hospitalized with West Nile Virus Disease. Arboviral Diseases Branch, Centers for Disease Control and Prevention, Fort Collins, Colorado; Prion and Health Office, Centers for Disease Control and Prevention, Atlanta, Georgia; Division of Preparedness and Emerging Infections, Centers for Disease Control and Prevention, Atlanta, Georgia. J. Erin Staples, Manjunath Shankar, James J. Sejvar, Martin I. Meltzer, and Marc Fischer. J. Erin Staples, Arboviral Diseases Branch, Centers for Disease Control and Prevention, 3150 Rampart Road, Fort Collins, CO 80521. E-mail: AUV1@cdc.gov.

Moreover, a study conducted in 1996-97 of La Crosse encephalitis (LACE), a human illness caused by a mosquito-transmitted virus, found a lifetime cost per human case at \$48,000 to \$3,000,000 and found that the disease significantly impacted lifespans of those who were infected. Following is a quote from the study which references the importance and value of active vector control services of the type that would be funded by the proposed Assessments:

*The socioeconomic burden resulting from LACE is substantial, which highlights the importance of the illness in western North Carolina, as well as the need for active surveillance, reporting, and prevention programs for the infection.* <sup>14</sup>

The services funded by the assessments help to prevent the likelihood of such outbreaks on property in the Annexation Area and reduce the harm to economic activity on property caused by existing mosquito populations. This is another direct advantage in the Annexation Areas that would not be received in absence of the assessments.

#### **PROTECTION OF THE TOURISM, AGRICULTURE AND BUSINESS INDUSTRIES IN THE ANNEXATION AREAS**

The agriculture, tourism and business industries within the Annexation Areas benefit from reduced levels of harmful or nuisance mosquitoes and other vectors. Conversely, any outbreaks of emerging vector-borne pathogens could also materially negatively affect these industries. Diseases transmitted by mosquitoes and other vectors can adversely impact business and recreational functions.

More recently, the invasive species *Aedes aegypti* (yellow fever mosquito) has been found in the San Francisco Bay area and the District is conducting enhanced surveillance using specialized traps to determine whether this species is present in its service area. This mosquito is an efficient vector of several emerging diseases such as dengue fever, Chikungunya (currently affecting the Caribbean), yellow fever and Zika. Fortunately none of these diseases are currently endemic in the service area, but the presence of the vector species increases the risk of transmission if cases are imported by infected person who travel to endemic areas of the world.

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<sup>14</sup> Utz, J. Todd, Apperson, Charles S., Maccormack, J. Newton, Salyers, Martha, Dietz, E. Jacquelin, Mcpherson, J. Todd, Economic And Social Impacts Of La Crosse Encephalitis In Western North Carolina, Am J Trop Med Hyg 2003 69: 509-518.

*A study prepared for the United States Department of Agriculture in 2003 found that over 1,400 horses died from West Nile Virus in Colorado and Nebraska and that these fatal disease cases created over \$1.2 million in costs and lost revenues. In addition, horse owners in these two states spent over \$2.75 million to vaccinate their horses for this disease. The study states that “Clearly, WNV has had a marked impact on the Colorado and Nebraska equine industry.”<sup>15</sup>*

*Pesticides for mosquito control impart economic benefits to agriculture in general. Anecdotal reports from farmers and ranchers indicate that cattle, if left unprotected, can be exsanguinated by mosquitoes, especially in Florida and other southeast coastal areas. Dairy cattle produce less milk when bitten frequently by mosquitoes <sup>16</sup>*

The assessments serve to protect the businesses and industries in the Annexation Areas. This is a direct advantage and special benefit to property in the Annexation Areas.

#### **REDUCED RISK OF NUISANCE AND LIABILITY ON PROPERTY IN THE ANNEXATION AREAS**

In addition to health-related factors, uncontrolled mosquito and vector populations create a nuisance for residents, employees, customers, tourists, farm workers and guests in the Annexation Areas. Properties in the Annexation Areas benefit from the reduced nuisance factor that is created by the Services. Agricultural and rangeland properties also benefit from the reduced nuisance factor and harm to livestock and employees from lower mosquito and vector populations.

Agricultural, range, golf course, cemetery, open space and other such lands in the Annexation Areas contain large areas of mosquito and vector habitat and are therefore a significant source of mosquito and vector populations. In addition, residential and business properties in the Annexation Areas can also contain significant sources.<sup>17</sup> It is conceivable that sources of mosquitoes could be held liable for the transmission of diseases or other harm. For example, in August 2004, the City of Los Angeles approved new fines of up to \$1,000 per day for property owners who don't remove standing water sources of mosquitoes on their property.

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<sup>15</sup> S. Geiser, A. Seitzinger, P. Salazar, J. Traub-Dargatz, P. Morley, M. Salman, D. Wilmot, D. Steffen, W. Cunningham, Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries: 2002, April 2003, Available from [http://www.aphis.usda.gov/vs/ceah/cnahs/nahms/equine/wnv2002\\_CO\\_NB.pdf](http://www.aphis.usda.gov/vs/ceah/cnahs/nahms/equine/wnv2002_CO_NB.pdf)

<sup>16</sup> . Jennings, Allen. (2001). USDA Letter to EPA on Fenthion IRED. United States Department of Agriculture, Office of Pest Management Policy. March 8, 2001.

<sup>17</sup> Sources of mosquitoes on residential, business, agricultural, range and other types of properties include removable sources such as containers that hold standing water.

The Services provided by the District reduce the mosquito and vector related nuisance and health liability to properties in the Annexation Area. The reduction of that risk of liability constitutes a special benefit to property in the Annexation Areas. This special benefit would not be received in absence of the Services funded by the assessments.

#### **IMPROVED MARKETABILITY OF PROPERTY**

As described previously, the Services specially benefit properties in the Annexation Areas by making them more useable, livable and functional. The Services also make properties in the Annexation Areas more desirable, and more desirable properties also benefit from improved marketability. This is another tangible special benefit to certain property in the Annexation Areas which would not be enjoyed in absence of the Services.<sup>18</sup>

#### **BENEFIT FINDING**

In summary, the special benefits described in this Report and the expansion and provision of Services to the Annexation Areas directly benefit and protect the real properties in the Annexation Areas in excess of the proposed assessments for these properties. Therefore, the Assessment Engineer finds that the cumulative special benefits to property from the Services are reasonably equal to or greater than the proposed assessment rate per benefit unit.

#### **GENERAL VS. SPECIAL BENEFIT**

Article XIID of the California Constitution requires any local agency proposing to increase or impose a benefit assessment to “separate the general benefits from the special benefits conferred on a parcel.” The rationale for separating special and general benefits is to ensure that property owners subject to the benefit assessment are not paying for general benefits. The assessment can fund the special benefits to property in the assessment area but cannot fund any general benefits. Accordingly, a separate estimate of the special and general benefit is given in this section.

In other words:

<b>Total Benefit</b>	<b>=</b>	<b>General Benefit</b>	<b>+</b>	<b>Special Benefit</b>
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There is no widely-accepted or statutory formula for general benefit from vector control services. General benefits are benefits from improvements or services that are not special in nature, are not “particular and distinct” and are not “over and above” benefits received by

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<sup>18</sup> . If one were to compare two hypothetical properties with similar characteristics, the property with lower mosquito infestation and reduced risk of vector-borne disease would clearly be more desirable, marketable and usable.

other properties. General benefits are conferred to properties located “in the district,”<sup>19</sup> but outside the narrowly-drawn Assessment District and to “the public at large.” SVTA provides some clarification by indicating that general benefits provide “an indirect, derivative advantage” and are not necessarily proximate to the improvements and services funded by the assessments.

A formula to estimate the general benefit is listed below:

<b>General Benefit</b>	<b>=</b>	<b>Benefit to real property outside of improvement district</b>	<b>+</b>	<b>Benefit to real property inside of improvement district</b>	<b>+</b>	<b>Benefit to public at large</b>
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Special benefit, on the other hand, is defined in the state constitution as “a particular and distinct benefit over and above general benefits conferred on real property located in the district or to the public at large.” The SVTA decision indicates that a special benefit is conferred to a property if it “receives a direct advantage from the improvement (e.g., proximity to a park).” In this Annexation Areas assessment, the overwhelming proportion of the benefits conferred to property is special, since the Services funded by the Assessments are directly received by the properties in the Assessment District and are only minimally received by property outside the Assessment District or the public at large.

Proposition 218 twice uses the phrase “over and above” general benefits in describing special benefit. (Art. XIID, sections 2(i) & 4(f).) Significantly, with this Annexation Area assessment, prior to 2004 there were no mosquito and vector related services being provided to the Annexation Areas by any federal, state or local government agency. Consequently, there were no mosquito and vector control related general benefits being provided to the Annexation Areas, and any new and extended service provided by the District would be over and above this zero baseline. Arguably, all of the Services to be

<sup>19</sup> SVTA explains as follows:

OSA observes that Proposition 218’s definition of “special benefit” presents a paradox when considered with its definition of “district.” Section 2, subdivision (i) defines a “special benefit” as “a particular and distinct benefit over and above general benefits conferred on real property located in the district or to the public at large.” (Art. XIII D, § 2, subd. (i), italics added.) Section 2, subdivision (d) defines “district” as “an area determined by an agency to contain all parcels which would receive a special benefit from a proposed public improvement or property-related service.” (Art. XIII D, § 2, subd. (d), italics added.) In a well-drawn district — limited to only parcels receiving special benefits from the improvement — every parcel within that district receives a shared special benefit. Under section 2, subdivision (i), these benefits can be construed as being general benefits since they are not “particular and distinct” and are not “over and above” the benefits received by other properties “located in the district.”

We do not believe that the voters intended to invalidate an assessment district that is narrowly drawn to include only properties directly benefiting from an improvement. Indeed, the ballot materials reflect otherwise. Thus, if an assessment district is narrowly drawn, the fact that a benefit is conferred throughout the district does not make it general rather than special.

funded by the assessment therefore would be a special benefit because the Services would particularly and distinctly benefit and protect the Annexation Areas over and above the baseline benefits and service of zero. Nevertheless, arguably some of the Services benefit the public at large and properties outside the Annexation Areas.

In the 2009 Dahms case, the court upheld an assessment that was 100% special benefit on the rationale that the services funded by the assessments were directly provided to property in the assessment district. Similar to the assessments in Pomona that were validated by Dahms, the Assessments described in this Engineer's Report fund mosquito, vector and disease control services directly provided to property in the Annexation Areas. Moreover, as noted in this Report, the Services directly reduce mosquito and vector populations on all property in the Annexation Areas. Therefore, Dahms establishes a basis for minimal or zero general benefits from the Assessments. However, in this Report, the general benefit is more conservatively estimated and described, and then budgeted so that it is funded by sources other than the Assessment.

#### **BENEFIT TO PROPERTY OUTSIDE THE DISTRICT**

Properties within the Assessment District receive almost all of the special benefits from the Services because the Services funded by the Assessments are provided directly to protect property within the Assessment District from mosquitoes and vector-borne disease. However, properties adjacent to, but just outside of, the proposed boundaries may receive some benefit from the proposed Services in the form of reduced mosquito populations on property outside the Annexation Areas. Since this benefit, is conferred to properties outside the district boundaries, it contributes to the overall general benefit calculation and will not be funded by the assessment.

A measure of this general benefit is the proportion of Services that would affect properties outside of the Annexation Areas. Each year, the District provides some of its Services in areas near the boundaries of the Annexation Areas. By abating mosquito and vector populations near the borders of the Annexation Areas, the Services could provide benefits in the form of reduced mosquito populations and reduced risk of disease transmission to properties outside the Annexation Areas. If mosquitoes and other vectors are not controlled inside the Annexation Areas, more of them would fly from the Annexation Areas. Therefore control of mosquitoes and other vectors within the Annexation Areas provides some benefit to properties outside the Annexation Areas but within the normal flight range of mosquitoes and other vectors, in the form of reduced mosquito and vector populations and reduced vector-borne disease transmission. This is a measure of the general benefits to property outside the Annexation Areas because this is a benefit from the Services that is not specially conferred upon property in the assessment area.

The mosquito and vector potential outside the Annexation Areas is based on studies of mosquito dispersion concentrations. Mosquitoes can travel up to two miles, on average, so this destination range is used. Based on studies of mosquito destinations, relative to parcels in the Annexation Areas, average concentration of mosquitoes from the Annexation Areas



on properties within two miles of the Annexation Areas is calculated to be 6%.<sup>20</sup> This relative vector population reduction factor within the destination range is combined with the number of parcels outside the Annexation Areas and within the destination range to measure this general benefit and is calculated as follows:

**Criteria:**

Mosquitoes may fly up to 2 miles from their breeding source.

3,671 parcels within 2 miles of, but outside of the District, may receive some mosquito and disease protection benefit

6% portion of relative benefit that is received

56,637 Parcels in the District

**Calculations:**

Total Benefit = 3,671 parcels \* 6% = 221 parcels equivalents

Percentage of overall parcel equivalents =  $221 / (56,637 + 221) = 0.39\%$

Therefore, for the overall benefits provided by the Services to the Annexation Areas, it is determined that 0.39% of the benefits would be received by the parcels within two miles of the Annexation Areas boundaries. Recognizing that this calculation is an approximation, this benefit is increased to 0.50%.

**BENEFIT TO PROPERTY *INSIDE* THE DISTRICT THAT IS *INDIRECT AND DERIVATIVE***

The “indirect and derivative” benefit to property within the Assessment District is particularly difficult to calculate. As explained above, all benefit within the Assessment District is special because the mosquito, vector and disease control services in the Annexation Areas provides direct service and protection that is clearly “over and above” and “particular and distinct” when compared with the lack of such protection under pre-assessment conditions. Further the properties are within the Assessment District boundaries, and this Engineer’s Report demonstrates the direct benefits received by individual properties from mosquito, vector and disease control services.

In determining the Assessment District area, the District has been careful to limit it to an area of parcels that directly receives the Services. All parcels directly benefit from the surveillance, monitoring and treatment that is provided on an equivalent basis throughout the Annexation Areas, in order to maintain the same improved level of protection against mosquitoes and reduced mosquito populations throughout the area. The surveillance and

<sup>20</sup> Tietze, Noor S., Stephenson, Mike F., Sidhom, Nader T. and Binding, Paul L., “Mark-Recapture of *Culex Erythrothorax* in Santa Cruz County, California”, Journal of the American Mosquito Control Association, 19(2):134-138, 2003.



monitoring sites are spread on a balanced basis throughout the area. Mosquito and vector control and treatment is provided as needed throughout the area based on the surveillance and monitoring results. The shared special benefit - reduced mosquito and vector levels and reduced presence of vector-borne diseases - is received on an equivalent basis by all parcels in the Annexation Areas. Furthermore, all parcels in the Assessment District directly benefit from the ability to request service from the District and to have a District field technician promptly respond directly to the parcel and address the owner's or resident's service need.

The *SVTA* decision indicates that the fact that a benefit is conferred throughout the assessment district area does not make the benefit general rather than special, so long as the assessment district is narrowly drawn and limited to the parcels directly receiving shared special benefits from the service. This concept is particularly applicable in situations involving a landowner-approved assessment-funded extension of a local government service to benefit lands previously not receiving that particular service. The Assessment Engineer therefore concludes that, other than the small general benefit to properties outside the Assessment District (discussed above) and to the public at large (discussed below), all of the benefits of the Services to the parcels within the Assessment District are special benefits and it is not possible or appropriate to separate any general benefits from the benefits conferred on parcels in the Annexation Areas.

#### **BENEFIT TO THE PUBLIC AT LARGE**

With the type and scope of Services to be provided to the Assessment Area, it is very difficult to calculate and quantify the scope of the general benefit conferred on the public at large. Because the Services directly serve and benefit all of the property in the Assessment Area, any general benefit conferred on the public at large would be small. Nevertheless, there would be some indirect general benefit to the public at large.

The public at large uses the public highways, streets and sidewalks, and when traveling in and through the Assessment Area they would benefit from the Services. The public at large also receives general benefits when visiting popular tourist area destinations in the Assessment Area (Golden Gate National Recreation Area, Muir Woods, Mount Tamalpais State Park, Point Reyes National Seashore, Stinson Beach etc.). A fair and appropriate measure of the general benefit to the public at large therefore is the amount of highway, street and sidewalk area, as well as tourist destination area within the Assessment Area relative to the overall land area. An analysis of maps of the Assessment Area shows that approximately 3.37% of the land area in the Assessment Area is covered by highways, streets and sidewalks and tourist area destinations. This 3.37% therefore is a fair and appropriate measure of the general benefit to the public at large within the Assessment Area.

#### **SUMMARY OF GENERAL BENEFITS**

Using a sum of the measures of general benefit for the public at large and land outside the Assessment Area, we find that approximately 3.87% of the benefits conferred by the proposed Mosquito and Disease Control Assessment may be general in nature and should be funded by sources other than the assessment.

General Benefit Calculation

0.50%	(Outside the Assessment District)
+ 0.00%	(Property within the Assessment District – indirect and derivative)
+ 3.37%	(Public at Large)
= 3.87%	(Total General Benefit)

Although this analysis supports the finding that 3.87% of the assessment may provide general benefit only, this number is increased by the Assessment Engineer to 5% to more conservatively ensure that no assessment revenue is used to support general benefit. This additional amount allocated to general benefit also covers general benefit to parcels in the Assessment Area if it is later determined that there is some general benefit conferred on those parcels.

The estimated cost of the improved Services is \$926,149. Of this total budget amount, the District must contribute at least \$46,307 or 5% of the total budget from sources other than the Northwest Mosquito, Vector and Disease Control Assessment (Assessment No. 2). The District will contribute \$131,606 from non-assessment revenue (ad valorem taxes), which equates to approximately 14% of the total assessment. This contribution offsets any general benefits from the Mosquito, Vector and Disease Control Assessment's Services.

## ZONES OF BENEFIT

The boundaries of the Annexation Areas have been carefully drawn to include the properties in Marin and Sonoma Counties that did not receive mosquito and disease control services before the Annexation and that materially benefit from the Services. Such parcels are in areas with a material population of people, pets and livestock on the property. The current and future population of property is a conduit of benefit to property because people, pets and livestock are ultimately affected by mosquitoes and vector-borne diseases and the special benefit factors of desirability, utility, usability, livability and marketability are ultimately determined by the population and usage potential of property.

The boundaries of the Annexation Areas have been narrowly drawn to include only properties that specially benefit from the proposed mosquito control services, and did not receive services prior to the Annexation from the District.

The SVTA decision indicates:

*In a well-drawn district — limited to only parcels receiving special benefits from the improvement — every parcel within that district receives a shared special benefit. Under section 2, subdivision (i), these benefits can be construed as being general benefits since they are not “particular and distinct” and are not “over and above” the benefits received by other properties “located in the district.”*

*We do not believe that the voters intended to invalidate an assessment district that is narrowly drawn to include only properties directly benefitting from an improvement. Indeed, the ballot materials reflect otherwise. Thus, if an assessment district is narrowly drawn, the fact that a benefit is conferred throughout the district does not make it general rather than special. In that circumstance, the characterization of a benefit may depend on whether the parcel receives a direct advantage from the improvement (e.g., proximity to park) or receives an indirect, derivative advantage resulting from the overall public benefits of the improvement (e.g., general enhancement of the district’s property values).*

In the Annexation Area, the advantage that each parcel receives from the proposed mosquito control services is direct, and the boundaries are narrowly drawn to include only parcels that benefit from the Assessment. Therefore, the even spread of Assessment throughout the narrowly drawn district is indeed consistent with the OSA decision.

### **ZONES OF BENEFIT A AND B**

In 2009 and 2010, the District completed an analysis of service levels throughout the District boundaries. In particular, the District evaluated service levels in regard to its core services including surveillance, larviciding and service requests; and confirmed that service levels and benefits are essentially equivalent across all parcels (except as noted below). Regarding service requests, the District will respond to any parcel located within the District, regardless of how remote, and provide mosquito control services appropriate to the situation.

However, the District’s evaluation showed that some mountainous areas of the District located in rural northern Sonoma County do not receive the same service level of surveillance services. These areas are described as Zone of Benefit B or Zone B, and are indicated in the assessment diagram.

The District uses mosquito traps to collect and quantify species, quantities, concentrations, viral loads, etc. of mosquitoes. The selection of the locations of these traps requires a multi-attribute evaluation, with trap locations changing seasonally and when high concentrations of mosquitoes are identified. Zone B parcels do not typically receive the same level of routine surveillance as compared to the areas outside Zone B (Zone A).

The Zone B parcels therefore will be subject to a reduced assessment, commensurate with the different benefit level. (If in the future, the routine adult mosquito trapping service is extended into part or all of Zone B, the Zone B boundaries will be modified accordingly.)

The District staff analyzed its overall budget and determined that 4.38% of the budget is allocated to routine adult mosquito trapping. Therefore, Zone B parcels will be subjected to a 4.38% assessment reduction.”

### **ZONE OF BENEFIT WEST MARIN**

As mentioned earlier in this Report, a new Zone of Benefit was introduced in 2016. The District’s Board ratified a four-year agreement between the District and the West Marin Mosquito Council at the District’s monthly Board meeting held on May 11, 2016. The geographic areas covered by the agreement are shown in the Assessment Diagram at the end of this report, and comprise essentially those areas of Marin County that are within the boundaries of the Annexation Area.

The agreement specifies and emphasizes certain approaches to mosquito control that are consistent with the District’s IVMP, although certain methods are emphasized over others and some materials are not applied within this area. Other materials, such as Merus 2.0 mosquito adulticide, are used exclusively within the area. The differences in the manner in which the services are provided are considered worthy of recognition with a new zone of benefit to be known as Zone of Benefit West Marin.

Staff estimated the cost of providing the services in this area (Zone of Benefit West Marin or West Marin Zone) and concluded that the slightly reduced material costs are offset by slightly increased labor and travel costs and therefore the proposed assessment amount per Single Family Equivalent parcel does not differ from that for parcels in Zone A. Therefore, the West Marin Zone parcels will be subjected to the same assessment rate as parcels in Zone A.

### **METHOD OF ASSESSMENT**

As previously discussed, the assessments fund comprehensive, year-round mosquito and vector control and disease surveillance and control Services that clearly confer special benefits to properties in the Annexation Areas. These benefits can partially be measured by the property owners, residents, guests, employees, tenants, pets and animals who enjoy a more habitable, safer and more desirable place to live, work or visit. As noted, these benefits ultimately flow to the underlying property.

Therefore, the apportionment of benefit is partially based on people who potentially live on, work at, or otherwise use the property. This methodology of determining benefit to property through the extent of use by people is a commonly used method of apportionment of benefits from assessments.

Moreover, assessments have a long history of use in California and are in large part based on the principle that any benefits from a service or improvement funded by assessments that

is enjoyed by tenants and other non-property owners ultimately is conferred to the underlying property.<sup>21</sup>

With regard to benefits and source locations, the Assessment Engineer determined that since mosquitoes and other vectors readily fly from their breeding locations to all properties in their flight range and since mosquitoes are actually attracted to properties occupied by people or animals, the benefits from mosquito and vector control extend beyond the source locations to all properties that would be a “destination” for mosquitoes and other vectors. In other words, the control and abatement of mosquito and vector populations ultimately confers benefits to all properties that are a destination of mosquitoes and vectors, rather than just those that are sources of mosquitoes.

Although some primary mosquito sources may be located outside of residential areas, residential properties can and do generate their own, often significant, populations of mosquitoes and vector organisms. For example, storm water catch basins in residential areas in the Annexation Areas are a common source of mosquitoes. Since the typical flight range for a female mosquito, on average, is 2 miles, most homes in the Annexation Areas are within the flight zone of many mosquito sources. Moreover, there are many other common residential sources of mosquitoes, such as miscellaneous backyard containers, neglected swimming pools, leaking water pipes and tree holes. Clearly, there is a potential for mosquito sources on virtually all property. More importantly, all properties in the Annexation Areas are within the destination range of mosquitoes and most properties are actually within the destination range of multiple mosquito source locations.

Because the Services are provided throughout the Annexation Areas with the same level of control objective, mosquitoes can rapidly and readily fly from their breeding locations to other properties over a large area, and there are current or potential breeding sources throughout the Annexation Areas, the Assessment Engineer determined that all similar properties in the Annexation Areas have generally equivalent mosquito “destination” potential and, therefore, receive equivalent levels of benefit.

In the process of determining the appropriate method of assessment, the Assessment Engineer considered various alternatives. For example, a fixed assessment amount per parcel for all residential improved property was considered but was determined to be inappropriate because agricultural lands, commercial property and other property also receive benefits from the assessments. Likewise, an assessment exclusively for agricultural

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<sup>21</sup> For example, in *Federal Construction Co. v. Ensign* (1922) 59 Cal.App. 200 at 211, the appellate court determined that a sewer system specially benefited property even though the direct benefit was to the people who used the sewers: “Practically every inhabitant of a city either is the owner of the land on which he resides or on which he pursues his vocation, or he is the tenant of the owner, or is the agent or servant of such owner or of such tenant. And since it is the inhabitants who make by far the greater use of a city’s sewer system, it is to them, as lot owners or as tenants, or as the servants or agents of such lot owners or tenants, that the advantages of actual use would redound. But this advantage of use means that, in the final analysis, it is the lot owners themselves who would be especially benefited in a financial sense.”

land was considered but deemed inappropriate because other types of property, such as residential and commercial, also receive the special benefit factors described previously.

A fixed or flat assessment was deemed to be inappropriate because larger residential, commercial and industrial properties receive a higher degree of benefit than other similarly used properties that are significantly smaller. (For two properties used for commercial purposes, there is clearly a higher benefit provided to a property that covers several acres in comparison to a smaller commercial property that is on a 0.25 acre site. The larger property generally has a larger coverage area and higher usage by employees, customers, tourists and guests that would benefit from reduced mosquito and vector populations, as well as the reduced threat from diseases carried by mosquitoes and other vectors. This benefit ultimately flows to the property.) Larger commercial, industrial and apartment parcels, therefore, receive an increased benefit from the assessments.

In conclusion, the Assessment Engineer determined that the appropriate method of assessment apportionment should be based on the type and use of property, the relative size of the property, its relative population and usage potential and its destination potential for mosquitoes. This method is further described next.

#### **ASSESSMENT APPORTIONMENT**

The special benefits derived from the Northwest Mosquito, Vector and Disease Control Assessment are conferred on property and are not based on a specific property owner's occupancy of property or the property owner's demographic status, such as age or number of dependents. However, it is ultimately people who do or could use the property and who enjoy the special benefits described above. The opportunity to use and enjoy property within the Annexation Area without the excessive nuisance, diminished "livability" or the potential health hazards brought by mosquitoes, vectors, and the diseases they carry is a special benefit to properties in the Annexation Area. This benefit can be in part measured by the number of people who potentially live on, work at, visit or otherwise use the property, because people ultimately determine the value of the benefits by choosing to live, work and/or recreate in the area, and by choosing to purchase property in the area.<sup>22</sup>

In order to apportion the cost of the Services to property, each property in the Annexation Areas is assigned a relative special benefit factor. This process involves determining the relative benefit received by each property in relation to a single family home, or, in other words, on the basis of Single Family Equivalents (SFE). This SFE methodology is commonly used to distribute assessments in proportion to estimated special benefit. For the purposes of this Engineer's Report, all properties are assigned an SFE value, which is each property's relative benefit in relation to a "benchmark" parcel in the Annexation Areas. The "benchmark" property is the single family detached dwelling on a parcel of less than one

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<sup>22</sup> It should be noted that the benefits conferred upon property are related to the average number of people who could potentially live on, work at or otherwise could use a property, not how the property is currently used by the present owner.



acre. This benchmark parcel is assigned one Single Family Equivalent benefit unit or one SFE.

The calculation of the special benefit apportionment and relative benefit to properties in the Annexation Areas from the Services is summarized in the following equation:

$$\text{Special Benefit (per property)} = \frac{\sum f ((\text{Special Benefits}))}{\sum (\text{Benefit Units(SFEs)})}$$

Total Benefit units calculated from property specific attributes such as use, property types, size as well as vector-specific attributes such as destination potential and population potential.

### RESIDENTIAL PROPERTIES

Certain residential properties in the Annexation Area that contain a single residential dwelling unit and are on a lot of less than or equal to one acre are assigned one Single Family Equivalent or 1.0 SFE. Traditional houses, zero-lot line houses, and townhomes are included in this category of single family residential property.

Single family residential properties in excess of one acre receive additional benefit relative to a single family home on up to one acre, because the larger parcels provide more area for mosquito sources and the mosquito, vector and disease control Services. Therefore, such larger parcels receive additional benefits relative to a single family home on less than one acre and are assigned 1.0 SFE for the residential unit and an additional rate equal to the agricultural rate described below of 0.002 SFE per one-fifth acre of land area in excess of one acre.

Other types of properties with residential units, such as agricultural properties, are assigned the residential SFE rates for the dwelling units on the property and are assigned additional SFE benefit units for the agricultural-use land area on the property.

Properties with more than one residential unit are designated as multi-family residential properties. These properties, along with condominiums, benefit from the services and improvements in proportion to the number of dwelling units that occupy each property, the average number of people who reside in each property, and the average size of each property in relation to a single family home in the Annexation Area. This Report analyzed Marin County and Sonoma County population density factors from the 2000 US Census (the most recent data available when Assessment No. 2 was established) as well as average dwelling unit size for each property type. After determining the population density factor and square footage factor for each property type, an SFE rate is generated for each residential property structure, as indicated in Figure 4 below.

The SFE factor of 0.37 per dwelling unit for multifamily residential properties applies to such properties with 20 or fewer units. Properties in excess of 20 units typically offer on-site management, monitoring and other control services that tend to offset some of the benefits



provided by the mosquito and vector control district. Therefore the benefit for properties in excess of 20 units is determined to be 0.37 SFE per unit for the first 20 units and 0.10 SFE per each additional unit in excess of 20 dwelling units.

**FIGURE 4 – MARIN AND SONOMA COUNTIES RESIDENTIAL ASSESSMENT FACTORS**

	MARIN COUNTY					SONOMA COUNTY					Blended Rate Factor
	Total Population	Occupied Households	Persons per Household	Pop.Density Equivalent	SqFt Factor	Total Population	Occupied Households	Persons per Household	Pop.Density Equivalent	SqFt Factor	
	Single Family Residential	155,706	61,026	2.55	1.00	1.00	323,963	117,289	2.76	1.00	
Condominium	17,793	8,201	2.17	0.85	0.85	34,137	13,466	2.54	0.92	0.79	<b>0.72</b>
Multi-Family Residential	58,782	29,445	2.00	0.78	0.49	68,894	31,061	2.22	0.80	0.45	<b>0.37</b>
Mobile Home on Separate Lot	2,777	1,513	1.84	0.72	0.62	19,764	10,153	1.95	0.70	0.66	<b>0.46</b>

Source: 2000 Census, Marin and Sonoma Counties and property dwelling size information from the Marin and Sonoma County Assessors.

### COMMERCIAL/INDUSTRIAL PROPERTIES

Commercial and industrial properties are generally open and operated for more limited times, relative to residential properties. Therefore, the relative hours of operation can be used as a measure of benefits, since residents and employees also provide a measure of the relative benefit to property. Since commercial and industrial properties are typically open and occupied by employees approximately one-half the time of residential properties, it is reasonable to assume that commercial land uses receive one-half of the special benefit on a land area basis relative to single family residential property.

The average size of a single family home with 1.0 SFE factor in Marin and Sonoma Counties is 0.20 acres. Therefore, a commercial property with 0.20 acres receives one-half the relative benefit, or a 0.50 SFE factor.

The SFE values for various commercial and industrial land uses are further defined by using average employee densities because the special benefit factors described previously are also related to the average number of people who work at commercial/industrial properties.

To determine employee density factors, this Report utilizes the findings from the San Diego Association of Governments Traffic Generators Study (the "SANDAG Study") because these findings were approved by the State Legislature which determined the SANDAG Study to be a good representation of the average number of employees per acre of land area for commercial and industrial properties. As determined by the SANDAG Study, the average number of employees per acre for commercial and industrial property is 24. As presented in Figure 4, the SFE factors for other types of businesses are determined relative to their typical employee density in relation to the average of 24 employees per acre of commercial property.

Commercial and industrial properties in excess of 5 acres generally involve uses that are more land intensive relative to building areas and number of employees (lower coverage ratios). As a result, the benefit factors for commercial and industrial property land area in excess of 5 acres is determined to be the SFE rate per fifth acre for the first 5 acres and the relevant SFE rate per each additional acre over 5 acres. Institutional properties that are used for residential, commercial or industrial purposes are also assessed at the appropriate residential, commercial or industrial rate.

Self-storage and golf course property benefit factors are similarly based on average usage densities. The following Figure 5 lists the benefit assessment factors for such business properties.

#### **AGRICULTURAL/VINEYARDS/WINERIES PROPERTIES**

Winery properties have the distinction of being the primary attraction for tourism in the Annexation Area. Since wineries have a relatively low employee density relative to other commercial properties and since tourists are primarily drawn to winery properties, the benefits for such properties are based on the average employees and tourists per acre. Utilizing data from UC Davis and the California Employment Development Department, this Report finds that the average employees and tourists per acre of winery property is 12. This equates to an SFE factor of 0.25 per one fifth acre (0.20 acres) of winery property.

Utilizing research and agricultural employment reports from UC Davis and the California Employment Development Department, this Report calculated an average employee density of 0.05 employees per acre for vineyards/agriculture property. Since these properties typically are important sources of mosquitoes and/or are typically closest to the sources of mosquitoes and other vectors, it is reasonable to determine that the benefit to these properties is twice the employee density ratio of commercial properties. Therefore, the SFE factor for vineyard and agricultural property is 0.002 per one fifth acre (0.20 acres) of land area. The benefit factor for this land use type is presented in Figure 5.

#### **TIMBERLAND/DRY RANGELANDS PROPERTIES**

Timberland and dry rangeland properties were determined to receive a lesser benefit from the vector abatement services than other types of agricultural parcels because their average usage and population density, and therefore benefit, relative to other agricultural properties is substantially lower. The average number of employees and visitors per acre for these types of properties is 0.01. Consequently, the benefit received by these properties is 0.00042 SFE benefit units per one-fifth acre of land area. This benefit determination is also presented in Figure 5.

**FIGURE 5 – COMMERCIAL/INDUSTRIAL BENEFIT ASSESSMENT FACTORS**

<i>Type of Commercial/Industrial Land Use</i>	<i>Average Employees Per Acre <sup>1</sup></i>	<i>SFE Units per Fraction Acre <sup>2</sup></i>	<i>SFE Units per Acre After 5</i>
Commercial	24	0.500	0.500
Office	68	1.420	1.420
Shopping Center	24	0.500	0.500
Industrial	24	0.500	0.500
Self Storage or Parking Lot	1	0.021	
Golf Course	0.80	0.033	
Cemetery	0.10	0.004	
Agriculture/Vineyard	0.05	0.002	
Wineries <sup>3</sup>	12	0.25	
Timber/Dry Rangelands	0.010	0.00042	

1. Source: San Diego Association of Governments Traffic Generators Study.
2. The SFE factors for commercial and industrial parcels indicated above are applied to each fifth acre of land area or portion thereof. (Therefore, the minimum assessment for any assessable parcel in these categories is the SFE Units listed herein.)
3. Wineries and wine production facilities that rest on parcels of land that include agriculture or vineyard uses are assessed the winery rate for the production facility and the agriculture/vineyard rate for the excess land.

### **VACANT PROPERTIES**

The benefit to vacant properties is determined to be proportional to the corresponding benefits for similar type developed properties. However, vacant properties are assessed at a lower rate due to the lack of active benefits. A measure of the benefits accruing to the underlying land is the average value of land in relation to improvements for developed property. An analysis of the assessed valuation data from the counties of Marin and Sonoma found that 50% of the assessed value of improved properties is classified as land value. Since vacant properties have very low to zero population/use densities until they are developed, a 50% benefit discount is applied to the valuation factor of 0.50 to account for the current low use density. The combination of these measures results in a 0.25 factor. It is reasonable to assume, therefore, that approximately 25% of the benefits are related to the underlying land and 75% are related to the day-to-day use of the property. Using this ratio, the SFE factor for vacant parcels is 0.25 per parcel.

### **OTHER PROPERTIES**

Article XI IID stipulates that publicly owned properties must be assessed unless there is clear and convincing evidence that those properties receive no special benefit from the assessment.

Publicly owned property that is used for purposes similar to private residential, commercial or industrial uses is benefited and assessed at the same rate as such privately owned property.

Church parcels, publicly owned parcels not in residential or commercial/industrial use, institutional properties, and property used for educational purposes typically generate employees on a less consistent basis than other non-residential parcels. Therefore, these parcels receive minimal benefit and are assessed an SFE factor of 1.

All properties that are specially benefited are assessed. Miscellaneous, small and other parcels such as right-of-way parcels, well, reservoir or other water rights parcels that cannot be developed into other improved uses, limited access open space parcels, watershed parcels and common area parcels typically do not generate employees, residents, customers or guests. Moreover, many of these parcels have limited economic value. These miscellaneous parcels receive no special benefit from the Services and are assessed an SFE benefit factor of 0.

#### **DURATION OF ASSESSMENT**

The benefit assessment ballot proceedings conducted in 2004 gave the Marin/Sonoma Mosquito and Vector Control District Board of Trustees the authority to levy the Assessment in fiscal year 2005-06 and to continue the Assessment every year thereafter, so long as mosquitoes and vectors remain in existence and the Marin/Sonoma Mosquito and Vector Control District requires funding from the Assessment for its Services in the Annexation Areas. As noted previously, after the Assessment and the duration of the Assessment were approved by property owners in 2004, the Assessment can continue to be levied annually after the Board of Trustees approves an annually updated Engineer's Report, budget for the Assessment, Services to be provided, and other specifics of the Assessment. In addition, the Board of Trustees must hold an annual public hearing to continue the Assessment.

#### **APPEALS AND INTERPRETATION**

Any property owner who feels that the assessment levied on the subject property is in error as a result of incorrect information being used to apply the foregoing method of assessment or for any other reason, may file a written appeal with the District Manager of the Marin/Sonoma Mosquito and Vector Control District or his or her designee. Any such appeal is limited to correction of an assessment during the then current Fiscal Year or, if before July 1, the upcoming fiscal year. Upon the filing of any such appeal, the District Manager or his or her designee will promptly review the appeal and any information provided by the property owner. If the District Manager or his or her designee finds that the assessment should be modified, the appropriate changes shall be made to the assessment roll. If any such changes are approved after the assessment roll has been filed with the Marin and Sonoma Counties for collection, the District Manager or his or her designee is authorized to refund to the property owner the amount of any approved reduction. Any dispute over the decision of the District Manager, or his or her designee, shall be referred to the Board. The decision of the Board shall be final.

## ASSESSMENT STATEMENT

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**WHEREAS**, the Marin/Sonoma Mosquito and Vector Control District Board of Trustees contracted with the undersigned Engineer of Work to prepare and file a report presenting an estimate of costs of Services, a diagram for the benefit assessment for the Annexation Area, an assessment of the estimated costs of Services, and the special and general benefits conferred thereby upon all assessable parcels within the Northwest Mosquito, Vector and Disease Control Assessment Annexation Area;

**NOW, THEREFORE**, the undersigned, by virtue of the power vested in me under Article XIID of the California Constitution, the Government Code and the Health and Safety Code and the order of the Board of said Marin/Sonoma Mosquito and Vector Control District, hereby make the following determination of an assessment to cover the portion of the estimated cost of said Services, and the costs and expenses incidental thereto to be paid by the Northwest Mosquito, Vector and Disease Control Assessment.

The District has evaluated and estimated the costs of extending and providing the Services to the Annexation Area. The estimated costs to be paid for the Services and the expenses incidental thereto to be paid by the Marin/Sonoma Mosquito and Vector Control District for fiscal year 2017-18 are summarized as follows:

**FIGURE 6 – SUMMARY COST ESTIMATE, FISCAL YEAR 2017-18**

Vector and Disease Control Services	\$ 1,048,508
Capital Replacement	\$ 9,247
Less: District Contribution from Other Sources	<u>\$ (131,606)</u>
<b>Net Amount To Assessments</b>	<b>\$ 926,149</b>

An assessment diagram is hereto attached and made a part hereof showing the exterior boundaries of said Annexation Area. The distinctive number of each parcel or lot of land in the said Annexation Area is its assessor parcel number appearing on the Assessment Roll. I do hereby determine and apportion said net amount of the cost and expenses of said Services, including the costs and expenses incidental thereto, upon the parcels and lots of land within said Northwest Mosquito, Vector and Disease Control Assessment Annexation Area, in accordance with the special benefits to be received by each parcel or lot, from the Services, and more particularly set forth in the cost estimate hereto attached and by reference made a part hereof.

The assessment determination is made upon the parcels or lots of land within said Annexation Area in proportion to the special benefits to be received by said parcels or lots of land, from the Services.

The maximum assessment is annually adjusted based on the Consumer Price Index for the San Francisco Bay Area as of December of each succeeding year (the "CPI"), with a maximum annual adjustment not to exceed 5%.

Property owners in the Annexation Area, in the assessment ballot proceeding conducted in 2004, approved the initial fiscal year benefit assessment for special benefits to their property, including the CPI adjustment schedule, the assessment may continue to be levied annually and may be increased by up to the maximum annual CPI increase without any additional assessment ballot proceeding. In the event that in future years the assessments are levied at a rate less than the maximum authorized assessment rate, the assessment rate in a subsequent year may be increased up to the maximum authorized assessment rate without any additional assessment ballot proceeding.

The annual CPI change for the San Francisco Bay Area from December 2015 to December 2016 is 3.53%, as reported by the United States Department of Labor, Bureau of Labor and Statistics. Therefore, the maximum authorized assessment rate for Fiscal Year 2017-18 has been increased by 3.53%, from \$24.76 to \$25.64 per single family equivalent (SFE) benefit unit for parcels in Zone of Benefit A and in Zone of Benefit West Marin, and from \$23.69 to \$24.52 per SFE benefit unit for parcels in Zone of Benefit B. The estimate of cost and budget in this Engineer's Report proposes assessments for fiscal year 2017-18 at the rates of \$25.64 per SFE for Zone A and \$24.52 for Zone B, which are the maximum authorized assessment rates.

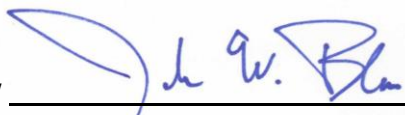
Each parcel or lot of land is described in the assessment roll by reference to its parcel number as shown on the Assessor's maps of the counties of Marin and Sonoma for the fiscal year 2017-18. For a more particular description of the property, reference is hereby made to the deeds and maps on file and of record in the office of the County Recorder of the counties of Marin and Sonoma.

I hereby place opposite the Assessor Parcel Number for each parcel or lot within the Assessment Roll, the proposed amount of the assessment for the fiscal year 2017-18 for each parcel or lot of land within the said Northwest Mosquito, Vector and Disease Control Assessment Annexation Area.

Dated: July 3, 2017



Engineer of Work

By   
John W. Bliss, License No. C052091

## **ASSESSMENT ROLL**

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Reference is hereby made to the Assessment Roll in and for said assessment proceedings on file in the office of the District Manager of the District, as said Assessment Roll is too voluminous to be bound with this Engineer's Report.



## ASSESSMENT DIAGRAM

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The Northwest Mosquito, Vector and Disease Control Assessment Annexation Area includes all properties within the boundaries of the Annexation Area. The boundaries of the Northwest Mosquito, Vector and Disease Control Assessment Annexation Area are displayed on the following Assessment Diagram.

