VECTOR MANAGEMENT PLAN
LILAC HILLS RANCH
SAN DIEGO COUNTY, CALIFORNIA

SPECIFIC PLAN
GENERAL PLAN AMENDMENT
REZONE
EIR
TENTATIVE MAP (MASTER)
TENTATIVE MAP (PHASE 1 IMPLEMENTING TM)
MAJOR USE PERMIT

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PREPARED FOR:
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SAN DIEGO, CALIFORNIA 92123
KIVA PROJECT: 09-0112513
SP 3810-12-001
GPA 3800-12-001
REZ 3600-12-003
TM 5571 RPL3 and 5572 RPL3
MUP 3300-12-005

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May 2, 2013

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Glossary of Terms and Acronyms

BMP	best management practices
CPA	community plan amendment
HM	hydromodification
HOA	homeowners association
MUP	major use permit
SWMP	storm water management plan
VCMWD	Valley Center Municipal Water District
WRF	water reclamation facility

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Summary

Implementation of all procedures in this Vector Control Plan would avoid the potential for an increase in vector populations at the water reclamation facility (WRF), hydromodification (HM) basins, and wetland areas and would reduce potential public health and safety impacts to below a level of significance. The Vector Control Plan has been forwarded to the Department of Environmental Health Vector Surveillance and Control Program. This department is responsible for enforcing Health and Safety Code Section 2060-2067, which prohibits the breeding of mosquitoes. Furthermore, the management measures associated with the WRF would become conditions of approval of the Major Use Permit (MUP), ensuring that they would be implemented and enforced.

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1.0 Introduction

1.1 Purpose of the Report

Pursuant to the County's 2007 Report Format and Content Requirements – Vectors, this technical report serves to identify and evaluate best management practices (BMPs) that will be implemented on the project site to minimize vector breeding sources. Specifically, this report addresses the potential for vectors associated with the following project components:

- **Water reclamation facility (WRF)** - A WRF may be constructed on-site as an alternative in the latter phases of project build-out to off-site treatment of wastewater at the Valley Center Municipal Water District (VCMWD) Moosa Canyon treatment facility. One of four options (described in greater detail in the Wastewater Management Alternatives Report prepared for the project), could be the WRF's ability to accommodate build-out of 1,746 homes and could produce up to 298.9 acre-feet of recycled water per year.

- **Hydromodification (HM) detention basins** - The project would include the construction of on-site drainage facilities, including water quality treatment and three HM basins (one per existing drainage basin), to protect against sedimentation resulting from stormwater runoff. This report addresses the potential for standing water in the HM basins to generate vectors and provides BMP recommendations.

- **Existing and proposed wetlands** - The project site contains several north-south and northeast-southwest trending drainage courses as well as existing and proposed wetlands in the southern portion of the project site that could potentially contain stagnant water which could support mosquito breeding. This report addresses the vector generation potential resulting from the stagnant water and provides BMP recommendations.

1.2 Project Description

The project would consist of a mix of residential, commercial, and institutional uses, along with parks and open space. Specifically, the project would include: 90,000 square feet of commercial, office, and retail, including a 50-room Country Inn; 903 traditional single-family detached houses; 164 single-family attached houses, 211 residential units within the commercial mixed-use areas; and 468 age-restricted residential houses within a senior citizen's neighborhood; necessary facilities and amenities to serve the senior population (including a senior community center, a 200-bed group residential, and group care facility); civic facilities that may include a fire station, a school site (K-8), public and private neighborhood parks, a private recreational facility, and other recreational amenities. Also planned within the project site are a Recycling Facility (RF), a WRF, and other supporting infrastructure. The mixed-use, commercial, and civic uses, with parks, form a Town Center and two Neighborhood Centers, to which residents can walk for various social and commercial needs. Open space is proposed to retain some of the existing citrus and avocado groves and add additional agricultural open space along with 102.7 acres of sensitive biological/wetland habitat. Additional open space may be provided off-site to mitigate impacts to upland habitat and contribute to a proposed regional preserve system.

Regional access to Lilac Hills Ranch would be from West Lilac Road, a Mobility Element Road. From the project site, West Lilac Road leads directly west to the Walter F. Maxwell Memorial Bridge over Interstate 15 with access to the freeway both north and south and to State Route 76 (SR-76) heading west and east. Additional access to the County-maintained road system would be provided by a legal physical connection to West Lilac Road via Covey Lane (the on-site portion would be a private road and the off-site portion would be a public road) and gated access would provide emergency access south of the project site to Circle R Drive via Mountain Ridge Road. The Institutional site would have direct access to Mountain Ridge Road that would not be gated.

Overall, off-site road and intersection improvements include the following:

1. West Lilac Road along the northern boundary of the project site;
2. West Lilac Road from the project entrance west to the intersection of Highway 395;
3. Lilac Hills Ranch Road connection between Phases 3 and 4;
4. Covey Lane from the project to West Lilac Road;
5. Fire Apparatus Access from the project to Rodriquez Road; and
6. Mountain Ridge Road from the project to Circle R Drive.

Additional off-site improvements include the extension of the sewer line from Mountain Ridge Road from the project to Circle R Drive to Moosa Water Treatment Facility, and the signalization of traffic lights at Gopher Canyon Road and I-15 ramps; Highway 395 and Circle R; and Highway 395 and West Lilac Road.

The project application includes a Specific Plan (SP 12-001), a General Plan Amendment (GPA 12-001), a Rezone (REZ 12-003), a Master Tentative Map (TM 5571 RPL3), an implementing Tentative Map for Phase I (TM 5572 RPL3); two site plans (S12-017 for “D” Designator and “V” for setbacks and S12-018 for Parks), and a Major Use Permit (MUP) for the WRF (MUP 12-005). The project would be implemented in five phases. Additional discretionary permits may be needed to implement latter phases, as identified in the Specific Plan.

1.3 Environmental Setting

The project site is approximately 608 acres, comprised of 59 contiguous properties. The project site is generally characterized by relatively flat, marginal agricultural lands and gently rolling knolls, with steeper hillsides and ridges running north and south along the western edge. The primary land uses are agricultural related with the project site currently supporting several different types of crops, including citrus, row crops, and avocados. Agricultural lands cover the majority of the southeastern, east-central, and northern portions of the project site.

The project site is located in the unincorporated portion of San Diego County in the westernmost portion of the Valley Center Community Plan area and easternmost portion of the Bonsall Community Plan area, and adjacent to I-15 and Old Highway 395, as illustrated on Figures 1 and 2. From the northwest project corner, West Lilac Road serves as the northern boundary of the project site, while Rodriguez Road serves generally as the project boundary to the south and east. From the southwest project corner, the western boundary of the project runs along Shirey Road and extends to Standell Lane, which serves as the northwestern project boundary.

The project site is within Township 10 South, Range 3 West, Section 24, and Township 10 South, Range 2 West, Sections 19 and 30, on the U.S. Geological Survey (USGS) 7.5-minute Pala and Bonsall quadrangles (see Figure 2).

The topography in the project area is characterized by the east-west San Luis Rey River Valley along the SR-76 corridor and the north-south I-15 corridor. Both the San Luis Rey River floodplain and the I-15 corridor are flanked by rolling hills, which have historically been used for citrus and avocado groves, estate residences, and open space, with cattle grazing also occurring in the more rugged terrain. The topography within the project site is consistent with the inland foothills and valleys found in this part of San Diego County. The project site includes a series of rolling hills dissected by drainage courses (several of which are shown as blueline streams on the USGS map) and a valley bottom that drains primarily to the south and southwest. The project site has mostly gentle topography, with some steep slopes along the lower riparian areas. The San Luis Rey River valley is less than two miles northwest of the project site, and Moosa Canyon is a short distance southwest of the project site; Keys Canyon is a short distance to the northeast.

Project Location

FIGURE 1

Regional Location

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Map Source: USGS 7.5 minute topographic map series, Pala & Bonsall quadrangles, T10SR02W & T10SR03W

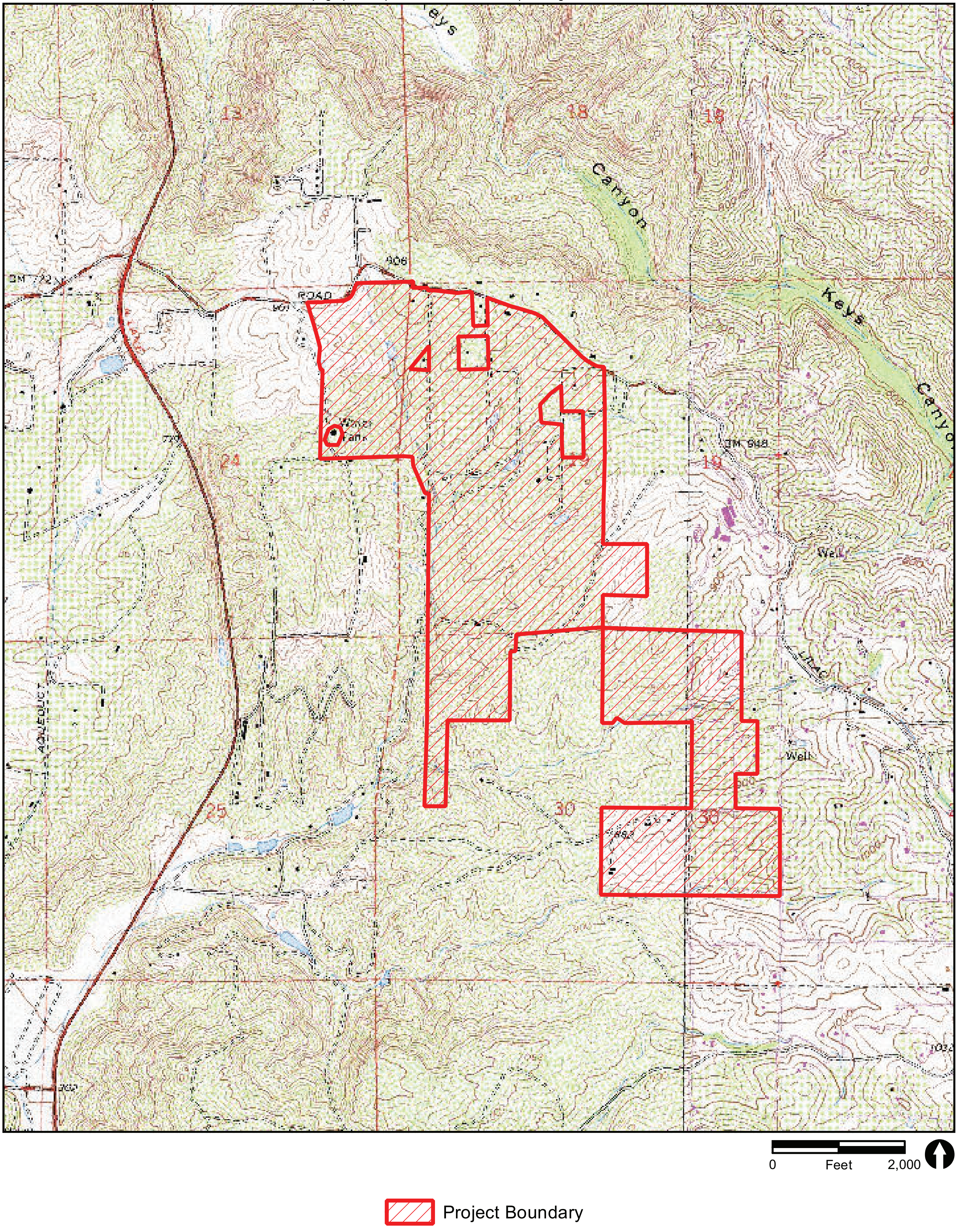

FIGURE 2

Project Location on USGS Map

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2.0 Vector Management

A vector is any insect, arthropod, rodent, or other animal of public health significance that can cause human discomfort, injury or is capable of harboring or transmitting disease. Disease causing microorganisms can be carried by a vector, such as a flea, tick, or mosquito that transfers the disease agent from its source in nature to a human host. In the County of San Diego, the most significant vector populations include mosquitoes, rodents, flies, and fleas. Adverse effects related to vectors are two-fold; vectors can cause significant public health risks due to the transmission of diseases to human and animal populations, and vectors can also create a nuisance for residents (County of San Diego 2007).

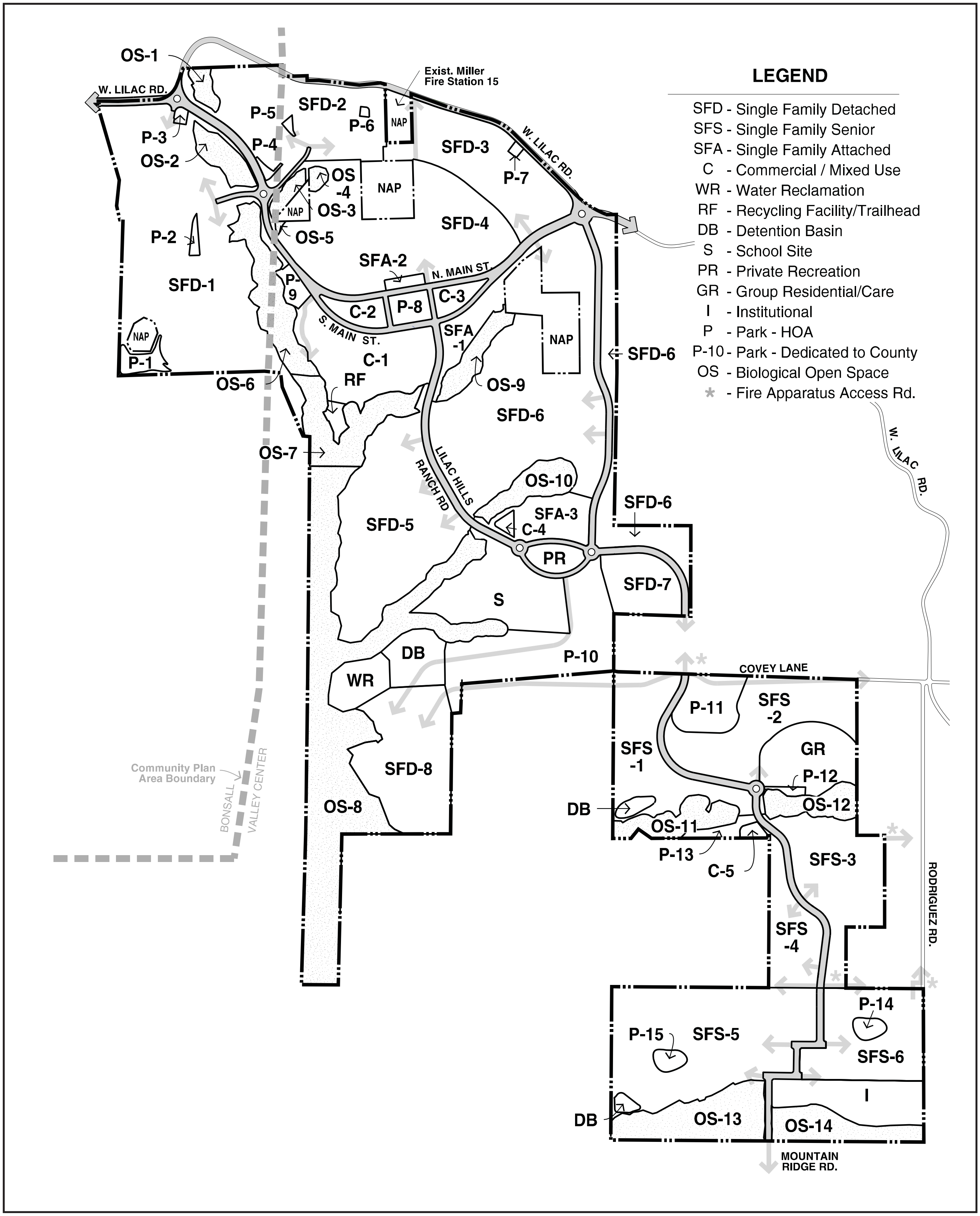
Vector sources occur where site conditions provide habitat suitable for breeding. These can include any source of standing water, including wetlands, unmaintained swimming pools, irrigation ponds, detention basins, percolation and infiltration basins, and other stormwater conveyance systems. Within a new development such as the project, a standard requirement is the incorporation of measures, or BMPs, to reduce stormwater flow rates, allow stormwater to infiltrate back into the ground, and to reduce constituent concentrations in runoff. However, BMPs used to manage runoff often provide aquatic habitats suitable for mosquitoes and other vector species as an unintended consequence of their implementation. Therefore, additional BMPs are recommended in order to reduce the health risks and nuisance factors associated with the vectors which can result from the stormwater conveyance/detention systems (County of San Diego 2007).

2.1 Management Practices

The project could have a significant public health and safety impact if the on-site WRF, HM basins, or wetlands significantly increase vector populations to a level that could harm the health of the public. These three components are discussed in more detail below.

2.1.1 Water Reclamation Facility

This section examines VCMWD selection of the WRF alternative that would include the construction of a full WRF that would treat all wastewater and solids generated by the project. This is identified as Alternative 4 in the Wastewater Management Alternatives Report (Dexter Wilson Engineering 2013). The WRF would be located on an approximately four-acre site within Phase 3 of the Specific Plan (Figure 3) that could be a vector source because of two primary components—the screening process and the disposal of excess recycled water (during wet weather). Within the permanent facility (upon build-out), wastewater would be pumped to the preliminary treatment building, Map Source: Vance and Associates, 2013



No Scale

FIGURE 3

Lilac Hills Ranch Specific Plan Map

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M:\JOBS4\6153\vmp\graphics\fig3.ai 04/23/13 which would also be located on-site. Post-treatment, the recycled water pump station would convey recycled water to the recycled water storage tank. The recycled water storage tank would have an estimated capacity of 8.3 million gallons, which is equal to 31 days of storage.

The estimated recycled water production would be 298.9 acre-feet per year. There would be approximately 208 acres of irrigated area within the project site, and the annual irrigation demand is estimated to be 820 acre-feet. Thus, there would be greater demand for irrigation than a supply of recycled water so that all of the recycled water generated by the project could be reused throughout the project site. Thus, standing water (a vector source) is not expected as part of normal operations. The second process associated with the WRF that could be a source for vectors is the initial screening process wherein the larger solids contained within the influent wastewater entering the WRF are physically screened and separated from the liquids via two stainless steel rotary screens (Dexter Wilson Engineering 2013). The screenings would drop into a bin located at grade. The WRF would implement measures to reduce the storage bin's attraction to flies, mosquitoes, and other vectors, including rodents. These measures are listed in Section 4.0 of this document. Other processes associated with wastewater treatment at this facility would be self-contained and would take place within an enclosed building.

2.1.2 Hydromodification Basins

Pursuant to the Stormwater Management Plan (SWMP) prepared by Landmark Consulting (March 2013), the project is required to implement BMPs in the form of HM basins to assure the control and maintenance of stormwater runoff resulting from the construction of new impervious surfaces and redirection of on-site drainage. Three HM basins are proposed on-site within Phases 3, 4, and 5 (see Figure 3). These basins could result in vector production through the pooling or ponding of water for time sufficient to permit the emergence of adult mosquitoes. In order to prevent such infestation, the primary method is to ensure that captured water is discharged within 72 hours which is too short for the mosquitos to complete their breeding cycle. Other methods typically include making the habitat less suitable for mosquito breeding such as vegetative management and/or chemical control, as necessary.

Additionally, all HM basins and other stormwater infrastructure would be designed to either (1) exclude vectors from enclosed sources of standing water; or (2) for rapid discharge, completely draining within 24 to 72 hours in order to prevent basins from becoming sources for vectors. As necessary, should standing water for longer than 72 hours be required, a third option is to make the breeding habitat less suitable. Mosquito larvicides may be applied within the HM basins to deter mosquito breeding. The U.S. Environmental Protection Agency reports that, when used properly, mosquito larvicides are of no concern for human health threats and do not pose risks to wildlife or the environment.

2.1.3 Wetlands

Wetlands are an additional potential source of vector breeding habitat. The project site contains several north-south and northeast-southwest trending drainage courses with running water (RECON 2013). Flowing and aerated water generally does not support mosquito breeding. However, there are both existing and proposed wetlands in the southern portion of the project site that could potentially contain stagnant water which could support mosquito breeding. Any habitat management plan prepared for the project should account for the need to manage vectors (County of San Diego 2007).

2.2 Education

Employees of the homeowners association (HOA) that are engaged in operations and maintenance of the WRF and other HOA-maintained areas, including the HM basins and wetland areas, should be trained on how to control vectors. The training sessions should be held once per year for HOA groundskeeper staff and every six months at minimum for employees responsible for the WRF. The training should cover all of the MUP conditions set forth to avoid and/or discourage vector breeding including:

- Chemical control and vegetation removal procedures for non-wetland standing water.
- Biological controls and vegetation maintenance for wetland waters.
- Cleaning and maintenance procedures for the wastewater treatment plant and reclamation facility.
- Inspection and maintenance procedures for the wastewater treatment plant and reclamation facility recycled water storage tank.
- Routine inspection and maintenance of HM basin BMPs.

3.0 Long-term Maintenance

The MUP for the on-site WRF would include conditions to ensure that the facility is properly maintained and regularly cleaned such that vectors are controlled. Implementation of those conditions would ensure that vectors generated by the major processes (as discussed in 2.1.1 above) do not become a public safety issue.

Easements put in place to protect on-site wetlands should recognize that entry by vector control professionals may be required to monitor and abate vectors within any stagnant water in order to protect the public health and safety.

4.0 Summary of Design Measures to Minimize Vectors

4.1 Water Reclamation Facility

The following project design considerations would be implemented to reduce attraction of flies, mosquitoes, other vectors, including rodents associated with the first phase of wastewater treatment - the screening process:

- Screened material shall be removed from the facility two to three times per week. The screening process would take place indoors, with screened material disposed of in a commercial dumpster that would be housed indoors until transported off-site. Routine removal of material would minimize fly attraction/propagation.

The recycled water storage tank would be designed to store approximately 8.3 million gallons of reclaimed water. As discussed above, during dry and normal years the project's recycled water demand (for irrigation/landscaping) would exceed the supply and all recycled water would be used on-site. However, during wet weather years, recycled water in excess of storage capacity would continue down to the Lower Moosa Canyon plant.

4.2 Hydromodification Basins

Implementation of the project would include the construction of stormwater BMPs (i.e., the proposed HM basins). The stormwater system and BMPs shall be designed to ensure that (1) vectors are excluded from enclosed sources of standing water; (2) any standing water is discharged within 72 hours; or (3) standing water is made less suitable for mosquito breeding. Pursuant to the County's requirements, the design measures listed below comprise numbers 1 and 2 (number 3 is discussed in Section 4.3 below) in order to ensure that impacts associated with vectors would be less than significant:

4.2.1 Rapid Discharge BMPs

4.2.1.1 Design Measures to Promote Rapid Discharge of Captured Water in BMPs

The most effective strategy to exclude vectors from stormwater management facilities is to design the system to ensure that water is discharged within 72 hours, thereby eliminating the potential vector breeding source. Design considerations for promoting rapid discharge of captured water in stormwater BMPs include:

- Select or design an alternative (or modified) stormwater device that provides adequate constituent removal and complete drainage within 72 hours. Examples include extended detention (dry detention) basins, vegetated swales, infiltration devices, and media filters. Special attention to groundwater depth is essential to determining water residence times.

- Incorporate features that prevent or reduce the possibility of clogged discharge orifices (e.g., debris screens). The use of weep holes is not recommended due to rapid clogging.

- Use the hydraulic grade line of the site to select a treatment BMP that allows water to flow by gravity through the structure. Pumps are not recommended because they are subject to failure and often require sumps that hold water.

- Design distribution piping and containment basins with adequate slopes to drain fully and prevent standing water. The design slope should take into consideration buildup of sediment between maintenance periods. Compaction during grading may also be needed to avoid slumping and settling. Avoid the use of loose riprap or concrete depressions that may hold standing water.

- Avoid barriers, diversions, or flow spreaders that may retain standing water.

4.2.1.2 Design Measures to Exclude Vectors from Enclosed Sources of Standing Water in Structural BMPs

Denying access to mosquitoes is necessary for stormwater treatment systems with sumps, vaults, or basins that incorporate features that hold permanent or semi-permanent standing water. Sumps, vaults, and basins may be located both above and below ground, but they are particularly common features of below ground proprietary and non-proprietary treatment devices that tie into existing storm sewers. Examples include above and below ground media filters, oil water separators, vortex separators, and vault-type devices. The following are design recommendations that apply to enclosed stormwater treatment systems that would hold permanent or semi-permanent standing water:

- Completely seal structures that retain water permanently or longer than 72 hours to prevent entry of adult mosquitoes. Adult female mosquitoes may penetrate openings as small as 1⁄16 inch (2 millimeters) to gain access to water for egg laying. Screening can exclude mosquitoes, but it is subject to damage and is not a method of choice.

- If using covers, they should be tight fitting with maximum allowable gaps or holes of less than 1⁄16 inch (2 millimeters) to exclude entry of adult mosquitoes. The use of gaskets can provide a much more effective barrier when used properly.

- If the sump, vault, or basin is sealed against mosquitoes, with the exception of the inlet and outlet, submerge the inlet and outlet completely to reduce the available surface area of water for mosquito egg-laying (female mosquitoes can fly through pipes). Alternatively, creative use of flapper or pinch valves, collapsible tubes (Mulligan and Schaefer 1982), and “brush curtains” might be effective for mosquito exclusion in certain designs.

- Design structures with the appropriate pumping, piping, valves, or other necessary equipment to allow for easy dewatering of the unit if necessary.

- Provide safe access. Devices with deep sumps or vaults and covered devices with heavy lids or grates are design examples that can prevent safe routine maintenance for vector control. All stormwater treatment devices should be easily and safely accessible without the need for special requirements (e.g., OSHA requirements for “confined space”). This allows vector control personnel to effectively monitor and, if necessary, abate vectors. If utilizing covers, the design should include spring-loaded or lightweight access hatches that can be opened easily for inspection.

4.3 Wetlands and Standing Water

For the on-site wetlands or any of the drainage facilities where rapid discharge or vector exclusion is not an option, the primary tool for vector management is to make the habitat less suitable for mosquito breeding through vegetation management, physical practices, and chemical control as appropriate. While some vegetation may be necessary to achieve water quality goals, excess vegetation can provide unnecessary breeding sources for mosquitoes. Ongoing monitoring and maintenance is an essential component in the implementation of a vegetation management strategy.

4.3.1 Non-wetlands

- Sodium hypochlorite shall be added to the recycled water should long-term storage be required, reducing attraction to flies and mosquitoes.

- Synthetic pesticides (e.g., methoprene and cyromzine), biochemical pesticides (i.e., Bti: Bacillus thuringiensis israeliensus), and/or biological controls (e.g., mosquito fish) would be applied to standing water (if applicable) to control attraction/propagation of mosquitoes;

- Chlorine addition to the treated water would be increased for long-term storage, reducing attraction to flies and mosquitoes; and

- The HM basins would be disked annually in the fall to remove vegetation within and around the perimeter of the pond.

4.3.2 Wetlands

- Support mosquito predators and biological control, where feasible. Note that mosquito fish are not allowed in any jurisdictional wetlands or in BMPs that flow to jurisdictional wetlands.

- Stormwater ponds and constructed wetlands should maintain water quality sufficient to support surface-feeding fish which feed on immature mosquitoes and can aid significantly in mosquito control.

- Large predatory fish (e.g., perch and bass) can negatively impact or eradicate mosquitofish populations. In this case, careful vegetation management remains the only non-chemical mosquito control measure.

- Vegetation Management - removal of emergent vegetation is necessary as it provides mosquito larvae refuge from predators, protection from surface disturbances, and increased nutrient availability. Also, vegetation overgrowth can interfere with monitoring and control efforts. The following are suggested design measures and management techniques to manage vegetation ponds, constructed wetlands, and unenclosed BMPs for mosquito control:

    - Perform routine maintenance to reduce emergent plant densities to facilitate the ability of mosquito predators (i.e., fish) to move throughout vegetated areas.

    - Remove wet basin emergent vegetation semi-annually (early spring and fall) or as recommended by San Diego County Vector Control Program.

    - No more than 50 percent of the surface area of any standing water should have emergent vegetation, e.g., cattails, sedges, etc.

    - Eliminate floating vegetation conducive to mosquito production (i.e., water hyacinth [*Eichhornia* spp.], duckweed [*Lemna* and *Spirodela* spp.], and filamentous algal mats).

    - Control emergent vegetation by pulling, either mechanically or by hand; or frequent clear cutting. Pulling the vegetation is recommended rather than cutting, as it tends to grow back more quickly and at greater density after cutting.

    - An alternative to semi-annual clean-outs is to remove swaths or patches of vegetation every three months such that no patch grows so dense as to exclude mosquito-eating fish. No stand of cattails should be any larger than 20 feet wide by 10 feet deep (200 square feet). All cattail stands need to be separated by 10 feet of non-vegetative water.

Any proposed vegetation removal in ponds, constructed wetlands, and stormwater management facilities must not conflict with existing regulation for wetland protections, site-specific requirements for habitat protection, or other requirement related to biological resource protection. Potential impacts associated with ongoing maintenance for vector control must be evaluated as part of the whole of the project under CEQA. Wet basins should be constructed with a 2:1 slope and maintain a minimum four-foot depth to contain vegetation within the prescribed zone. Incorporate periodic silt removal into the maintenance plan to maintain adequate water depth. Wet basin construction should be designed to exclude the entry of unauthorized persons. Where appropriate, barriers such as, fences or walls may be included.

Open bodies of water often attract the attention of people who in turn, release game fish, which predate upon mosquito fish. Provide safe and adequate perimeter access for ongoing maintenance activities. Access around the perimeter of wet basins is needed to provide access for vector management activities. Mosquito larvicides are applied with handheld equipment at small sites and with backpack or truck-mounted high-pressure sprayers at large sites. The effective swath width of most backpack or truck-mounted larvicide sprayers is approximately 20 feet (6 meters) on a windless day.

Because of these equipment limitations, all-weather road access (with provisions for turning a full size work vehicle) should be provided along at least one side of large aboveground structures that are less than 25 feet (7.5 meters) wide. Structures that have shoreline-to-shoreline distances in excess of 25 feet should have a perimeter road for access to all sides.

Where a basin is constructed with steep sides, provide a safety shelf or sloping ramp as a safety measure to ensure vector maintenance personnel or other persons can get out if they accidentally fall in.

5.0 References

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6.0 List of Persons and Organizations Contacted

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7.0 Signatures

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