14 Mitigation of Potential Impacts of the Long-Term Plan

Section 7 identified potential impacts associated with the Long-Term Plan. SEQRA requires that mitigations be identified, where possible, for such potential impacts. This section identifies the potential impacts and also discusses mitigating measures identified in the Long-Term Plan.

14.1 Mitigations of Potential Impacts Associated with Long-Term Plan Public Education and Outreach

The Long-Term Plan identified the potential for impacts associated with counseling the public to use DEET to avoid mosquito bites. Although it is not clear that any health impacts result from the use of DEET, the County will echo the NYSDEC position and urge the public to use caution when applying DEET to skin. Most importantly, the public will be reminded that label directions must be followed. Any potential impacts associated with DEET use are mitigated by reductions in disease risk associated with its effective deterrence of mosquito bites.

The County will also seek to mitigate potential impacts to those areas that commonly receive one (or more) Vector Control adulticide application in a season. Targeted outreach will stress the importance of avoiding exposure to mosquitoes, and in taking mitigating steps if exposure cannot be avoided. The Commissioner of SCDHS will also craft an advisory detailing the means that SCDHS recommends (or suggests) to minimize risks for potential impacts from exposure to adulticides.

14.2 Mitigations of Potential Impacts Associated with Long-Term Plan Surveillance

There are no overt impacts associated with the Long-Term Plan surveillance approach. Surveillance will cost money and effort, and require minor expenditures of energy. Changes proposed by the Long-Term Plan are incremental from current levels, however. These are all mitigated by the immense benefits brought to a program making decisions on the basis of scientifically collected information.

14.3 Mitigations of Potential Impacts Associated with Long-Term Plan Source Reduction

There were two impacts associated with implementation of source reduction as espoused by the Long-Term Plan:

1) expansion of catch basin sampling

The Long-Term Plan proposes to make a large increase in the scope of catch basin sampling. Catch basins clearly support the breeding of *Culex spp*. mosquitoes, which have been implicated as the primary vector for WNV in the US. Currently the County monitors catch basins if they are in an area with a high water table. The Long-Term Plan, on the basis of information collected as part of the Plan development, calls for much more effort to monitor catch basins. This will require significant expenditures of personnel effort, with associated monetary costs. These should be mitigated by reductions in disease risk if additional *Culex* breeding locations are identified and treated.

2) waste management issues

Collection of littered tires can cause a waste management problem, and the maintenance of stormwater structures can also generate some-what problematic materials. The scope of these problems, in light of waste management as a whole County-wide, is not great. The impact of problems associated with these waste streams is mitigated by the potential for improved mosquito management, and especially in the reductions of risks to human health.

14.4 .Mitigations of Potential Impacts Associated with Long-Term Plan Water Management

The BMP manual of the Marsh Management Plan identified 15 BMPs and four IMAs for consideration by the County in taking action in its marshes. These were categorized four ways:

1) No to little impact actions (BMPs 1-3)

2) Minimal impact actions (BMPs 4-9)

3) Major impact actions (BMPs 10-15)

4) Interim actions (IMAs 1-4)

The following discussion reviews each BMP, and determines, if a potential impact was identified, and what mitigation may exist to minimize the impact or its likelihood of occurring.

The proposed BMPs generally provide some degree of restoration or mitigation of past marsh manipulations. If applied in the proper setting with skill and care, it is believed the BMPs will result in improvements to the ecology of the addressed marsh. The key to ensuring impacts are minimized is to determine what kinds of settings are appropriate for a particular improvement. The programmatic mitigation for making inappropriate wetlands management choices is through the creation of a project review process. The process involves interested stakeholders and provides project oversight and design review. It is intended to make as many of the water management projects, as is possible, into cooperative ventures involving the interested parties. Therefore, the Long-Term Plan does not envision that SCVC will develop and then implement projects solely on its own, but rather in conjunction with other interested agencies and organizations (especially the land managers, as their input is key in determining the scope of water management undertakings). In addition, the generation of progress reports and plans will ensure public involvement in the implementation of the Wetlands Management Plan. Finally, it is anticipated that the Screening Committee will quickly develop an overall County marsh management plan, in which the current Wetlands management Plan will be subsumed.

There is always a degree of risk in altering complex systems such as marshes. Not all key parameters can be completely or even adequately evaluated prior to taking action. System complexities mean feedback mechanisms, synergies, or unexpected decouplings of system features can lead to unforeseen results. Thus, often it seems best to do the least. This is the genesis of the presumptive interim policy for non-intervention in the marshes. However, it is also true that the potential for gains from more aggressive actions often outweigh risks, and some key concerns may require restoration efforts.

Class I: No to Minimal Impact Actions

BMP 1. Natural Processes (No action/reversion)

Reversion is the presumptive interim action for the County marshes, and is generally perceived of as having many benefits as a management tool. However, in certain settings it is clear that reversion may lead to negative impacts.

The great mitigation for impacts associated with reversion is that it is the management selection that can most easily be "undone" (by choosing an active marsh management means). Active marsh management techniques can not necessarily be undone, if desired. Reversion as a management choice is also mitigated by ongoing monitoring (through remote sensing) of the health of the County's marshes, ensuring that if reversion begins to have negative impacts on a particular setting, then alternate considerations for the site can be entertained in a timely fashion.

BMP 2. Maintain/Repair Existing Culverts

An example used in Section 7 where potential impacts might result from the implementation of this BMP was Cedar Beach, as some elements of the marsh did not appear to be functioning well. Culvert maintenance/repair will maintain or increase tidal flow to the marsh. To avoid potential negative impacts, such as drowning or over draining the marsh surface, culvert maintenance/repair should be implemented only on marshes deemed as "healthy." Other management alternatives should be used in conjunction with culvert maintenance/repair on marshes overcome by *Phragmites* in order to limit the drier conditions favored by this species. Physical disturbance to vegetation and wildlife can be minimized with the use of low-ground pressure equipment performed during the winter months. Impacts associated with this management alternative are anticipated to be minimized through the use of open and appropriate project design. Mitigation of the potential transport of polluted upland runoff to adjacent waters via existing culverts should be addressed through compliance with USEPA Phase II stormwater goals and implementation of appropriate management tools in various programs conducted by the responsible municipality.

BMP 3. Maintain/Reconstruct Existing Upland/Fresh Water Ditches

Manorville was identified as a site where this BMP could result in negative impacts. Maintaining ditches in the Manorville area may have an impact on important surface water features, and lead to threats to some of the important rare species in this area. Often, as in this case, the only appropriate mitigation of the impacts is not to conduct the proposed action.

Although the upland ditches at Johns Neck Creek would benefit from maintenance, impacts to vegetation may occur with the use of heavy machinery. *Phragmites* would be the vegetation most impacted because it dominates the upland area. *Phragmites* is not consumed to any great extent by wildlife, nor is it considered an important nesting habitat for most marsh-resident birds. The rapid vertical and horizontal clonal growth of *Phragmites* allows it to overgrow other native wetland plants by physical displacement. Therefore, impacts to *Phragmites* are not viewed as negative. Impacts to high marsh vegetation, such as *S. patens* and *D. spicata*, may also occur, but would be limited to a small section near machinery access areas. Low-ground pressure equipment used during winter months when the marsh surface is less vulnerable to physical damage will mitigate this impact. Furthermore, heavy machinery would not be operated during excessively wet marsh conditions in order to prevent rutting or root damage.

Negative impacts regarding the transportation of polluted upland runoff into the estuary would be mitigated under the USEPA Phase II stormwater goals and management tools, which are being implemented by the County and various municipalities across the County.

Class II: Minor Impacts

BMP 4. Selective Maintenance/Reconstruction of Existing Salt Marsh Ditches (Standard Water Management)

Maintaining ditches ensures that all of the impacts – positive and negative – associated with their construction across the County's marshes, will continue to occur. Mitigation of the impacts associated with this BMP will primarily be realized by limiting the scope of ditch maintenance. The current program uses ditch maintenance as its primary means of water management. This will not longer be the case under the Long-Term Plan. As an example, in Section 7 it was

realized that not all impacts at Pickman-Remmer could be adequately addressed through ditch maintenance.

Ditch maintenance will only be conducted under select conditions. Those conditions are:

- Deterioration of or damage to structures is resulting in a significant mosquito problem, as evidenced by larval and/or adult surveillance, serious enough to require control. An example would be a collapsed pipe that restricts tidal flow and results in a need to larvicide an area. Or:

- Failure to maintain the structures would result in the loss of resource values, such as fish passage or tidal flow, or loss of vegetation due to freshwater impoundment. Or:

- Failure to maintain the structures would result in a hazard or loss of property as a result of flooding.

Alternatives to maintaining the grid ditch system will be investigated in all cases. Where alternative actions are not feasible or cannot be considered for regulatory or landowner preferences, then ditch maintenance may be selected. It is expected that less than 50 acres per year of salt marsh will be affected by ditch maintenance (including projects addressed as Interim Actions, see below).

Proper project planning will limit the amount of negative impacts associated with ditch maintenance. Marshes with a history of continuing ditch maintenance and aerial larviciding will not be managed solely by standard water management. An example of a marsh where this is the case is Namkee Creek.

In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be conducted outside of nesting times, and when fish use of the marsh is minimal – during the winter, or, late fall and early spring. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and root damage. Various pathways for machinery to transverse the marsh will be used to limit damage to existing vegetation. To limit disturbance to spotted turtles, hand tools may be used in ditches that are believed to serve as turtle habitat.

Impacts associated with the casting of spoils can be mitigated with careful planning. On marshes where *Phragmites* dominates ditch edges, rhizomes could be spread to areas of native vegetation. To mitigate this risk, spoil containing *Phragmites* rhizomes will be cast to existing areas of *Phragmites* and not to areas of native vegetation. If spoil is spread across the marsh surface too thick, it can result in damage to vegetation and may cause vegetation shifts to those that prefer drier conditions. This can be mitigated by spreading a thin veneer across the marsh surface to no more than three inches thick to allow existing vegetation to recover.

BMP 5. Upgrade or Install Culverts, Weirs, or Bridges

Potential impacts to the hydrology of a marsh resulting from a culvert upgrade, such as were identified in Section 7 as potentially occurring at Pipes Cove, can be mitigated through careful evaluation and planning prior to performing such actions. If existing vegetation patterns show evidence of tidal restriction, a culvert upgrade may be implemented.

Impacts associated with changes in hydrology can be mitigated through ongoing monitoring (through remote sensing), ensuring that if the marsh is becoming overly flooded or excessively drained, then other management techniques could be implemented to alleviate the problem in a timely fashion. For instance, the maintenance or reconstruction of existing upland/fresh water ditches may be conducted in order to reduce the flooding of upland properties.

In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be conducted outside of nesting times, and when fish use of the marsh is minimal – during the winter, or, late fall and early spring. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and root damage. Various pathways for machinery to transverse the marsh will be used to limit damage to existing vegetation.

To ensure that undue impacts from ancillary actions – roadway repairs, etc – do not occur, coordination needs to occur with other parties involved with whatever structure (roadway, train track, etc.) the culvert passes under. This ensures that if repairs will be required, those using the structure are not impeded.

BMP 6. Naturalize Existing Ditches

Naturalizing ditches may result in the creation of an erosive, unstable waterway which may lead to the creation of new mosquito breeding habitats. This erosion can lead to infilling of the waterway. In addition, the change in flows could result in a waterway that no longer maintains itself due to dissipation of tidal energies through greater friction. Good planning of potential projects can limit the chances of this occurring. Models have been developed that may be accurate enough to predict the dynamics of such systems, for example, although the accuracy of the modeling at these scales is an unresolved issue. Monitoring the effects of changes will assist here.

In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be conducted outside of nesting times, and when fish use of the marsh is minimal – during the winter, or, late fall and early spring. In addition, heavy equipment will not be used at times when the marsh is excessively wet to prevent rutting and areas of standing water. Various pathways for machinery to transverse the marsh will reduce damage to existing vegetation.

BMP. 7 Shallow Spur Ditches

Spur ditches will slightly alter the hydrology of a marsh and may cause excess drainage of ponds and pannes. Mitigation for this impact would be to construct spur ditches to a depth no more than six inches deep, to maintain the same hydrological level. To ensure that the spur ditches function properly post construction, initial monitoring can be conducted to hand remove any debris that may have clogged flow during high tides.

The Wertheim Early Action OMWM project experienced some impacts associated with this BMP, in that one spur ditch connecting a pond to the tidal channel appeared to be undergoing rapid erosion. Monitoring of the area found that the erosion stabilized – albeit, at a depth somewhat greater (close to a foot). Although the spur ditch is deeper, the pond it is connected to still maintains a water height above the level measured in the tidal channel – which was the intent of using the spur ditch in this area.

Heavy machinery is required for the construction of spur ditches. In order to limit potential impacts associated with heavy equipment, low-ground pressure equipment will be operated outside of nesting times, and when fish use of the marsh is minimal – during the winter, or, late fall and early spring. In addition, heavy equipment will not be used at times when the marsh is excessively wet to prevent rutting and areas of standing water.

BMP 8. Back-blading and/or Sidecasting Material into Depressions

Potential impacts associated with back-blading and/or sidecasting material into depressions can be mitigated with good project planning. Pickman-Remmer was a marsh where potential impacts were anticipated if this BMP were implemented there, due to the overwhelming presence of *Phragmites*. To avoid potential negative impacts, such as the spreading *Phragmites*, spoil containing *Phragmites* rhizomes should be cast to areas already dominated by *Phragmites* and avoided in areas of native vegetation. In addition, if spoil is spread too thickly across the marsh surface, impacts to vegetation may occur. To mitigate these impacts, spoil should be limited to three inches in thickness on the marsh surface. This would prevent suffocation and plant damage, and would also prevent elevation of the marsh surface which could result in vegetation shifts.

Heavy equipment is required for this BMP. In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be conducted outside of nesting times, and when fish use of the marsh is minimal – during the winter, or, late fall and early spring. In addition, heavy equipment will not be used at times when the marsh is excessively wet to prevent rutting and areas of standing water. Various pathways for machinery to transverse the marsh will limit damage to existing vegetation.

BMP 9. Small (500-1000 sq. ft) Fish Reservoirs in Breeding Areas

A major impact associated with this BMP is the loss of vegetation. Replacing vegetated wetlands with open water features leads to a loss of wetland acreage, which violates policies and precepts in New York State. Mitigation for this loss would be to construct small ponds, as the loss associated with any one pond would be negligible. Another mitigation is the creation of more diverse habitat types can increase natural resource values associated with the marsh.

This BMP does not propose to convert all of the vegetated salt marsh to open water, but only a portion of it. It is generally believed that monocultures are less valuable ecologically than more diverse habitats, and so it could be argued that even though primary production may be lower, ecological value has been increased.

Heavy equipment is required for this BMP. In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be used during winter months when the marsh is less vulnerable to physical damage and disturbance to wildlife using the marsh. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and areas of standing water. Various pathways for machinery to transverse the marsh will limit damage to existing vegetation.

Class III: Major Impacts

The potential for impacts associated with these BMPs is greater because they involve major hydraulic changes to the existing waterways in the marsh. The flow of water into and off a marsh largely controls factors such as sedimentation, nutrient balancing, contaminant sequestration or transport, and the overall connectivity between the marsh and its surrounding estuary. Changes to these processes may result in dramatic changes to the marsh.

However, the prospect of natural resource enhancement that often accompanies these kinds of projects can be a tremendous mitigation for the risk of impacts. For example, at the Wertheim OMWM Demonstration Project, initial project results find that the large ponds were extensively used in spring and early summer by waterfowl, and through the summer wading birds foraged across them. Nekton use of the marsh has also increased.

BMP 10. Break Internal Berms

Several potential negative impacts are associated with this BMP. Breaking internal berms may result in excessive drainage of ponds and pannes and the introduction of tidal water into areas where it is not desired. This change in hydrology may cause shifts in vegetation, including potential changes from fresh to salt marsh, or changes from low to high marsh (or vice versa). Mitigation to prevent such impacts consist of careful planning to ensure that the depth of cut through the berm is limited to that necessary to restore the desired degree of tidal connection.

Breaking internal berms may also lead to excessive flooding of the marsh and upland areas. Mitigations, such as self-regulating tidal gates, can be used to minimize hydrological changes while maximizing flow increases.

Often berms were installed to prevent tidal flooding. Changing the hydrology of the existing systems may result in unintended impacts to the surrounding upland areas.

Heavy equipment is required for breaking internal berms. In order to limit potential damage from the use of heavy equipment, low-ground pressure equipment will be used during winter months when the marsh is less vulnerable to physical damage and disturbance to wildlife using the marsh. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and areas of standing water. Various pathways for machinery to transverse the marsh will limit damage to existing vegetation.

BMP 11. Tidal Channels

Potential negative impacts associated with altering the hydrology of a marsh through the creation of a tidal channel can be reduced with the use of models to determine acceptable channel sizes and shapes for each particular marsh. Tidal channels will be constructed in marshes that show a need for increased hydrology, and/or improved water quality. There is a risk of spreading *Phragmites* if spoil containing *Phragmites* rhizomes are not carefully managed. To ensure that *Phragmites* will not be spread to areas of native vegetation, such as *S. patens* or *D. spicata*, spoil containing the rhizomes should be sidecast into existing *Phragmites* stands or removed by a dump body to upland locations.

In order to limit potential damage from the use of heavy equipment required for this BMP, low-ground pressure equipment will be used during winter months when the marsh is less vulnerable to physical damage. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and areas of standing water. The use of varied pathways to traverse the marsh will also limit damage to existing vegetation.

BMP 12. Ditch Plugs

Ditch plugs create a closed system, allowing tidal exchange only during spring or storm tides. This could lead to retaining too much water on the marsh and lead to stagnation, creating new mosquito breeding habitats. This impact can be mitigated through careful planning prior to installation. Interior water in a marsh has also been connected to the Jamaica Bay syndrome. Ditch plugs have also been thought to retain too much fresh water on a marsh, causing *Phragmites* expansion to be fostered (although most ditch plug advocates suggest they limit Phragmites by making the marsh hydrology more saline). To avoid these potential negative impacts, ditch plugs are probably best limited to marshes that have a high tidal regime where surface water losses from drainage at tidal lows are of concern. Sill plugs have also been identified as a mitigation of this potential impact. Sill plugs are not constructed to the marsh surface, but to some intermediate point between the marsh surface and mean water. This means that the plugged area will retain water at lower tidal stands, but will also be inundated during higher tides each day, leading to limited tidal circulation. Plugs are likely to settle over time and may become impacted by water flow prior to revegetation and stabilization. To avoid plugs from settling low enough to retain water, plugs should be installed to an elevation above that of the surrounding marsh surface. A top layer of vegetated spoil may be placed on the surface of the plug to expedite revegetation and limit puddle formation.

To limit potential damage from the use of heavy equipment, low-ground pressure equipment will be used during winter months when the marsh is less vulnerable to physical damage. In addition, heavy equipment will not be used at times when the marsh is excessively wet in order to prevent rutting and areas of standing water. The use of varied pathways to traverse the marsh will also limit damage to existing vegetation.

BMP 13. Ponds above 1,000 sq. ft for Wildlife Value

As with small ponds, a major impact associated with this BMP is the loss of vegetation. Since larger ponds may create conflicts with existing State regulations and federal policies regarding "no net loss" of tidal wetlands, other alternatives may be combined with this BMP that would meet the requirements of these policies. For example, to maintain the amount of vegetation on a

marsh, the spoil generated from large ponds may be used to fill existing ditches. Careful project planning prior to construction can ensure no net loss of wetland acreage.

There are concerns that establishing open water on the marshes could lead to erosion or rotting of the marshes from the inside. Because the mechanisms involved in the vegetation losses at Jamaica Bay have not been identified, providing some opportunity for interior water can be perceived as a threat to the integrity of the vegetated marsh. This does not seem to be altogether well-considered, however, as many stable marshes have extensive pond and panne structural patterns. This is, in fact, a feature of the classic model for New England marshes. Preventing "Jamaica Bay syndrome" in other marshes must be more than simply avoiding creating open water in the interior of marshes.

As with all other BMPs involving heavy equipment, construction needs to be carefully considered in order to ensure damage to the marsh and impacts to wildlife are minimized.

BMP 14. Filling ditches

In order to fill the ditches, a source of material must be identified. One problem may be that in order to generate enough material to fill the existing ditches, too many ponds or feet of tidal channels will need to be created. Conversely, as ditches are filled and their water conveyance potential is lost, it will be necessary to provide alternate means to maintain the tidal circulation – if that is deemed necessary.

Because ditch filling is the ultimate undoing of the 1920s/1930s unthoughtful ditching efforts, it is especially attractive to many. However, the changes that will occur across particular marshes when the ditches are no longer present may be vast. Unless those consequences are to be faced, alternative water conveyance systems must be installed. The aesthetic improvements to the marsh by removing the linear ditch features may not balance increased mosquito production, loss of fish habitat, and expansion of *Phragmites*. All of these are potential outcomes, if the project is not well-considered and -designed.

It is extremely important to properly fill the ditches. One problem arising at the Wertheim OMWM Demonstration Project is settling of material in the filled ditches, so that shallow ponds tend to appear following tidal inundations. This is a prime mosquito breeding opportunity, and

also tends to retard revegetation. Also, relocation of plant material from pond areas to the ditches did not always result in resprouting at the new locations. It remains to be seen if this is a consequence of poor execution of intended work, or is the general result when such transplants are tried.

As with all other BMPs involving heavy equipment, construction needs to be carefully considered in order to ensure damage to the marsh and impacts to wildlife are minimized. It is difficult to determine if a greater degree of compaction in the fill areas is needed to avoid settling, or if highly compacted sediments may prove to be more resistant to plant regrowth.

BMP 15. Dredge Material Removal

Three major potential impacts are associated with dredge materials removal.

1) The ecological setting associated with this upland area will be lost. In almost all situations, this is not regarded as a major issue, as dredge spoil areas are often colonized by *Phragmites* or other "low value" vegetation. Restoring dredge spoil areas to salt marsh is almost always considered to be an ecological upgrade.

2) One of the more difficult restoration projects to do well is to re-create salt marsh. Grading, hydrological planning, and plantings must all be considered carefully. Often, the system is sketched in, anticipating that natural processes, if started, can do a better and more complete restoration if given enough time. However, this is a project that clearly requires expert design and implementation.

3) The existing dredge materials will need to be relocated appropriately. The difficulty in doing so has been increased over time with the additional scrutiny that these materials now receive – it used to be assumed that almost all Suffolk County dredge spoils contained no contaminants of any consequence. That is no longer assumed, and some materials have been found to contain high levels of certain regulated compounds, requiring more controls on disposal and/or reuse. One positive that may allow for easier reuse is the near certainty that the spoils have fully dewatered.

As with all other BMPs involving heavy equipment, care will need to be taken to minimize impacts to vegetation and wildlife.

The difficulties associated with removing dredge spoils are clearly mitigated by the potential increase in wetlands that can result.

Interim Actions/On-going Maintenance Activities

IMA 1. Natural Processes (No action/reversion)

Reversion has been identified as the presumptive interim action at County marshes when a long-term management strategy can not be implemented immediately. However, at many marshes, as discussed above, when reversion occurs mosquito breeding and other negative results may ensue.

Therefore, all reversion sites will require monitoring to ensure that the policy of allowing natural processes to run their course does not lead to unacceptable negative impacts.

IMA 2. Selective Ditch Maintenance (Standard Water Management)

State Tidal Wetlands require Unit Management Plans prior to implementing any long-term management activities. It is unlikely such plans can be generated very soon for the many State holdings. Therefore, some degree of interim management may be needed at these sites. Reversion is the preferred option; however, many of the State wetlands breed mosquitoes, to the extent they are aerially larvicided at this time. Some form of water management is likely to be needed at these sites.

Most already are sites where ditch maintenance has been used. Selective maintenance of the grid ditches may alleviate some of the mosquito breeding problems experienced in the marshes. However, the intent of the Long-Term Plan is to minimize ditch maintenance as a means of water management used by the County. The mitigations discussed above under BMP 4 will be employed to limit interim ditch maintenance as much as is possible.

IMA 3. Culvert Repair/Maintenance when Tidal Restrictions are Apparent

Largely due to the necessity of coordinating with other entities, it may be that optimal culvert management is not possible at all times. Stop-gap measures should then be employed to address the problem as much as can be, understanding that longer-term solutions will be sought as soon as is possible. The inadequacy of the temporary measure is mitigated by intentions to conduct a more comprehensive repair when possible.

IMA 4. Stop-gap Ditch Plug Maintenance

Thin ditch plugs were the favored means of conducting OMWM in Suffolk County since the Seatuck demonstration project in 1986. However, it has become apparent that such small plugs do not last well. At certain sites, while they lasted, they seemed to have met landowner expectations. East Hampton anecdotally reports that plugs installed for coliform reductions have achieved those goals, and, as reported in Section 5, ditch plugs at the William Floyd Estate seem to be meeting the site management's expectations. There may be other areas where ditch plugs have been installed, and are now failing (or have failed already). For those locations, where marsh health seems to be good, and where a longer-term plan for the marsh is not yet complete, the ditch plugs could be restored to maintain the system status quo. This is only intended to serve as an interim step, and more complete management of the system can then be undertaken following complete analysis of the setting.

14.5 Mitigations of Potential Impacts Associated with Long-Term Plan Biocontrols

The Long-Term Plan identified potential impacts of fish into certain fresh water habitats as a potential impact associated with the use of biocontrols. This is because certain predator-free/predator-"deficient" environments allow for the development of aquatic invertebrates, insects, and amphibians. Some of the insects that can flourish in these environments are mosquitoes. Therefore, it might seem to be worthwhile, from a mosquito control standpoint to introduce mosquito larvae predators to reduce emergent populations. This would likely have negative impacts on other species, however. Therefore, the County will mitigate this potentially negative impact by limiting fish releases generally to locations where they have been used before. In addition, any expansion of fish releases will only occur after the locations have been

reviewed and determined not to provide these kinds of "vernal pool" or "coastal plain pond"-type environments, and that any connected waters that the fish might migrate to also do not constitute such environments. This will be done for natural waters, and also for the various artificial waterways (such as recharge basins) that sometimes appear to need treatment.

14.6 Mitigations of Potential Impacts Associated with Long-Term Plan Larval Controls

Potential impacts can be associated with the control of larval mosquitoes.

Aerial applications of larvicides appear to have the potential to cause impacts to certain bird species. Aircraft, especially when flown low over a marsh, have been observed to startle resting (and, potentially, nesting) birds, causing them to take flight. Research on the impacts of startling such birds at one or two week intervals, as can occur due to repeated applications of larvicide across a season, is sparse, and so the impacts to any such species is based on speculation. This potential impact is mitigated in two ways through the Long-Term Plan. One is by identifying important populations, and then altering application techniques to avoid any startling. This is already the practice of SCVC when piping plover nesting sites may be in potential flight paths. SCVC has requested that local experts work more closely with it to identify any significant populations or environments that may be impacted by its operations; although the focus of this effort is on fresh water settings, the same experts may be useful in identifying at risk populations in salt marshes, and the times when they are most sensitive to disturbance. Secondly, it is hoped that full implementation of progressive water management across the salt marshes will lead to a reduction in aerial larviciding. This has been the experience in neighboring jurisdictions where these procedures are used regularly. The goal is to reduce aerial larviciding by approximately 75 percent; that would lead to at least a commensurate decrease in potential impacts from startling birds with aircraft.

Generally, any potential larvicide impact will be mitigated by the proposed large-scale reduction in applications, as the need for such applications is reduced. Another overall mitigation is the benefit to human health resulting from disease risk reductions when potential vector populations are reduced.

As mentioned above, potential impacts associated with larval controls in fresh water settings are going to be actively mitigated by encouraging information exchange between experts with knowledge of at risk organisms or settings, and SCVC. As each party understands habitat needs of the organisms, and proposed treatments by SCVC, it is anticipated that alterations can be made in the means SCVC uses to control mosquitoes to minimize the potential for impacts. These alterations could be shifts in the time of day that applications are made, to avoidance of treatments for certain settings at certain times, to more studied selection of treatments and times or applications to optimize mosquito control while minimizing the opportunities for impacts to occur. SCVC has, for example, worked closely with NYSDEC to avoid treating any tiger salamander habitats at times when impacts might affect breeding, or development and emergence of young. This is true although there do not appear to be any reasons to believe larvicide applications directly affect amphibians.

The quantitative risk assessment, the literature in general, and local field work all found no potential impacts from the use of the biorational larvicides selected by the County. Nonetheless, the County will seek to minimize its use of pesticides in the program. This is for several reasons:

- It complies with the County pesticide phase-out law
- It complies with IPM, where other means of pest control are preferred to the use of pesticides
- Reliance on pesticides for mosquito control can lead to suboptimal control. Resistance might develop, weather or other factors may impede the delivery of the pesticide, or the application may fail to impact the targeted population as expected (for a number of reasons). Thus, the pesticide may not achieve the expected efficacy.
- The potential exists for impacts due to accidents or misapplications.
- All studies, experiments, and calculations involve some uncertainties; in the case of much of the work with mosquito control pesticides, there are certainly a number of factors and conditions that have not been completely studied and understood. Therefore, there is still a potential for impacts from the use of these products.

Nonetheless, as nearly as can be completely determined, Bti, Bs, and methoprene pose no threat to human health, and have little to no likelihood of causing ecological impacts.

14.7 Mitigations of Potential Impacts Associated with Long-Term Plan Adult Controls

Any potential impact from the use of adulticides to control mosquitoes is mitigated by the conceptual underpinning that adult controls are always the last – and never the primary – option for mosquito control. Consideration of adulticides for control purposes means that all other options have not succeeded, and a problem exists of such a magnitude that it requires addressing. The decision to apply adulticides will only be reached when a series of parameters have been exceeded, and checks have been made that demonstrate a clear need for the treatment. The decision-making process is laid out in detail in the Long-Term Plan.

There has been great concern that adulticides use might impact human health. This is because the mechanisms of action used by the selected pesticides, and certain laboratory tests, make it plausible that the compounds might affect human health. However, epidemiological work and theoretical analyses (such as the risk assessment) all tend to find no elevation of risks for impacts, because the concentrations that the adulticides are applied at, and thus the relative lack of exposure to them for people, means that any potential impact cannot be realized.

The risk assessment did find one potential exposure scenario that might lead to some human health impacts. That was for the maximally exposed individual in Davis Park who primarily consumed produce grown at his home in Davis Park, due to exposure from 14 applications of malathion over a season. This exposure was not accepted as a reasonable determination of human health impacts, however, because it was based on the highest potential dose for Davis Park under that scenario. Other factors not explicitly considered by the risk assessment, but which weigh on this scenario, are:

- an individual is extremely unlikely to primarily consume locally grown produce in Davis Park (soils are not suitable for vegetable growing, and so a large container garden would need to be created);

- malathion is not likely to be the primary pesticide used in Davis Park (sumithrin is the preferred kind)

- washing the produce should reduce exposure, although pesticide adsorbed by the produce will not be removed by washing

Similarly, there is also a conceptual basis for concerns that adulticides may impact the environment. The selected pesticides have been shown to be toxic to non-target organisms at low concentrations. However, they are also applied at very low concentrations. Mosquito control applications, in fact, often use lower concentrations than is done for other pest control reasons, but mosquitoes are considered to be fragile insects that are impacted readily by pesticides. Modern mosquito control products are designed to degrade quickly, and not to leave residues (unlike earlier products, where persistence was designed into the compounds to increase effectiveness).

For those reasons, most accounts do no find impacts for adulticides to non-target organisms. This included field studies conducted specially for the project, and most of the analyses associated with the quantitative risk assessment of the selected compounds. The risk assessment did find some aspects of the analysis that did suggest the potential for impact:

- Using a honeybee model, all of the analyzed compounds were found to potentially have impacts on flying insects at the time of application. Analysis of the air model and its potential to overestimate deposited concentrations suggests that under many of the considered scenarios, resmethrin and sumithrin can be understood not to truly present a risk to flying insects. Considering the rapid degradation measured under local conditions for resmethrin, the analysis found it very unlikely that resmethrin actually causes impacts to flying insects, and similar considerations appear to hold for sumithin, as well. Nonetheless, there may be a potential for impacts to insects, especially those of similar or smaller size than mosquitoes. As was done with larvicides and tiger salamanders, the County has proposed working with NYSDEC and other local wildlife managers to identify organisms and settings that appear to be important to preserve for natural resource reasons. The primary mitigation of this potential impact appears to be the

relatively small scope of the County's adulticiding program, and the apparent ability of natural populations to rebound quickly following mosquito control applications.

Permethrin, under a limited scenario, and malathion more generally, appeared to have the potential to reduce aquatic invertebrate populations (including larval insects and crustaceans). Modeling determined this reduction in invertebrate populations did not propagate in the food web, meaning there was no overall ecological impact from the potential invertebrate impact. Additionally, except for one population (amphipods), no difference in modeled populations (treated and exposed) was detectable within several months, and the difference the model reported for amphipods was not statistically significant. These potential impacts are mitigated by further considerations. Testing of resmethrin, for example, showed that it was exceptionally ephemeral in the environment. Modern pesticides are designed to degrade rapidly, and, for resmethrin, at least, the goal has been attained. Other selected pesticides may also degrade more rapidly than laboratory tests or theoretical considerations suggest.

Adulticides are applied over only a small portion of the County. In 2003, which had more adulticide use of any year since 1999, only six percent of the County received an adulticide application. This means that any potential impacts are extremely limited in terms of geographical extent.

Furthermore, the use of adulticides provides benefits. They reduce risks for mosquito-borne disease, and other impacts to quality of life, as it is clear they can be effective means of reducing mosquito populations (albeit, see below for a more complete discussion on this topic).

14.8 Mitigations of Potential Impacts Associated with Long-Term Plan Programmatic Considerations

The intent of the Long-Term Plan is to reduce mosquito populations. This has a potential for impacts if organisms depend on mosquitoes as prey. There is some limited evidence that, in some fresh water settings, dragonflies emerge in concert with mosquitoes, so that the nymphs feed on mosquito larvae and the adults feed on adult mosquitoes. However, in general, organisms have not been shown to depend on mosquitoes for prey. This appears to have resulted

from a lack of observations of dependency on mosquitoes, and therefore a lack of research on the subject.

In any case, the Long-Term Plan does not propose to eliminate mosquitoes from the County. The intent is to reduce and perhaps largely eliminate mosquito problems, not mosquitoes. A mosquito problem requires, but is not defined by, the presence of mosquitoes. Other factors, including people, and often the presence of pathogens or large populations, determine whether mosquito presence becomes a problem.

The Long-Term Plan is an IPM program – that is, it is an integrated approach. In a sense, it is an artifice to aid analysis to divide the program into its components and consider each separately. This is especially so when considering the benefits that can be associated with mosquito control. For water management, specific benefits can be associated with habitat augmentation, for example. However, most of the benefits, such as disease risk reduction, or improvements in quality of life, associate with the program as a whole. Thus, while the program appears to have substantial benefits associated with WNV mortality and encephalitic risk reduction, it may not be possible to determine if larvicides are responsible for (say) 50 percent of the reduction, and other components less. Therefore, much of the mitigation, whether based on models on WNV impacts, or economic benefits, or quality of life enhancements, belongs to the proposed program as a whole, and not to any constituent part.

As a whole, therefore, the Long-Term Plan appears to reduce human health risks from mosquito-borne disease, improve living conditions for many County residents and visitors (thereby also providing certain economic benefits), and provide the means for certain environmental benefits associated with natural resource enhancements through progressive water management implementation. There are some potential ecological impacts that have been identified, but these appear to be limited in scope and ephemeral – except for some associated with water management efforts, which appear to be avoidable if enough care is taken in implementation processes. There were no significant human health impacts associated with the Long-Term Plan.