The Suffolk County Department of Public Works, Division of Vector Control, is responsible under the County Charter for controlling mosquito infestations that are of public health importance. The Division's responsibility is to control mosquito infestations that significantly threaten public health, or create social or economic problems for the communities in which they occur. The Division meets its responsibilities in consultation with the Suffolk County Department of Health Services (SCDHS) and the appropriate federal, state and local agencies. This Plan of Work has been prepared pursuant to and in compliance with the Vector Control and Wetlands Management Long Term Plan and Generic Environmental Impact Statement (the Long Term Plan). The Long Term Plan was approved by the County Legislature as Resolution 285-2007 on March 20, 2007 and signed by the County Executive on March 22, 2007. The 2017 Annual Plan of Work is therefore governed by State Environmental Quality Review Act (SEQRA) Regulation 617.10(d)(1) which provides the following: “When a final generic EIS has been filed under this part (1) no further SEQR compliance is required if a subsequent proposed action will be carried out in conformance with the conditions and thresholds established for such actions in the generic EIS or its findings statement.” This issue is also discussed in the Findings, appended hereto, pages 7 and 58. The 2015 Plan of Work added the use of a new active ingredient, prallethrin, which required a modification of the Long Term Plan. In accordance with the Findings, a SEQR review of prallethrin was conducted in order to allow the use of the new active ingredient. This review was completed with the issuance of a Negative Declaration as CEQ Resolution 34-2014 and the modification of the Long Term Plan approved by the Legislature as Resolution 706-2014. This Annual Plan complies with the reporting requirements in Executive Order 15-2007 (Suffolk County Vector Control Pesticide Management Committee) and Resolution 285-2007 (which adopts the Findings Statement for the Long-Term Plan). The reporting requirements of Resolution 285-2007 are satisfied within this Annual Plan, and the Pesticide Management Committee will submit a report to CEQ independently to satisfy Executive Order 15-2007.

On October 17, 2013, the County approved Resolution 797-2013 requiring this Plan of Work to include a section on the “steps being taken to reduce the incidence of tick-borne diseases in Suffolk County”. Accordingly, the 2017 Plan of Work includes a section on current tick surveillance, research and control activities. For 2017, these steps will be limited to planning, information gathering, outreach, technical assistance, and small scale tick control trials and as such will be Type II actions under SEQRA Section 617.5 (c) (20), (21) and (27).

2016 SUMMARY

1. Water Management: Water Management activities will conform to the guidelines outlined in the Long Term Plan and GEIS Finding statement’s Wetlands Best Management Practices (BMP’s). The Wetlands Stewardship Program finalized the Wetlands Stewardship Strategy in 2015. Maintenance of existing structures (select ditches and culverts) will be conducted as

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described in BMP’s 2, 3 and 4 in the Findings Statement and Long Term Plan. Water management work beyond those measures specified in BMP’s 2, 3, and 4 will have to undergo review under SEQRA, and would be subject to Suffolk County’s Council of Environmental Quality (CEQ) review. With the Wetlands Stewardship Strategy finalized, the County is undertaking Integrated Marsh Management (IMM) projects as called for under that Strategy. The County received $1.3M in Sandy funding from the National Fish and Wildlife Foundation Coastal Resiliency grant for IMM work to be done in cooperation with the Towns of Babylon, Islip and Brookhaven and New York State. These projects are in the planing and permitting stage with work to begin in early 2017. The County has also received $560,000 from a Federal Hazard Mitigation Grant Program for IMM work at Smith Point County Park marsh in Shirley for costal resiliency. Planning is underway for that project with construction targeted for 2017-18 completion.

2. Larval Control: Perform approximately 15,000 inspections of larval sites. Treat approximately 20,000 to 30,000 acres with the biorational larvicides: Bacillus thuringiensis israelensis (Bti), Bacillus sphaericus or methoprene depending on weather, coastal tides and virus findings.

3. Adult Control: Conduct adult control when infestations are severe and widespread and/or necessary to respond to the presence of pathogens.

4. Research and Surveillance: Vector Control collects and identifies 10,000-12,000 larval and adult mosquito samples each season, depending on mosquito populations and viral activity. The Department of Health Services Arthropod-Borne Disease Laboratory (ABDL) will collect and process approximately 50,000 mosquitoes for arbovirus surveillance. Vector Control will evaluate the effectiveness of treatments in cooperation with the ABDL. Vector staff perform special studies of new mosquito problem areas, check for pesticide resistance, identifying the sources of unusual infestations or researching introduced vector species, including the Asian Tiger Mosquito.

**Technical and Institutional Framework for Vector Control**

To achieve this goal, the Division employs an integrated control program. Control measures are employed in a hierarchical manner that emphasizes prevention, and are guided by a surveillance program to ensure that control measures are only directed to address a clear need. Control proceeds from the long-lasting, more “environmentally friendly” measures such as water management and biological control to highly specific larvicides, and uses chemical control such as adulticiding only after other measures prove to be either insufficient or not feasible. This integrated approach is recognized as the most effective and environmentally sound manner in which to conduct a mosquito control program.

Because mosquitoes are of high public health importance, the Division works closely with SCDHS Arthropod Borne Disease Laboratory (ABDL). The ABDL concentrates its efforts on surveillance for mosquito-borne pathogens, primarily the arboviruses West Nile Virus (WNV), Zika and Eastern Equine Encephalitis (EEE). The Division conducts laboratory work that concentrates on estimating populations of mosquito adults and larvae. The Division also
conducts laboratory work related to special projects designed to improve the control program and to evaluate the impacts of wetlands management. The results of this surveillance are used to guide and evaluate the Division’s control work. During times of a declared public health emergency, the Division comes under the operational control of SCDHS. However, these declarations are rare and must be issued by the New York State Health Commissioner. The State has determined that such declarations are not normally needed for West Nile Virus, since the virus is now established here and its control is not considered a General Public Health activity.

Under most circumstances, the Division takes the lead role on control efforts but works in close consultation with SCDHS when there is active virus activity. Under the County’s NY State Freshwater Wetlands permit, the Commissioner of Health Services must determine that application of adulticides is required in response to mosquito-borne pathogens before they can be applied to most freshwater wetlands. SCDHS is also responsible for other activities related to mosquitoes and the public health, such as medical surveillance, sanitation, environmental monitoring, community outreach and public education.

The New York State Department of Health (DOH) provides important support to the program by analyzing mosquito samples for pathogens, providing technical advice and guidelines and determining when a public health threat declaration is required. DOH also provides significant assistance with public education, as well as financial aid for vector surveillance and control.

Because mosquito control involves work in environmentally sensitive areas and the use of pesticides, environmental compliance and protection are important components of the program. The Division is heavily regulated and subject to inspection under a series of New York State Department of Environmental Conservation (DEC) permits, as well as regulations pertaining to the use of pesticides and licensing of applicators. Close contact is maintained with DEC, United States Fish and Wildlife Services (USFWS) and other agencies throughout the year to ensure that all work is conducted to a high environmental standard.

### 2017 PROGRAM COMPONENTS

**WATER MANAGEMENT:** Field personnel conduct this component from January 1 to April 30, and October 1 to December 31 (varies due to seasonal weather). Water management during the winter months is a functional way to reduce the need for pesticide applications during the summer, by keeping ditches and creeks free of blockages. The Division expects to conduct water management in each of the County's ten towns, as needed. Highest priority is assigned to larval habitats where adult mosquito infestations have the greatest potential for negative impact. In particular, areas that showed unexpectedly high infestations in 2016 will have high priority over the coming winter. Water management activities will be carried out in such a manner so that the primary goal of the work will be to protect the health of the marsh, while also reducing mosquito numbers.

Water management minimizes mosquito production through maintaining or improving systems of tidal channels, ditches, culverts and other structures that drain off surface water and/or allow access to potential larval habitats by predatory fish. In some cases, the current ditch system has become an important component of the wetland as it exists today, and maintenance of the system is necessary to maintain tidal flow, fish habitat, or existing vegetative patterns. Much of this is maintenance work that may not require a permit, but is nonetheless conducted after consultation.
with the New York State Department of Environmental Conservation (DEC) to ensure consistency with conservation of the wetland. Sometimes, work to restore a system, even within its original configuration, requires a permit. In such cases, work is performed under permit and in cooperation with the DEC. More extensive work to rehabilitate wetlands in a manner that restores and preserves resource values while also reducing mosquito production is now underway under the umbrella term Integrated Marsh Management (IMM). In accordance with the Long Term Plan, all water management activities will be conducted with appropriate notification to and oversight by the Wetlands Stewardship Committee (WSC) and Council for Environmental Quality (CEQ), as outlined in the Findings Statement of the Suffolk County Legislature that was adopted by Suffolk County Resolution 285-2007.

The Wetlands Stewardship Committee completed its work in establishing standards for wetlands Best Management Practices (BMP’s) and a Wetlands Stewardship Strategy was issued by Executive Order 01-2015 on July 13, 2015. With that Strategy in place, 2017 will include more extensive marsh projects using more intensive BMP’s described in the Long Term Plan will be undertaken under the framework of IMM in consultation with CEQ, WSC and DEC. These will be projects that restore and enhance the natural resource values of the wetlands while also reducing or eliminating the need for pesticides to control mosquitoes. All work will be planned in partnership with the landowner and NYSDEC, USFWS and other natural resources agencies.

CONTROL OF MOSQUITO LARVAE: All field personnel conduct larval control during the active mosquito season. Most crews conduct ground larviciding, while a heavy equipment crew assists in helicopter larvicide applications. This component is conducted during the active mosquito season of May 1 to September 30 (approximate dates). Larval control is most often employed when water management has not been able to completely prevent mosquito production. It also is used when water management has not been conducted or is not appropriate. Larval control is the Division’s second most important control method. Ground crews visit known larval habitats, check for the presence of larvae, obtain larval specimens for identification in the laboratory and apply larvicide if necessary. Field crews also eliminate larval habitats by unclogging pipes, removing containers or otherwise eliminating standing water. While the acreage of these sites is small, their proximity to residential areas makes them important. Ground crews also respond to complaints from the public. Over 90% of the larvicide used by the Division is applied in the major salt marshes and other wetlands, by helicopter. These marshes are surveyed at least weekly, or after flood tides. If larvae are discovered, a contract helicopter applies larvicide. For salt marshes and similar habitats, either liquid Bti (Bacillus thuringiensis israelensis) or liquid Altosid (methoprene), or both (“Duplex”) are applied, based on larval stage, temperature, and weather conditions. Larval control is used only if inspection of a site reveals or has the potential for significant larval production.

The larval control products to be used in 2017 and the conditions under which they are used are described as follows:

Altosid Liquid Larvicide concentrate (methoprene, EPA 2724-446) – Aerial application to tidal and freshwater marshes.
Altosid Liquid Larvicide (methoprene, EPA 2724-392) – Ground application to tidal and freshwater marshes, as well as other temporarily flooded areas.
Altosid Pellets (methoprene, EPA 2724-448) – Ground application to intermittently or permanently flooded areas such as freshwater swamps, catch basins, drainage areas and recharge basins, provided that they are not fish habitats.

Altosid XR-G (methoprene, EPA 2724-451) – Ground or aerial application to tidal wetlands; ground application to intermittently flooded freshwater areas; aerial application in freshwater areas in response to Eastern Equine Encephalitis (EEE) or West Nile Virus (WNV) with case-by-case approval by DEC.

Altosid XR Briquets (methoprene, EPA 2724-421) – Catch basins and other drainage or artificial structures that are not fish habitats. XR briquets will be used in May and June, with follow up treatments using Vectolex or Altosid pellets as necessary.

Aquabac 200G (Bti, EPA 62637) – Ground application to intermittently flooded freshwater and tidal areas.

Sphaeratax SPH (50G) (B. sphaericus, EPA 84268-2) - Aerial or ground application to freshwater and tidal areas that hold water for more than 7 days, such as ditches, impounded marshes, swamps, ponds; catch basins in July and August.

Valent BioSciences Vectobac 12 AS (Bti, EPA 73049-38) – Aerial application to tidal and freshwater marshes; ground application to intermittently flooded areas such as tidal and freshwater marshes.

Summit B.t.i. Briquets (Bti, EPA 6218-47) – Catch basins, ground depressions, artificial sites.

Fourstar Briquets 90 (Bti plus B. sphaericus, EPA 83362-3) – Catch basins, ground depressions, artificial sites

Valent VectoPrime (Bti and methoprene EPA 73049-501) Ground and aerial application to tidal and freshwater marshes, as well as other temporarily flooded areas.

Valent VectoBac WDG (Bti EPA 73049-56) Ground and aerial application to tidal and freshwater marshes, as well as other temporarily flooded areas.

The equipment to be used for larval control includes various trucks for crew transportation, samplers such as dippers and mosquito traps, truck-mounted hydraulic sprayers, backpack sprayers and granular blowers, plus specially-equipped helicopters for larvicide applications on areas too large or inaccessible for ground treatment. All pesticide applications will use EPA and DEC-registered materials and be conducted under appropriate DEC permits and in accordance with label directions and other relevant State and Federal law.

The Division has developed technical guidelines for larval surveillance and control that determine where and when larvicides are used and what materials are selected for a particular situation. These guidelines emphasize the use of bacterial products when possible and reserve methoprene for those situations where bacterial products are unlikely to be effective. As per the Findings for the Long Term Plan and Executive order 15-2007, the Pesticide Management Committee has reported on the results of its review of literature on methoprene and potential impacts, as well as on research sponsored by the County. The Committee found no significant new concerns regarding the use of methoprene. The County is committed to implementing a Pesticide Reduction Action Plan, that will seek to further accelerate pesticide reduction. As part of this Pesticide Reduction Action Plan, the County will continue to work with technical experts to further refine protocols related to larval monitoring and larvicide usage, consistent with the Long-Term Plan and GEIS. The County is not aware of any new data, studies or reports which
contravene research, reports and Findings of the Long Term Plan with respect to larval treatment guidelines or thresholds. Therefore, those Findings are still valid, and control this Annual Plan.

In accordance with the Division's priorities and goals, approximately 1,500 of the 2,000 plus major larval habitats known to the Division will be surveyed and controlled as necessary throughout the active season. These known historic mosquito habitats consist primarily of freshwater wetlands and salt marshes, as well as roadside ditches, recharge areas and other non-wetland sites. The remaining major larval habitats and the countless artificial container larval sites will be controlled on a service requested basis, as resources permit. Maps showing major larval habitats requiring control are on file at the Division's office in Yaphank.

**CONTROL OF ADULT MOSQUITOES:** This control method is conducted generally from June 1 through September 15. It is carried-out on an overtime basis; because the need is so highly variable and it is not efficient to dedicate staff full time to the task. This is a tertiary form of control and the smallest component of the program, although the most noticed. It is carried out only when adult infestations constitute an immediate threat of mosquito-borne disease or there is a severe and widespread infestation of vector species, as determined by surveys and/or numerous public complaints. While the need for adult control can be reduced by the other program components, it is not possible to control all larval sites in Suffolk County for a variety of reasons. Higher than normal rainfall can increase the need for adult control and some sites cannot be expeditiously treated due to independent permitting requirements. In addition, some Federal and State lands are restricted as is the case of extensive larval habitats in the Wilderness portions of Fire Island. New or unexpected larval habitats always seem to occur, despite the best efforts of the program. It is not appropriate to treat for adult mosquitoes in every area where residents express a concern, nor is it appropriate to treat small areas or individual properties for adult mosquitoes. Adult control is conducted only when it is clear, based on complaints, Division surveillance and SCDHS consultation that a substantial portion of a community is infested with vector species or there is a threat of mosquito-borne disease. Then, the entire affected area is treated so as to give relief to the greatest number of residents in an environmentally sound and cost effective manner. The guidelines for adult control in this Plan are consistent with those described in the GEIS Findings Statement.

Adult control can be deemed to be necessary under two separate operational scenarios in the GEIS. One is defined as a “Vector Control” (public health nuisance) application, the other is defined as “Health Emergency” application. Vector Control adulticide applications are made to reduce excessive numbers of human biting mosquitoes that impact public health and quality of life by their biting activities. These high populations also represent potential vectors if a pathogen is present or appears in the area. Health Emergency applications are made when an unacceptably high risk of disease transmission to humans is detected, based on the ongoing presence of pathogens in mosquitoes. In either case, pesticide use decisions are only made on the basis of scientifically-determined surveillance data.

The need for Health Emergency treatments is determined by the New York State Department of Health West Nile Virus Response Plan and the County’s Zika Action Plan, adapted for local conditions by staff experts at Vector and Health Services. Because of the persistent presence of WNV in the County, the County perpetually begins each year in Risk Category 2. The New York
State Department of Health has determined that there is an ongoing threat to the public health from West Nile Virus, and no longer declares health threats on a year-by-year basis for WNV. The determination of when this ongoing threat rises to the level that requires adulticiding is made by the County. As Zika virus becomes entrenched in the US; the CDC, NYS Health and the Suffolk continually reevaluate the risk to County residents. Currently, only travel related Zika cases have been reported in Suffolk, but Health continues to monitor Asian Tiger mosquitoes that have shown competence to carry Zika.

The need for adulticiding in response to WNV varies greatly from year to year. An analysis of Suffolk County’s WNV history during the years 2000-2015 indicates that most years, (10 of 16) the number of human cases of WNV is low, 0-4 cases. Under such conditions, the WNV human transmission risk level is low, even when WNV is found in the County. In these low risk years, determining exactly where and when to adulticde is nearly impossible with limited data. As a result, in low years, adulticiding is usually not warranted due to the difficulty in delineating areas to target. High risk years are caused largely by environmental conditions favorable to virus amplification in birds and mosquitoes, such as a warm spring and a hot dry summer weather. These conditions manifest themselves in late July and early August through higher than normal numbers of positive mosquito samples and infection rates. WNV history also demonstrates that, in years when WNV activity is higher than normal, human cases are more likely to occur in some parts of the County than others. In years with early indicators of high risk, adulticiding targeted to these high risk areas can measurably reduce the risk of human transmission and is therefore warranted. When a high risk year is identified, these WNV applications generally take place in late July and August. Responding to early indications of high risk is important, because adulticiding should occur before peak human transmission occurs in the first 2-3 weeks of August. Waiting to see if transmission results in actual human cases is not appropriate because by the time cases are detected, transmission has been ongoing for several weeks and it may be too late to prevent further transmission.

As indicators of risk of transmission to humans accumulate, Vector Control and Health determines when control measures are best suited to the situation and which areas should be targeted for maximum benefit. The Commissioner of the SCDHS makes the final determination of the need for adult control in response to pathogens. By limiting the use of adulticides for virus response to only those years and areas where a benefit is likely, the risks associated with adulticiding can be reduced while still providing a high level of public health protection. This strategy is consistent with the goal in the Findings to reduce the use of pesticides by a targeted approach.

To ensure adulticides are used only when there is a clear need and a likely benefit, the criteria for conducting an adulticide treatment will include:

1. **Evidence of high numbers of mosquitoes biting residents and visitors (Vector Control):**
   - Service requests from public - mapped to determine extent of problem.
   - Requests from community leaders, elected officials.
   - New Jersey trap counts higher than generally found for area in question (at least 25 females of human-biting species per night).
   - Centers for Disease Control (CDC) portable light trap counts of 100 or more.
2. Higher than normal risk of human disease transmission that can be reduced by adulticiding (Health Emergency):

- Indications of a higher than normal year for WNV activity County-wide as determined by such measures as infection rates and/or the number or proportion of positive mosquito samples, especially by late July or early August. In a year with normal or below normal levels of WNV activity, adulticiding is generally not indicated.
- In a high risk year, adulticiding may be warranted when there are indications of higher than normal levels of WNV risk (such as the number of positive mosquito samples, infection rates, vector species populations and history of human transmission) in particular areas. Adulticiding priority will be given to those parts of the County where WNV cases have occurred in multiple years and at high densities compared to the rest of the County.
- Zika response will occur when positive mosquitoes are found in traps or local transmission by mosquitoes is suspected due to acquired cases without travel history.
- Adulticiding will be strongly considered if EEE is detected during July, August or September when human transmission is most likely.
- Adulticiding in response to other pathogens (such as dengue, chikungunya, malaria or other emerging pathogens) will be considered on a case-by-case basis based on the vector ecology of the pathogen involved.

3. Control is technically and environmentally feasible:

- A target area can be clearly defined based on geographic features and the distribution of vector species and other risk factors.
- Weather conditions are predicted to be suitable for ULV application when mosquitoes are active. Aerial applications in response to WNV are particularly dependent on weather conditions, and near-ideal conditions of low wind combined with high temperatures and humidity are needed for truly effective results.
- The road network is adequate and appropriate when truck applications are considered.
- Legal restrictions on the treatment of wetlands, open water buffers, and no-spray list members in the treatment zone will not create untreated areas that would prevent adequate coverage to ensure treatment efficacy.
- There are no issues regarding listed or special concern species in the treatment area.
- Meeting label restrictions for selected compounds will not compromise expected treatment efficacy.

4. Likely persistence or worsening of problem without intervention:

- Considerations regarding the history of the area, such as the identification of a chronic problem area for biting mosquitoes or a history of virus transmission.
- Seasonal cycles of pathogen activity, such as whether or not the treatment is in time to prevent WNV transmission or whether it is too late and most transmission has already occurred.
- Determination if the problem will spread beyond the currently affected area absent intervention, based on the life history and habits of the species involved.
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- Crew reports from adjacent larval habitats suggest adults will soon move into populated areas.
- Life history factors of mosquitoes present – i.e., if a brooded species is involved, determining if the brood is young or is naturally declining.
- Weather factors, in that cool weather generally alleviates immediate problems, but warm weather and/or the onset of peak viral seasons exacerbate concerns.
- Determining, if the decision is delayed, if later conditions will prevent treatment at that time or not. Conversely, adverse weather conditions might remove most people from harm’s way.

In essence, criteria 1 and/or 2 are necessary thresholds which should be met, prior to a treatment being considered, while criteria 3 and 4 are countervailing factors that would indicate treatment may not be required. Treatment will not occur unless criteria 1 or 2 are satisfied through a combination of surveillance indicators, although not all surveillance techniques may be feasible in every setting and situation. The County is not aware of any new data, studies or reports which contravene the research, reports and Findings of the Long Term Plan with respect to adulticide treatment guidelines or thresholds. Therefore, those Findings remain valid and guide this Annual Work Plan.

Vector Control applications will normally be made by truck since that technique has been shown to be effective for the most common species involved, although aerial application remains an option for unusually widespread problems or areas with limited road networks. Health Emergency applications will be done by aerial application due to the need to treat large areas and due to the lack of evidence ground application significantly impacts WNV activity in our setting. Necessary public notices will be issued in a timely manner (normally, at least 24 hours pre-application), and appropriate precautions will be made to meet DEC restrictions on applications, and to avoid “No Spray” properties. If necessary to protect sensitive resources, buffer areas will be provided between the sensitive area and the application equipment. A 150-foot buffer from freshwater wetlands will be provided to avoid the need for DEC Article 24 (Freshwater Wetlands) permits unless a permit or other authorization from DEC has been received.

In 2009 and previous years, an Emergency Authorization were requested from DEC if freshwater wetlands were involved to eliminate the need for an Article 24 (Freshwater Wetlands) permit. In 2011, NYSDEC issued an Article 24 permit to allow adulticide applications in freshwater wetlands or adjacent areas if necessary to protect the public health and replace the use of Emergency Authorizations. This permit controls the use of adulticides in and adjacent to freshwater wetlands during the term of that permit, 2011-2020. The permit covers Health Emergency applications throughout the County and will also allow Vector Control applications in and adjacent to some freshwater wetlands in heavily developed areas of southern Brookhaven Town. Appropriate required public notices will be issued, including CodeRed telephone alerts. Pre-application mosquito sampling will be conducted (for efficacy determinations). If an aerial application is required, a helicopter using a GPS guidance technology will be used to optimize the delivery of the pesticide to the targeted zone.

Efficacy measurements will be made following adulticide applications as weather conditions and staff resources allow. The Long-Term Plan also calls for the establishment of resistance testing.
for the more commonly used compounds. Continued testing of local mosquitoes against resmethrin (Scourge), sumithrin (Anvil) and Duet (sumithrin and prallethrin) in 2016 revealed no local resistance to these materials in several species of mosquitoes tested. Species recently tested included the Asian Tiger Mosquito (Zika), Culex pipiens (WNV) and salt marsh species (Aedes sollicitans and A. taeniorhynchus).

The Long-Term Plan proposed a general reliance on resmethrin, a synthetic pyrethroid, as the adulticide pesticide. However, the Federal and State registration for resmethrin products is ending and existing stocks are nearly exhausted. Sumithrin, a similar pyrethroid, was proposed by the Long Term Plan to be the primary back-up to resmethrin, and the primary pesticide for hand-held applications. Sumithrin has now become the Division’s primary adulticide material. Sumithrin, like resmethrin has been found to be an effective pesticide for mosquito control, can be used for ultra-low volume applications for truck and aerial delivery, undergoes rapid decay in the environment, and, as discussed below, has few identified non-target effects when applied as proposed under the Long-Term Plan. The Division has also begun use of Duet, the Long Term Plan has been modified to include it and its active ingredients, sumithrin and prallethrin. Duet is similar to the Division’s primary sumithrin product, Anvil, in that both products contain sumithrin and the synergist piperonyl butoxide (PBO). However, in addition to 5% sumithrin and 5% PBO, Duet also contains 1% prallethrin. This amount of prallethrin is not sufficient to control mosquitoes, but it does induce them to fly, a phenomenon known as “benign agitation”. Benign agitation causes mosquitoes that are resting to fly so that they will encounter aerosol droplets and be exposed to a lethal dose of sumithrin. Duet has been shown to be particularly effective against mosquitoes that tend to rest during the optimal time of the day for aerosol treatment, that is, at night. The primary use for Duet will be against the Asian Tiger mosquito (ATM), Aedes albopictus and may be used for control of other daytime species including salt marsh mosquitoes. The ATM is an introduced species that inhabits containers and tends to bite during the daytime, making it a significant biting pest that is difficult to control because it is less active at night. The Long-Term Plan also identifies two other pyrethroids, permethrin and natural pyrethrins, as potential adulticide compounds. Neither is preferred; however, as permethrin is a widely available product that is manufactured for many uses that may increase resistance to the material. Natural pyrethrins are identified as a potentially useful compound because its label allows for use over agricultural areas. In addition to the pyrethroids, malathion, an organophosphate pesticide, was identified as a potential adulticide. Malathion would be used under very specialized conditions, such as Zika response if thermal fogging were needed, daylight applications were called for, or if resistance testing indicated pyrethroid applications would be ineffective in meeting the goals of public health protection. All of these pesticides would be applied at the label rate, in the best way of achieving effective mosquito control and to avoid the development of pesticide resistance. The adulticides included in this Annual Plan have been fully evaluated in the GEIS for the Long-Term Plan, and this Annual Plan is fully consistent with the attached Findings. Vector Control continually reviews available pesticides and alternatives, including emerging materials and application techniques for the most environmentally suitable control methods.

PUBLIC EDUCATION: Mosquito problems resulting from larval habitats around homes and yards, containers, drains and the like, is generally brought to the Division's attention through residents' requests for service. Control of these "domestic" mosquitoes is promoted through
education and appeal to individual property owners. Given the Zika and WNV threat posed by these container mosquitoes, especially the Asian Tiger Mosquito *Aedes albopictus* and the House Mosquito *Culex pipiens*, Vector and SCDHS has taken on a leading role in public education. Sanitarians are utilized to require property owners to clean up potential mosquito larval sites. Public education includes the distribution of pamphlets, telephone contact, site visits, media exposure and presentations to various citizens’ groups and associations. In addition, the Division offers assistance to residents in eliminating sources of mosquitoes on their property, and leaves “door hangers” with educational information at properties they visit. Educational materials are also available on the County Web site. The appearance of introduced, container-breeding species *Aedes japonicus* and *Aedes albopictus* and Zika means this component must take on increasing importance, since the public’s cooperation will be needed to control these backyard container larval habitats.

**PUBLIC NOTIFICATION AND THE “NO-SPRAY” REGISTRY:** In 2000, the County passed new laws to improve required public notification for adult mosquito control. As a result, there is now an increased use of the media and extensive outreach to local officials. The Health Services Web site is used to post spray maps. For each adulticide application, over 150 e-mails and faxes are sent to various officials and other interested parties. Newsday and News12 often post spray schedules and maps. It is important to recognize that adulticide applications are very sensitive to the weather, especially aerial pyrethroid applications. The need to inform the public needs to be balanced with the need to conduct operations promptly, within weather windows and before the problem spreads and more acreage needs treatment. It is usually not appropriate to provide more than 24 hours’ notice in most cases, because beyond that time, weather forecasts are not very reliable. Attempts to provide more than 24-hour notice often result in aerial spray operations being announced and then cancelled. These cancellations are confusing to the public and difficult to reschedule. Despite these difficulties, the County provides 48-hour notice for aerial adulticide applications whenever possible for non-virus response.

In addition to the previous public notification procedures, the County has implemented a County law, passed in 2010, requiring the use of its “Code Red” automated calling and messaging system to provide more thorough public notice for adulticiding. This system allows automated phone calls to be placed to all telephones in an area designated for treatment. These messages provide basic information about the operation, such as spray hours, and refer the recipient to additional sources of information. The system ensures that nearly everyone in the area knows about the operation. Use of the Code Red system has been very successful and provides a new level of public information for the program.

The Division maintains a “no-spray” registry of residences where adult mosquito control is not desired. During ground applications the application unit is shut off 150 feet prior to passing such a residence and not turned on until 150 feet after. For aerial control, a system has been devised for identifying and avoiding areas with a minimum radius of ¼ mile, more than 65% of the area is residential and where more than 35% of the residences are on the registry. This registry represents an effort to balance the desires of those residents who want control of adult mosquitoes with those who oppose the use of pesticides. At this writing, the “no-spray” registry lists 326 properties, including beekeepers and organic farms. When control is required to deal with a public health emergency, the Commissioner of SCDHS can override the list. Even then
list members are contacted prior to applications in their area through the Code Red system. In addition to this legally required registry, the Division maintains on the listing beekeepers and organic farms who register. Beekeepers’ properties are generally avoided and beekeepers are notified via Code Red before treatments so that they can take any additional actions they may deem necessary to protect their hives. In addition, steps are taken to avoid impacts to bees including timing of applications to the evening hours when bees are not foraging. Vector also uses mosquito control materials least likely to impact bees and through adjustment of spray equipment and technique using an ultra-low volume (ULV) droplet size that will impact mosquitoes, but not larger bodied insects, including bees. Certified organic farms are avoided and a buffer zone around the farm is included.

Although not required to do so by law, the County also provides public notification for aerial larviciding. An e-mail notice of the marshes to be treated by helicopter is sent each week to Legislators, local governments and other interested parties. In addition, a list of marshes to be treated is posted each week on the County Web site and the list is sent to the media, including Newsday.

SURVEILLANCE AND RESEARCH: All control operations are based on information obtained from surveillance and research. This is a cooperative effort between Vector Control staff in the Department of Public Works and the Arthropod Borne Disease Laboratory in the Department of Health Services. Knowledge of mosquito populations, species composition and arbovirus activity is used to guide and evaluate control measures. Arbovirus surveillance allows the Division, in cooperation with the County and State Health Departments, to gauge the potential for disease transmission and take appropriate action.

A) Mosquito population surveillance: Approximately 12,000 larval and adult mosquito surveys are analyzed each year. These surveys are necessary for locating infestations, directing control efforts and evaluating the effectiveness of those efforts. The mosquito species that breed in various locations are determined from larval samples. Numbers of adult mosquitoes in residential areas are estimated from a network of approximately 29 New Jersey light traps in fixed locations throughout the County. New Jersey traps provide staff with ongoing population trends and are compared with service requests in a community to assist in determining the need for adult mosquito spraying. Some 50,000-100,000 mosquitoes per year from these traps are identified and counted. This work is conducted by DPW staff. In addition, Vector DPW maintains an array of specialized Mosquito Magnet traps to monitor seasonal cycles and long term trends in populations of the introduced exotic, container-breeding species *Aedes japonicus* and *Aedes albopictus* (The Asian Tiger Mosquito).

B) Arbovirus surveillance in mosquitoes: Viral surveillance is conducted primarily by the ABDL and will be directed primarily at the main pathogens, WNV, Zika and EEE. Surveillance will be conducted according to the latest CDC and State DOH guidelines, modified for Suffolk County’s unique environment. To monitor virus activity, CDC light traps and gravid traps are placed on a weekly or rotating basis at various locations throughout the County. These sites are chosen based on their history of viral activity or the presence of viral indicators such as the finding of birds with WNV in the area. The ABDL and the Division collect and process approximately 50,000 live, adult mosquitoes annually for viral
analysis. In 2017, the samples will be sorted by species, frozen, and sent to Albany for arbovirus analysis in the State DOH laboratory.

C) Human, avian and other surveillance: SCDHS, State DOH, DEC and CDC monitor other WNV indicators such as unusual bird deaths or the number of dead birds sighted in an area. The presence of WNV-positive birds is an indicator of virus activity in an area, although the usefulness of dead birds as an indicator has declined in recent years as birds adapt to the virus. The County picks up selected dead birds for WNV testing. The County conducts a rapid, field test (the RAMP test). There are also indications that the number of dead bird sightings in an area is a surrogate indicator of risk. There is also SCDHS monitoring of hospitals, blood banks and outreach to physicians to quickly detect human cases of Zika, WNV and other emerging vector borne illnesses.

D) Efficacy monitoring: While the Division has always monitored the effectiveness of the control program in a variety of ways, there has been an increased effort in this area, based on trial work to develop methods conducted in 2007. In particular, trapping of adult mosquitoes before and after adulticide events is conducted using carbon dioxide baited CDC light traps, NJ traps or service request logs. In addition, indicators of virus activity before and after treatment are followed to be sure the desired effect is achieved. While the number of adult mosquitoes in New Jersey traps and other traps is a key indicator of the overall success of the larval control program, additional effort will be directed toward before and after sampling of treated areas to confirm the efficacy of the treatment methods used.

E) Special surveys and field investigations: Vector’s Control staff conduct special surveys to determine the source of mosquito problems when these turn up in places where they are not expected. Special surveys of problems that appear early in a season can allow larval crews to prevent further trouble through the summer. Ongoing studies on mosquito production in catch basins are helping to define appropriate control measures for this important habitat for Culex mosquitoes that transmit WNV. In addition, we are developing new techniques to improve surveillance and control for the Asian tiger mosquito, Ae. albopictus a species which has become a major biting pest in large portions of the County the last four years. Given the somewhat unpredictable ways mosquitoes seem to find to cause problems for residents and visitors to the County, it is important that the Division retain a flexible ability to investigate issues as they come up.

F) Support for Wetlands Stewardship activities: Vector Control continues to provide support for monitoring and other investigations related to Wetlands Stewardship activities. In particular, Division staff assist in the ongoing monitoring of the Integrated Marsh Management (IMM) projects at Wertheim and Seatuck National Wildlife Refuges. In addition, the Division will assist the Wetlands Stewardship Program in identifying and evaluating prospective sites for future IMM projects, particularly those that will help meet Long Term Plan goals for pesticide use reduction. With the completion of the Wetlands Stewardship Strategy and the availability of grant funding, this component of the program will commence in 2017 with several funded restoration projects. Grant projects include:
i) National Fish and Wildlife Foundation (NFWF) a Sandy restoration grant of $1.3 million to restore south shore marshes for coastal resiliency. Proposed sites include Gardiners County Park, Timber Point & Pepperidge Hall NYSDEC marshes, and Babylon barrier beach marshes. The consultant is currently working up the project plans with County consultation and will be submitting the permit application package for the first sites in the fall of 2016. This grant is funded through Spring of 2018, with Gardiners Park and Timber Point projects to begin in the winter/spring of 2017. A second set of sites will be selected during spring 2017 with work scheduled for fall/winter of 2017-18.

ii) Hazard Mitigation Grant Program (HMGP) for coastal resiliency of Sandy impacted communities. A $564,000 grant for salt marsh restoration work at Smith Point County Park North (Marina). The consultant is working on phase I which includes project plans and completing the permit package. Phase II funding is for the actual restoration work to be completed over the 2017-18 winter.

iii) NYSDOS grant for the restoration a former wetland that was partly filled in by dredge material from Beaverdam Creek in Brookhaven hamlet. The $85,000 grant is to be used for design and permitting work with anticipated completed of all work in April 2017, when the grant expires. The County is working on bringing in a consultant to undertake the design and permit application packages. The Post Morrow Foundation is a project partner on this grant with a section of the restoration site on Post Morrow lands, with the remainder of land held by SC Parks.

iv) Indian Island/Terry Creek marsh restoration project is to partially restore a dredge material filled wetland at the County Park in Riverhead. Project is funded by the NYSDEC for the removal of dredge material and reestablishing a tidal connection to the former wetland. A consultant was chosen in 2016 to begin final design work and project permit applications. It is anticipated that work will commence in late 2017.

Other provisions of the Work Plan notwithstanding, Vector Control may participate in limited research, monitoring, and demonstration projects in cooperation with other levels of government such as the State, Towns or Federal agencies such as the US Fish and Wildlife Service or Army Corps of Engineers. These activities would be subject to separate DEC permitting and SEQRA compliance, and would be subject to CEQ and Wetlands Stewardship Committee review as well.

**TICK RESEARCH SURVEILLANCE AND CONTROL:**

In 2013, the Division began work under Resolution 797-2013 to determine how the County might be able to reduce the impact of tick-borne diseases. It’s important to remember that this subject was covered in the report of the Tick Management Task Force (TMTF) that was submitted to the Legislature in May of 2008 in response to Resolution 1123-2006. In addition, Resolution 132-2014 created the Tick Control Advisory Committee (TCAC) to advise Vector on tick control planning. Large scale effort to reduce the number of ticks on the landscape, such as
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those described by the TMTF, would have the potential for adverse impacts on the environment and would need SEQRA review. This means that no large scale control efforts can be undertaken without an environmental review of tick control under SEQRA and potentially an EIS of the plan. The development of a control plan, therefore, is a major effort that has yet to be funded. It is expected that the re-established TCAC under Resolution 1668-2016 will help the County develop a plan of action and identify the resources needed going forward to fully develop a County-wide environmentally sound tick control plan.

In 2017, Vector Control will continue to work on developing a tick control plan with the limited resources available. Studies are restricted to research activities that would not require full environmental review under SEQRA. Vector is working to improve the technical basis for control efforts and provide practical information to the various public and private entities currently undertaking localized tick control programs. These cooperative efforts can help leverage the County’s limited resources through partnership efforts.

The 2017 tick control efforts include:

1. In 2015 the County created a new position and hired an Entomologist for tick-related activities. Having this person devoted full time to tick research and control was a major step forward in understanding the tick problem in Suffolk.

2. We will continue to work with the reestablished TCAC in 2017 to explore alternatives that might be available to the County. Most importantly, the TCAC will allow for the continued input and feedback from stakeholders needed to gauge what options might be feasible and acceptable for implementation at each local level. This is a significant task, since each of the available control options have their own unique benefits and drawbacks.

3. We have initiated several long-term and seasonal surveillance sites and sampling methods and will continue baseline surveillance of tick populations across Suffolk County. This continued surveillance effort will provide important locally based data such as species composition, abundance, seasonal cycles, and pathogens present. This information will help design and conduct control efforts by other jurisdictions and private pest control operators.

4. Vector staff will continue submitting tick samples collected during population surveys for pathogen testing by NYSDOH and assist SCDOH with tick sample collections for future County based testing.

5. Additional tick samples will continue to be collected for current collaborations with academic research institutions at Columbia University and The City University of New York. Vector Control will continue to collaborate with USDA- Wildlife Services, DEC, local municipalities, government agencies and others interested in assisting with tick or tick pathogen related sample collections.

6. Vector Control will continue to search the literature on the subject in order to improve the Division’s technical expertise in tick control and the environmental effects thereof.

7. We will continue our efforts to reach out to experts for their advice and input and attend related seminars and conferences in the field. These efforts have already proven very helpful in gaining knowledge that may not be published but is highly valuable and allow fostering of mutually beneficial collaborations.
8. Vector staff will continue to provide workshops, technical advice and tick management program design to landowners, government agencies, municipalities and civic groups that are conducting tick control or are considering doing so. These activities will continue to provide further opportunities to learn what techniques local entities are interested in adopting, currently using, or which may be useful to the County and others.

9. In 2016 Vector Control and Cornell Cooperative Extension held three tick management workshops for private pest control operators with funding through a small grant. These workshops allow us to collect information on locally used materials in tick management, discuss application techniques and provide technical assistance to commercial tick control providers within Suffolk County.

10. Vector staff will continue to hold requested presentations at various pest control association meetings, municipalities and civic groups as time and resources allow.

11. Vector Control, in cooperation with Cornell Cooperative Extension, will continue local field trial assessment of tick management materials and area-wide management strategies as opportunities and resources allow.

12. Vector Control and Cornell Cooperative Extension were awarded small grant in 2016 to fund educational workshops and field testing of acaricides. Additional grant applications are planned for 2017.

The prevention of tick-borne diseases in the County is a difficult and complex issue. It is particularly difficult because the biology of these vectors and diseases are significantly linked to deer overpopulation, expansion of range and limited management. In addition, tick control technology suitable for large scale application is not as well developed as mosquito control techniques. A proper plan with concurrent SEQRA compliance would require additional resources to undertake an EIS, beyond those currently available to Vector. However, tick-borne diseases and the adverse impacts ticks have on the ability of County residents to utilize the outdoors, and even their own property, are important issues that need continued investigation.
Pesticide Use in 2016

The Findings Statement for the Long Term Plan requires Vector Control to provide an annual report of pesticide use to the Legislature. The table below summarizes the use of pesticides by the Division in 2016. The acres treated are compiled by multiplying the total used by the standard dose. In a Duplex treatment, the acres treated with two products simultaneously are only counted once.

<table>
<thead>
<tr>
<th>Suffolk County Pesticide Acreage Estimates for 2016</th>
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<tbody>
<tr>
<td><strong>Product</strong></td>
</tr>
<tr>
<td>Larvicides</td>
</tr>
<tr>
<td>Altosid Liquid Larvicide (5%)</td>
</tr>
<tr>
<td>Altosid Liquid Larvicide concentrate (20%)</td>
</tr>
<tr>
<td>Altosid pellets</td>
</tr>
<tr>
<td>Altosid XR</td>
</tr>
<tr>
<td>Valent BioSciences Vectobac 12 AS</td>
</tr>
<tr>
<td>Summit Bti briquets</td>
</tr>
<tr>
<td>Fourstar 90 briquets</td>
</tr>
<tr>
<td>Valent VectoPrime FG</td>
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<tr>
<td>Aquabac 200G</td>
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<tr>
<td>Altosid XR briquets</td>
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<tr>
<td>Spheratax 50G</td>
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<td>Duplex Vectobac 12AS + Altosid 20%</td>
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<tr>
<td>Scourge 18+54</td>
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<tr>
<td>Anvil 10+10 ULV</td>
</tr>
<tr>
<td>Duet</td>
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<tr>
<td>Adulticide acreage</td>
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