APPENDIX C

BIOLOGICAL ASSESSMENT AND BIOLOGICAL OPINION

Biological Assessment
of the Effects on Threatened And Endangered Species of the Commonwealth of the Northern Mariana Island's Green Energy School Project

Northern Mariana Islands

U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Golden Field Office

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Biological Assessment
of the Effects on Threatened And Endangered Species of the Commonwealth of the Northern Mariana Islands Green Energy Project

Northern Mariana Islands

December 2011

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1. INTRODUCTION

1.1 Description of DOE's Proposed Action

The U.S. Department of Energy (DOE) has awarded Federal funding to the Commonwealth of the Northern Mariana Islands (CNMI) through the State Energy Program (SEP) under the *America Recovery and Reinvestment Act of 2009.* One goal of the SEP is to develop renewable energy sources to improve reliability of energy supply and reduce energy costs. CNMI will use a portion of their SEP grant to fund its "Green Energy School Project."

1.2 Commonwealth of the Northern Mariana Island's Proposed Action

The CNMI Green Energy School Project has and would continue to develop renewable energy as a reliable source of power. Specifically, the projects will provide energy to power CNMI schools. Overall, six (20 kW) and ten (2.4 kW) wind turbines would be erected at the public schools on the islands of Saipan and Tinian.

The proposed wind turbines consist of the following types: Jacobs 20kW wind turbines, which are monopole-mounted on 80-foot towers with a top mounted 31-foot rotor diameter turbine (Figure 1). These turbines are 95.5 feet tall at full blade extent and have a rotor swept area of 755 square feet. CNMI would install six of the Jacobs wind turbines in an open grass field between the Saipan Southern High School and Koblerville Elementary School. The wind turbines at the other locations are Skystream 2.4 kW turbines. These turbines are also monopole-mounted, with a tower height of 33 feet and a rotor diameter of 12 feet (Figure 2). These turbines are 39 feet tall at full blade extent and have a rotor swept area of 115 square feet. Both the 20 kW and 2.4 kW wind turbines are significantly smaller than turbines at commercial-scale wind farms where tower heights range from 150 to 330 feet with rotor diameters of up to 330 feet. In addition, no lighting will be installed on the towers unless required for local aviation safety.

1.3 Roles and Responsibilities

The DOE role in the CNMI Green Energy School Project is as a funding agency. The Green Energy School Project is administered by the CNMI Department of Education and Public School System (PSS). The CNMI Division of Fisheries and Wildlife (DFW) manages and provides law enforcement for fish and wildlife resources in the Commonwealth. As a territory of the United States, threatened and endangered species in the CNMI are managed under the authority of the Endangered Species Act through the U.S. Fish and Wildlife Service (FWS).

Because of the Federal funding provided to PSS by DOE through the SEP, the evaluation of potential impacts on threatened and endangered species is a Section 7 consultation between DOE the FWS. However, because of DOE's limited role as a funding agency, CNMI agencies and organizations will assume responsibility for the long-term implementation of the Green Energy School Project and will actively participate in the mitigation of potential impacts to threatened and endangered species that will be developed through this Section 7 consultation process. Although this Biological Assessment generally recognizes these roles and responsibilities, defining specific roles and responsibilities will continue throughout this Section 7 process through discussions and agreements between FWS, DOE and CNMI.

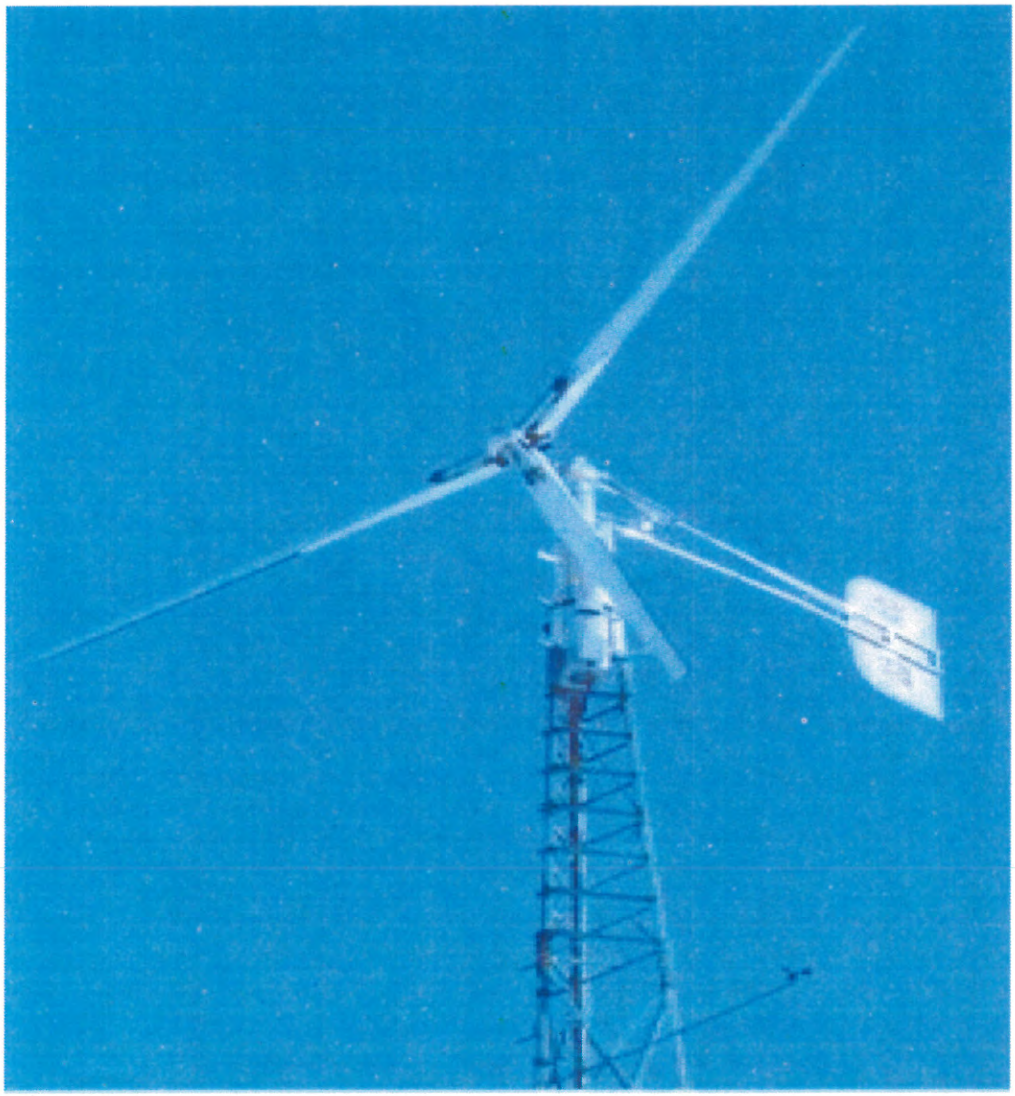

Figure 1. Picture of a Jacobs 20 kW wind turbine. ****Note that the 20 kW turbines at Southern Saipan High School are being installed on monopole towers and not lattice towers as illustrated above.**

Figure 2. Skystream 2.4 kW wind turbine.

1.4 Informal Consultation for the Proposed Action

On May 26, 2011, DOE sent the U.S. Fish and Wildlife Service (FWS) a letter requesting a list of any threatened, endangered, proposed species, and designated or proposed critical habitat that may occur within or near the respective project sites (Rossiter 2011). The Service responded on June 1, 2011 with the following list of species that may be found on or near the proposed projects sites, or may be affected by the operation of the wind turbines (Mehrhoff 2011):

Nightingale reed-warbler (*Acrocephalus luscinia*), endangered
Mariana swiftlet (*Aerodramus bartschi*), endangered
Mariana moorhen (*Gallinula chloropus guami*), endangered
Micronesian megapode (*Megapodius laperouse*), endangered
Mariana fruit bat (*Pteropus mariannus mariannus*), threatened.

In August 2011, DOE send FWS a draft BA for preliminary review and comments as the basis for discussion of the individual project sites and potential impact on the listed species. FWS provided initial comments in an e-mail on September 21, 2011 (Rachel Rounds, e-mail to Peter Ashley [DOE], September 21, 2011). A conference call was held on September 23, 2011 between FWS and DOE to discuss FWS comments and project locations and actions. Topics discussed included treating individual projects sites separately because actions could be implemented independently from each other and potential impacts on listed species could be different at each location. This could possibly allow some locations to be developed while consultation is completed for others. FWS stated that a "No Effect" finding could be reasonable for Garapan and both sites on Tinian pending further internal discussion with FWS staff. FWS stated that there were no real concerns for the Mariana fruit bat or the Micronesian megapode but that the nightingale reed-warbler, Mariana swiftlet, and Mariana moorhen were of primary concern. There is known nightingale reed-warbler territory near the project site at the Southern Saipan High School. The development of a mortality monitoring plan was specifically requested by FWS.

After internal staff discussion following the September 23rd conference call, FWS responded to DOE in an e-mail on September 27, 2011 and agreed to segregate the Garapan Elementary School and two Tinian project sites (Rachel Rounds, e-mail to Peter Ashley [DOE], September 27, 2011). The projects at these sites were determined to have "No Effect" and these projects were allowed to proceed. FWS stated that a "Not Likely To Adversely Affect" finding would be appropriate at sites with the small wind turbines pending surveys around the schools for reed-warblers. However, FWS preferred that mortality monitoring be performed at all project sites except the "No Effect" sites and that a detailed monitoring plan be included in the Biological Assessment. FWS stated that for a 20 year project life cycle, a "May Adversely Affect" finding was appropriate for the larger wind turbines planned for the Southern Saipan High School. Several options for mitigation to off-set potential take were discussed.

On October 6, 2011, FWS provided DOE with the results of the nightingale reed-warbler surveys conducted at Cha Cha Oceanview Junior High School, Kagman High School, and Gregorio T. Camacho Elementary School (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). Surveys were conducted by the CNMI Department of Fisheries and Wildlife. Survey results are reported in the Biological Assessment.

1.5 Conclusions of No Effect

DOE concluded that the proposed actions would have no effect on any of the listed species at the Garapan Elementary School on Saipan, Tinian Elementary School, or Tinian Junior/Senior High School. For the administrative record, the rationale used to reach these conclusions was that the small wind turbines in Garapan are located in residential/commercial areas with no suitable habitat for any of the listed species. The listed species are either absent from the Island of Tinian or occur in extremely low numbers and are distant from the project locations (Appendix 1). In addition, DOE concluded no effect on the Micronesian megapode (*Megapodius laperouse*) and Mariana fruit bat (*Pteropus mariannus mariannus*) at Saipan Southern High School, Kagman High School, Cha Cha Oceanview Junior High School, and Gregorio T. Camacho Elementary School because of extremely low population sizes, project locations in relation to potential habitat or occupied habitat, and life history characteristics that made potential take unlikely.

Because there will be no effect at the projects on Tinian, at the Garapan Elementary School on Saipan, and no effect on the Micronesian megapode or Mariana fruit bat, these project locations or species will not be discussed in further detail in this Biological Assessment.

1.6 Objective of the Biological Assessment

The islands of the Mariana Archipelago are home to a number of animal species classified as either threatened or endangered under the Endangered Species Act. These species include the endangered nightingale reed-warbler, Mariana swiftlet, Mariana moorhen, Micronesian megapode, and threatened Mariana fruit bat (Mehrhoff 2011). These species have a long history of multiple impacts and threats that trace back to the human occupation and settlement of these islands. Some of the primary impacts and threats include alteration of native habitat by human activities; habitat degradation by non-native animals such as goats, cattle, and pigs; predation by non-native rats, feral cats, cockroaches, and brown treesnakes; and illegal human hunting. In addition, natural disasters such as typhoons and volcanic eruptions have had periodic negative impacts on these species.

DOE has prepared this biological assessment to evaluate whether the funding and subsequent installation and operation of small-scale wind turbines at individual project locations could potentially adversely affect listed species or critical habitat pursuant to the *Endangered Species Act of 1973*, as amended (16 U.S.C. 1531 *et seq.* ESA) and its implementing regulations (50 C.F.R. Part 402). For the purposes of evaluation, DOE has considered each location as an independent project because each site has different proposed actions, different surrounding habitats, and could be implemented independently of each other.

2. DESCIPTION OF PROPOSED PROJECTS AND ACTION AREAS

The locations of the wind turbines for the Green Energy Project discussed in this Biological Assessment are for those proposed on Saipan in the Mariana Archipelago. No native habitat will be disturbed. A small area will be disturbed during the installation of the foundations. Wind turbines will be installed in open maintained grass fields or existing disturbed areas on school property. The wind turbines will be connected to the electrical system for the respective schools and local electrical grid as appropriate. The operational lifespan of the wind turbines is estimated to be 20 years. The following sections describe the individual proposed projects.

2.1 Saipan Southern High School and Koblerville Elementary School

The proposed project at the Saipan Southern High School and Koblerville Elementary School consist of six 20 kW Jacob turbines and one 2.4 kW Skystream turbine. The proposed location of these wind turbines is in a maintained grass field near the boundary between the high school and elementary school (Figure 3).

2.2 Kagman High School

The proposed project at Kagman High School consists of one 2.4 kW Skystream wind turbine. The Kagman region of Saipan lies on the east coast of the island. The proposed location of the wind turbine is on the north side of the school property on an existing disturbed area or small grassy area (Figure 4).

2.3 Cha Cha Oceanview Junior High School

The proposed project at Cha Cha Oceanview Junior High School consists of one 2.4 kW Skystream wind turbine. The junior high school is located in the Kagman region of Saipan and is about 0.25 miles southwest of Kagman High School (Figure 4). The proposed location of the wind turbine is on the south side of the school property in a grass field.

2.4 Gregorio T. Camacho Elementary School

The proposed project at Gregorio T. Camacho Elementary School consists of a single 2.4 kW Skystream wind turbine. Gregorio T. Camacho Elementary School is located along the northwest coast of Saipan in the small community of San Roque (Figure 5). The proposed location of the wind turbine is in a large open field (~220 x 220 feet) between the school and the ocean.

Figure 3. Approximate location of the six 20 kilowatt wind turbines at the Saipan Southern High School and the one 2.4 kilowatt wind turbine at Koblerville Elementary School on the island of Saipan The red lines indicate approximate location of the wind turbines.

Figure 4. The location of the one 2.4 kilowatt wind turbine at Kagman High School and at Cha Cha Oceanview Junior High School on the island of Saipan. The Kagman Wildlife Conservation Area is located on the right side of the figure. The location of the wind turbines is indicated by the red line.

Figure 5. Location of the proposed 2.4 kilowatt wind turbine at Gregorio T. Camacho Elementary School in the village of San Roque on the northwest coast of Saipan. The red line indicates the approximate location of the wind turbine.

3. STATUS, HABITAT, AND BEHAVIOR OF LISTED SPECIES

3.1 Mariana Moorhen

The common moorhen (*Gallinula chloropus*) is distributed world-wide but the Mariana subspecies is endemic to the Mariana Archipelago. The Mariana moorhen is a species closely associated with emergent vegetation of freshwater marshes and ponds, including both man-made and natural wetlands (USFWS 1992, Takano and Haig 2004a, b). One of the key characteristics of moorhen habitat is a combination of deep marshes with emergent vegetation with equal areas of cover and open water. Recent research demonstrates that the Mariana moorhen will use small ponds; even man-made ponds provided adequate vegetation cover is available (Takano and Haig 2004a). Daily and intra-seasonal (dry vs. wet season) activity is spent primarily in one or two wetland habitats. Takano and Haig (2004a) estimated that moorhens on Saipan visited about 1.2 wetland sites per individual. During the dry season (January – May), moorhens typically remain at one wetland and use more permanent wetlands. As the wet season (July – November) progresses, moorhens tend to disperse to seasonal wetlands. In addition to a general movement among wetlands between the dry and wet seasons, radio-telemetry studies have also confirmed inter-island movements of moorhens between Tinian and Saipan at the onset of the wet season (Takano and Haig 2004a). Therefore, Mariana moorhens are capable of sustained long distance flight. However, moorhens spend most of their time among emergent wetland habitat and do not engage in widespread daily flight. Average daily distance traveled by three female and one male moorhen during the dry season was 317 meters (range 76 – 895 meters) (Takano and Haig 2004a).

On Saipan, moorhens were observed on 41 of 56 wetlands surveyed including wetlands on golf courses and an abandoned 0.5 hectare oil tank inundated by rainwater (Takano and Haig 2004b). The wetlands occur along the coastal plain surrounding the central highlands. However, more wetlands occur on the western side of the island. The proposed wind turbine site at Kolberville, located between the Saipan Southern High School and Koblervile Elementary School, is 1.5 – 2.5 miles south of Lake Susupe and the adjacent wetlands. The Kolberville site is located in an open grass field on school property near a residential area.

A single small wind turbine is proposed for the Gregorio T. Camacho Elementary along the northwestern coast of Saipan. The Camacho Elementary School is located in San Roque approximately 5 miles northeast of Garapan. Between Garapan and San Roque, several wetland sites and man-made structures (abandoned oil tank) provide habitat for the Mariana moorhen.

Two small wind turbines also are proposed on the east side of the island in Kagman on the property of the Cha Cha Oceanview Junior High School and at the Kagman High School. Several small ponds and wetlands, including golf course man-made ponds, are scattered along the eastern coastal plain. The Lao Lao Bay Golf Course ponds are 0.25 – 0.5 miles from the Cha Cha Oceanview Junior High School and 0.5 – 0.75 miles from Kagman High School.

On Tinian, the primary wetland habitat for moorhens is Lake Hagoi on the northern end of the island and it is approximately 8 miles south of the Lake Susupe region on Saipan. Takano and Haig (2004a) have documented movement of moorhens from Saipan to Lake Hagoi on Tinian and suggested that the Tinian-Saipan moorhens be considered one population.

3.2 Mariana Swiftlet

The Mariana Swiftlet (*Aerodramus bartschi*) is a highly colonial species whose life history is closely tied to natural limestone caves that are used for nesting and roosting. Swiftlets in the genus *Aerodramus* are unique in that they use echolocation similar to bats to navigate in the darkness of the caves. Unlike bats, the Swiftlet does not use echolocation to detect prey and forages for aerial insects during the daylight. Most birds in a colony leave their cave at dawn to forage for insects over ridge crests, forests, and open grassy fields.

Cruz et al. (2008) provides some of the most recent information on the abundance and distribution of the Mariana Swiftlet in the Northern Mariana Islands. The Mariana Swiftlet occurs on Guam, Aguiguan, and Saipan and is locally extirpated on Rota and Tinian. On the island of Tinian, there is evidence of prehistoric presence but recent mapping of 88 caves revealed no evidence of their presence (Cruz et al. 2008). On the island of Saipan, the Mariana Swiftlet is considered locally common and in recent years have increased to their highest abundance (>5,000 birds) since 1985. There are 10 known caves on Saipan that Swiflets use for roosting and nesting. These caves are located in the central uplands surrounding Mount Tapochau. The proposed wind turbines in Kagman are the closest to any of the caves (~1.75 miles to Tin Can Cave) and at Garapan Elementary (~ 2 miles to Doc's and Takpochao Caves). The larger wind turbines proposed at Southern Saipan High School are ~4.5 miles to the nearest cave (Hourglass). Mariana Swiftlets are strong fliers and aerial insect foragers. However, little to no information has been reported on how far and wide-ranging Swiftlets' foraging activities are in relation to the caves they use for roosting and nesting. Conservation measures have largely focused on protecting the limestone caves that are a critical part of their habitat. Protective measures have included limiting human disturbance, public education, and trapping non-native cockroaches in the caves. Cockroaches consume nesting material and the glue-like salvia that secures Swiflet nests to cave ceilings causing nests to fall, destroying nests and nest occupants. Cockroach control programs have been credited with reducing Swiflet nest damage, reducing mortality, and improving total reproductive output (Cruz et al. 2008).

3.3 Nightingale Reed-Warbler

The Nightingale reed-warbler (*Acrocephalus luscinia*) is a medium-sized passerine species with a large, long bill. The species was long considered to inhabit primarily wetland habitats, but it also occupies open, secondary forest habitats (USFWS 1998, Camp et al. 2009). Historically, the nightingale reed-warbler was known in six islands in the Mariana archipelago: Guam, Tinian, Aguijan, Saipan, Alamagan, and Pagan. It has been extirpated from most of its range including Guam, Tinian, and Pagan (USFWS 1998). A few sightings have been made on Aguijan but the only sizeable populations occur on Saipan and Alamagan.

On Saipan, the nightingale reed-warbler is distributed island wide and occurs in a variety of habitats such as wetlands, secondary forests and Tangantangan thickets. The species also occurs in residential areas, golf courses, and limestone forest but those are considered less suitable habitats (Camp et al., 2009). Camp et al. (2009) performed an island-wide avifauna survey in 2007 on Saipan with emphasis on the nightingale reed-warbler and evaluated the trends from previous surveys in 1982 and 1996. Although abundance trends declined in all habitats, the declines were most notable in the less suitable residential, golf course, and limestone forest

habitats. This was attributed to the four-fold increase in the human population on Saipan since 1982 and the increased conversion of land cover from forest to anthropogenic-dominated habitats. Density estimates in 2007 were 22.5 nightingale reed-warblers/km^2 with a population estimate of 2,742 (Camp et al. 2009) opposed to density estimates of 57.7 and 40.2 nightingale reed-warblers/km^2 in 1982 and 1997, respectively.

Nightingale reed-warblers are usually found in thick vegetation. They primarily eat insects and glean other invertebrates from leaves but will consume lizards and geckos. The species is territorial and occupies territories of approximately 1 ha. Individuals exhibit site fidelity from year to year but will leave their territories for short time periods.

4. ASSESSMENT OF POTENTAL IMPACTS

The environment on Saipan has been extensively modified and impacted by human activities and natural events (typhoons and volcanic eruptions). The Mariana Islands have a long history of human occupation that has resulted in physical changes to the vegetation. Very little native forest remains. Secondary forest exists where succession has occurred following removal of human activities. During various time periods and occupation by different governments, land has been cleared for different types of agricultural activities such as sugar cane, coconut groves, and grazing by introduced species such as pigs, goats, deer, and cattle. Many of these introduced species established feral populations that also contributed to the degradation of the vegetation on the island. World War II (WWII) resulted in the destruction of much of the native vegetation on Saipan. Following WWII, the U.S. Navy seeded large areas of Saipan with tangantangan (*Leucaena leucocephala*), an introduced tree species, to prevent erosion in areas formerly used by the Japanese to grow sugar cane or in areas cleared by war-time activities (Berger et al. 2005). This resulted in the establishment of pure stands of tangantangan forest. With increasing economic development following WWII, human populations greatly increased and have resulted in development of residential communities, commercial industry, agricultural forests/crops, resorts, and golf courses. Populations of native wildlife species were impacted with changes in vegetation. Introductions of non-native plant and animal species (e.g., rats) have also impacted native species, but none more so than the brown treesnake on the island of Guam. Extreme measures are being undertaken to prevent the establishment of the brown treesnake on the Northern Mariana Islands.

Because the wind turbines would be installed in developed areas (i.e., maintained grass fields or disturbed areas) and are adjacent to school buildings, the only impact considered is that of potential collision with turbine blades. Also factored into the analysis was the size of the wind turbines. The proposed wind turbines are extremely small in comparison to typical commercial-scale wind turbines.

4.1 Saipan Southern High School and Koblerville Elementary School

The area immediately surrounding the Saipan Southern High School and Koblerville Elementary School is primarily residential to the north and west, golf resort to the south, and mixed forest/shrubland and agricultural land to the east (Figure 3). The Saipan International Airport lies approximately one mile to the east.

Mariana Moorhen - The larger turbines proposed at the Kolberville site are sufficiently removed (1.5-2.5 miles) from Mariana moorhen habitat to minimize potential collisions with moorhens during seasonal dispersal movements. However, the Mariana moorhen disperses past the Saipan Southern High School and the Koblerville Elementary School area to Tinian during the wet season. Exact dispersal routes and flight heights are not known. Because of the uncertainty about dispersal flight routes, DOE concludes that installation and operation of the wind turbines over a 20 year period at the Saipan Southern High School and the Koblerville Elementary School **may affect but would not likely adversely affect** the Mariana moorhen.

Mariana Swiftlet - The ecology of the Mariana Swiftlet is closely tied to the limestone caves that it uses for nesting and night roosting. The Mariana Swiftlet is a strong flier and aerial forager for insects. Therefore, wind turbine blades pose a potential risk. Swiftlets forage during the day when turbines are more visible. The larger 20 kW turbines at Southern High School are located approximately 4 - 5 miles to the nearest cave (Hourglass) that Swiftlets are known to use. However, because of project life-span of 20 years and the aerial foraging habits of the Swiftlet, DOE concludes that the turbines at the Saipan Southern High School and the Koblerville Elementary School **may adversely affect** the Mariana Swiftlet.

Nightingale Reed-Warbler - Nightingale reed-warblers occupy a variety of habitats including wetlands and open, secondary forests and are usually found in thick vegetation. They primarily eat insects and glean other invertebrates from leaves but will consume lizards and geckos. Although the reed-warbler is capable of strong flight, flight is generally more associated with movement within and amongst territories and dispersal. Unlike the Mariana Swiftlet, the nightingale reed-warbler does not engage in wide-ranging flight on a daily basis.

The proposed wind turbines in Koblerville would be installed in an open field between the two schools. There is known reed-warbler territory/habitat near the school (Rachel Rounds, personal communication, September 23, 2011). Considering the 20 year life-span of the project, presence of reed-warblers nearby, and six larger 20 kW wind turbines, there is potential for take. Therefore, DOE concludes that the proposed project at Saipan Southern High School and the Koblerville Elementary School **may adversely affect** the nightingale reed-warbler.

DOE concludes that because of the small size, location, and life history characteristics of the respective species, the wind turbines at the Saipan Southern High School and Koblerville Elementary School **may affect but would not likely adversely affect** the Mariana moorhen, and **may adversely affect** the Mariana swiftlet and nightingale reed-warbler (Table 1).

4.2 Kagman High School

The immediate area surrounding Kagman high school is primarily residential with small areas of forest/shrub land (Figure 4). Approximately 0.25 southeast of the high school is the Kagman Wildlife Conservation Area. A large golf course and resort complex is located about 0.5 miles to the southwest.

Mariana Moorhen - Several small ponds and wetlands, including man-made ponds at the golf course, are scattered along the eastern coastal plain. However, none are immediately adjacent to the high school. Considering the moorhen's affinity for wetland habitat and to remain in a

relatively small area, along with the very small size of the proposed wind turbine, DOE concludes that the turbine at Kagman High School **may affect but would not likely adversely affect** the Mariana moorhen.

Mariana Swiftlet - The ecology of the Mariana Swiflet is closely tied to the limestone caves that it uses for nesting and night roosting. The Mariana Swiftlet is a strong flier and aerial forager for insects. Therefore, wind turbine blades pose a potential risk. Mariana Swiftlets forage during the day when turbines are more visible. The high school is approximately 2 miles from the nearest cavesused for roosting (Tin Can, Da'ok, and Celis). The wind turbine proposed for installation at Kagman High School is a small Skystream 2.4 kW with a blade diameter of only 12 feet. Because of the wide-ranging aerial foraging habits of the Swiftlet, DOE concludes that the turbine at Kagman High School **may affect but would not likely adverse affect** the Mariana Swiftlet.

Nightingale Reed-Warbler - Nightingale reed-warblers occupy a variety of habitats including wetlands but also open, secondary forests and are usually found in thick vegetation. They primarily eat insects and glean other invertebrates from leaves but will consume lizards and geckos. Although the reed-warbler is capable of strong flight, flight is generally more associated with movement within and amongst territories and dispersal. Unlike the Mariana Swiftlet, the nightingale reed-warbler does not engage in wide-ranging flight on a daily basis.

The proposed 2.4 kW wind turbine at Kagman High School would be installed in a small open field or existing disturbed area adjacent to the school. This area is composed largely of residential area with vegetation composed of tangantangan, scarlet gourd, sword grass, and monkey pod (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). The CNMI DFW conducted call-back surveys in September 2011 with no detections of reed-warblers. However, the DFW concluded that there is a possibility of nightingale reed-warblers in the area in the next 20 years (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). Considering the relatively small size of the proposed single wind turbine and the surrounding habitat, DOE concludes that the proposed project at Kagman High School **may affect but would not likely adversely affect** the nightingale reed-warbler.

DOE concludes that this single wind turbine, because of its small size, location, and life history characteristics of the respective species, **may affect but would not likely adversely affect** the Mariana moorhen, Mariana swiftlet, and nightingale reed-warbler (Table 1).

4.3 Cha Cha Oceanview Junior High School

The immediate area surrounding the junior high school is primarily residential and small areas of forest/shrub land (Figure 4). The Kagman Wildlife Conservation Area is about 0.25 miles east of the school. A large golf course and resort complex is located about 0.25 miles to the southwest.

Mariana Moorhen - Several small ponds and wetlands, including man-made ponds at the golf course, are scattered along the eastern coastal plain. However, none are immediately adjacent to the junior high school. Considering the moorhen's affinity for wetland habitat and to remain in a relatively small area, and the very small turbine, DOE concludes that the turbine at Cha Cha

Oceanview Junior High School **may affect but would not likely adversely affect** the Mariana moorhen.

Mariana Swiftlet - The ecology of the Mariana Swiflet is closely tied to the limestone caves that it uses for nesting and night roosting. The Mariana Swiftlet is a strong flier and aerial forager for insects. Therefore, wind turbine blades pose a potential risk. However, Mariana Swiftlets forage during the day when turbines are more visible. The junior high school is approximately 1.75 miles from the nearest caves (Tin Can, Da'ok, and Celis) used for roosting. However the wind turbine proposed for installation at Cha Cha Oceanview Junior High School is a small Skystream 2.4 kW with a blade diameter of only 12 feet. DOE concludes that the turbine at Cha Cha Oceanview Junior High School **may affect but would not likely adverse affect** the Mariana Swiftlet.

Nightingale Reed-Warbler - Nightingale reed-warblers occupy a variety of habitats including wetlands but also open, secondary forests and are usually found in thick vegetation. They primarily eat insects and glean other invertebrates from leaves but will consume lizards and geckos. Although the reed-warbler is capable of strong flight, flight is generally more associated with movement within and amongst territories and dispersal. Unlike the Mariana Swiftlet, the nightingale reed-warbler does not engage in wide-ranging flight on a daily basis.

The proposed single 2.4 kW wind turbine at the Junior High School would be installed in a small open field adjacent to the school. This surrounding area is composed largely of residential area and contains several large open fields (e.g., ball fields). The CNMI DFW conducted call-back surveys in September 2011 with no detections of reed-warblers (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). The surrounding vegetation is composed of tangantangan, scarlet gourd, sword grass, and monkey pod. However, the DFW concluded that there is a possibility of nightingale reed-warblers in the area in the next 20 years (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). Considering the relatively small size of the proposed single wind turbine and the surrounding habitat, DOE concludes that the proposed project at the Cha Cha Oceanview Junior High School **may affect but would not likely adversely affect** the nightingale reed-warbler.

DOE concludes that the proposed single wind turbine at Oceanview Junior High School, because of its small size, location, and life history characteristics of the respective species, **may affect but would not likely affect** the Mariana moorhen, Mariana swiftlet, and nightingale reed-warbler (Table 1).

4.4 Gregorio T. Camacho Elementary School

The elementary school is surrounded by a small commercial/residential area to the southeast, ocean to the north, and an area of developed wood/shrub land to the southwest (Figure 5). The proposed single 2.4 kW wind turbine would be in a large open field (~220 x 220 feet) adjacent to the school.

Mariana Moorhen - Several small ponds and wetlands occur along the west coastal plain between Garapan and San Roque. These ponds and wetlands are 1+ miles from the project site at the elementary school. Because of the small size of the 2.4 kW wind turbine and affinity of

the moorhen for remaining near its wetland habitat, collisions with the turbines are highly unlikely. Therefore, DOE concludes that the project **may affect but would not likely adversely affect** the Mariana moorhen.

Mariana Swiftlet - The ecology of the Mariana swiflet is closely tied to the limestone caves that it uses for nesting and night roosting. The Mariana Swiftlet is a strong flier and aerial forager for insects. Therefore, wind turbine blades pose a potential risk. Mariana Swiftlets forage during the day when turbines are more visible. Camacho Elementary is approximately 3.5 miles from the nearest caves (Japanese Tunnel, Hospital, and Ladder) used for nesting and roosting. However the wind turbine proposed for installation at Camacho Elementary School is a small Skystream 2.4 kW with a blade diameter of only 12 feet. DOE concludes that the turbine at Garapan Elementary School **may affect but would not likely adverse affect** the Mariana Swiftlet.

Nightingale Reed-Warbler - Nightingale reed-warblers occupy a variety of habitats including wetlands but also open, secondary forests and are usually found in thick vegetation. They primarily eat insects and glean other invertebrates from leaves but will consume lizards and geckos. Although the reed-warbler is capable of strong flight, flight is generally more associated with movement within and amongst territories and dispersal. Unlike the Mariana Swiftlet, the nightingale reed-warbler does not engage in wide-ranging flight on a daily basis.

The proposed single 2.4 kW wind turbine at Camacho Elementary School would be installed in a large open field adjacent to the school. This surrounding area is composed largely of residential and commercial areas and the ocean to the north. A private residence is located in the small north beachside portion of the property. The area near the road is developed with residences and small agriculture. The CNMI DFW conducted call-back surveys in September 2011 with no detections of reed-warblers (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). The surrounding vegetation is composed of tangantangan, agricultural forest, scarlet gourd, sword grass, and monkey pod. The DFW concluded that there is a possibility of nightingale reed-warblers in the area in the next 20 years (Rachel Rounds, e-mail to Peter Ashley [DOE], October 6, 2011). Considering the relatively small size of the proposed single wind turbine and the surrounding habitat, DOE concludes that the proposed project at the Camacho Elementary School **may affect but would not likely adversely affect** the nightingale reed-warbler.

DOE concludes that this single wind turbine, because of its small size, location, and life history characteristics of the respective species, **may affect but would not likely adversely affect** the Mariana moorhen, Mariana swiftlet, and nightingale reed-warbler (Table 2).

Table 1. Summary of potential effects on five threatened or endangered species from the installation of wind turbines at Saipan Southern High School and the Koblerville Elementary School, Kagman High School, and Cha Cha Oceanview Junior High School on the island of Saipan.

	Project Site		
Species	**Saipan Southern High School and the Koblerville Elementary School**	**Kagman High School**	**Cha Cha Oceanview Junior High School**
Mariana Moorhen	**May affect but would not likely adversely affect**	**May affect but would not likely adversely affect**	**May affect but would not likely adversely affect**
Micronesian megapode	**No effect**	**No effect**	**No effect**
Mariana swiftlet	**May adversely affect**	**May affect but would not likely adversely affect**	**May affect but would not likely adversely affect**
Nightingale reed-warbler	**May adversely affect**	**May affect but would not likely adversely affect**	**May affect but would not likely adversely affect**
Mariana fruit bat	**No effect**	**No effect**	**No effect**

Table 2. Summary potential effects on five threatened or endangered species from the installation of wind turbines at Garapan Elementary School and Gregorio T. Camacho Elementary School on the island of Saipan and the Tinian Elementary School and Tinian Junior & Senior High School on the island of Tinian.

	Project Site		
Species	**Garapan Elementary School**	**Gregorio T. Camacho Elementary School**	**Tinian Elementary and Junior/Senior High School**
Mariana Moorhen	**No effect**	**May affect but would not likely adversely affect**	**No effect**
Micronesian megapode	**No effect**	**No effect**	**No effect**
Mariana swiftlet	**No effect**	**May affect but would not likely adversely affect**	**No effect**
Nightingale reed-warbler	**No effect**	**May affect but would not likely adversely affect**	**No effect**
Mariana fruit bat	**No effect**	**No effect**	**No effect**

5. MITIGATION PLANS AND MEASURES

DOE and the CNMI have developed and propose the following plans and measures to mitigate potential impacts on the Mariana moorhen, Mariana swiftlet, and nightingale reed-warbler related to implementation of the CNMI Green Energy School Project. Because DOE is only providing financial assistance to CNMI for this project, roles and responsibility for implementation of mitigation actions will be established with appropriate CNMI agencies and organizations during the life of the project.

5.1 Construction Measures

Turbine Blades – The faster rotational velocity of smaller wind turbines often creates "motion smear" which is a decrease in visibility of the rotating blades at higher frequencies owing to the inability of the eye to detect the motion. Studies have indicated that painting one blade black and the other two white increases the visible perception of the rotating blades (Hodos 2003). However, the actual effectiveness of the improved blade visibility in decreasing bird collision has not been well established yet. CNMI will ensure that prior to erection and installation of the turbines, one blade will be painted black and two blades will be painted white in an effort to improve visibility during daylight hours.

Lighting – Unless required for aviation safety, no lighting will be attached to turbines towers which will reduce attractiveness to birds.

5. 2 Monitoring

Nightingale Reed-Warbler Surveys – Because suitable reed-warbler habitat exists around the project locations, annual detection surveys will be conducted at each site to determine whether reed-warblers have established territories near the project sites. Currently, the Southern Saipan High School is the only site with a known established reed-warbler territory. Surveys will be conducted by qualified individuals from the CNMI DFW. If reed-warblers are detected in the future near project locations, appropriate management actions will be cooperatively determined by the CNMI PSS, CNMI DFW, and the FWS. Results of surveys will be shared with the FWS.

Mortality Monitoring – To determine actual impacts on aerial vertebrates, mortality monitoring will be conducted at each project location, except the elementary school in Garapan and the two schools on the island of Tinian, where DOE determined no effect on any listed species. Because the Mortality Monitoring Plan (MMP) is likely to be revised as data is acquired, the MMP is attached in Appendix 2 to allow revision independently of the Biological Assessment and concurrence among the participating organizations. The MMP establishes roles and responsibilities for monitoring, monitoring methods and protocols, reporting requirements, and periodic review and revision of the plan.

5.3 Habitat Mitigation

Nightingale Reed-Warbler Habitat – An existing reed-warbler territory is located on school property at the Southern Saipan High School. To offset the potential loss of this habitat through clearing either for school expansion or intentionally to prevent potential occupancy near the wind turbines, a request will be made to the CNMI Department of Land and Natural Resources to

donate a free credit in the Saipan Upland Mitigation Bank for use by the project. The FWS and the appropriate CNMI government agencies will determine whether this habitat should be cleared, and mitigation will be established prior to any habitat clearing.

Mariana Swiftlets – Construction and operation of the Green Energy School Project will not directly alter Swiftlet habitat. However, potential take of Swiftlets could occur during the 20 year life cycle of the project because of the wide-ranging aerial foraging by Swiftlets. To offset potential take of Swiftlets, DOE and CNMI propose trapping nonnative cockroaches (*Periplaneta americana*) at one or more of the limestone caves used by Swiftlets for night roosting and nesting. Cockroaches consume Swiftlet nest material and the gluelike saliva that secures the nests to cave ceilings and walls (Cruz et al. 2008). Nests attacked by cockroaches often fall, destroying the nest and occupants. A cockroach control program initiated in 1989 has been credited with improving Swiftlet reproductive output and may have contributed to the recent increase in numbers (Cruz et al. 2008). The location and scope of this effort will be determined by CNMI and FWS.

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Appendix 1

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Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3393

October 13, 2011

Rachel Rounds
U.S. Fish & Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard
Room 3-122, Box 50088
Honolulu, HI 96850

Subject: **Commonwealth of the Northern Mariana Islands Green Energy School Project; 2011-TA-0258**

Dear Ms. Rounds:

The U.S. Department of Energy (DOE) has determined the following species have potential to occur in the Commonwealth of the Northern Mariana Islands: the endangered nightingale reed-warbler, Mariana crow, Mariana swiftlet, Micronesian megapode, Mariana moorhen, the threatened Mariana fruit bat, the endangered Rota white-eye, the Green sea turtle, the Hawksbill turtle, and three species of plants (*Nesogenes rotensis*, *Osmoxylon mariannense*, and *Serianthes nelsonii*).

The Green Energy School Project is receiving federal funding from the DOE's State Energy Program and will develop renewable energy as a reliable source of power. The projects selected will provide energy to power CNMI schools. CNMI is proposing to install six (20 kW) and ten (2.4 kW) unit wind turbines at public schools on the islands of Saipan and Tinian.

DOE has determined that the turbines to be located at Tinian schools, consisting of four 2.4 kW turbines, and the turbines to be located at Garapan schools, consisting of two 2.4 kW turbines will have *No Effect* on any of the above-listed species. These sites will not require monitoring.

As discussed, the smaller turbines to be located at: Kagam High, Cha Cha Oceanview Junior High, Gregorio T. Comacho Elementary School, and Koblerville Elementary will likely receive a determination of *Not Likely to Adversely Affect*. However, the final decision regarding these turbines is pending the reed-warbler surveys being conducted around these schools. Additionally, DOE will continue to work with your office to development appropriate monitoring plans for these turbines.

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DOE will also continue to work with your office as we develop the Biological Assessment required for the 20 kW turbines to be located at Saipan Southern High School.

DOE's determination of *No Effect* for Tinian and Garapan is being sent to your office for your record-keeping purposes.

Please contact me at 720-356-1566 or Melissa.Rossiter@go.doe.gov with any questions regarding this determination or our ongoing consultation. .

Sincerely,

Melissa Rossiter
Environmental Protection Specialist

cc: Peter Ashley, SEP Project Officer
Thelma Inos, Director, Energy Division

Appendix 2

Mortality Monitoring Plan

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Mortality Monitoring Plan
for
CNMI Green Energy School Project

January 2012

Concurrence: Date

_____

U.S. Department of Energy

_____

CNMI Public School System

_____

CNMI Department of Fish and Wildlife

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U. S. Fish and Wildlife Service

1. INTRODUCTION

The purpose of this plan is to describe the procedures, methods, and roles and responsibilities for monitoring potential fatalities of aerial vertebrates (birds and bats) during the operation of wind turbines at four locations on the island of Saipan in the Commonwealth of the Northern Mariana Islands (CNMI). Although the primary concern is for threatened and endangered species, the program will monitor mortality for all birds and bats. The U.S. Department of Energy (DOE) has awarded Federal funding to the Commonwealth of the Northern Mariana Islands (CNMI) through the State Energy Program (SEP) under the *America Recovery and Reinvestment Act of 2009* to develop renewable energy sources to improve reliability of energy supply and reduce energy costs. CNMI will use a portion of their SEP grant to fund the Green Energy School Project. As part of the Green Energy School Project, the CNMI plans to install wind turbines at on the islands of Tinian and Saipan. The operational lifespan of the wind turbines is estimated to be 20 years.

The wind turbines to be installed consist of two types: 20 kW and 2.4 kW. The 20kW turbines and towers consist of a 80 foot monopole tower with a top mounted Jacobs 20kW wind turbine. The Jacobs wind turbine has a 31 foot rotor diameter with a rotor swept area of 755 square feet. Total turbine height with blades is 95.5 feet. The current plan is to install six 20 kW wind turbines in an open grass field between the Saipan Southern High School and Koblerville Elementary School. The wind turbines at all other locations are small 2.4 kW units. The 2.4 kW turbines are the Skystream 3.7 with a monopole tower design. The tower height is 33 feet and the rotor diameter is 12 feet. The rotor swept area is approximately 115 square feet. Total turbine height including blades is 39 feet.

The following paragraphs describe the individual proposed projects.

Saipan Southern High School and Koblerville Elementary School – The proposed project at the Saipan Southern High School and Koblerville Elementary School consists of six 20 kW Jacob turbines and one Skystream 2.4 kW turbine. The wind turbines are proposed to be constructed in a maintained grass field between the high school and elementary school.

Kagman High School – One Skystream 2.4 kW wind turbine is proposed at Kagman High School. The Kagman region of Saipan lies on the east coast of the island. The wind turbine would be located on the north side of the school property on an existing disturbed area or small grassy area.

Cha Cha Oceanview Junior High School – One Skystream 2.4 kW wind turbine will be installed at Cha Cha Oceanview Junior High School. The junior high school is located in the Kagman region of Saipan and is about 0.25 miles southwest of Kagman High School. The wind turbine would be located on the south side of the school property in a grass field.

Gregorio T. Camacho Elementary School – The proposed project at Gregorio T. Camacho Elementary School consists of a single Skystream 2.4 kW wind turbine. Gregorio T. Camacho Elementary School is located along the northwest coast of Saipan in the community of San Roque. The wind turbine would be placed in a large open field (~220 x 220 feet) between the school and the ocean.

Garapan Elementary School – Garapan Elementary School is located in the middle of the west of coast of Saipan. The proposed project at Garapan Elementary consists of a two Skystream 2.4 kW wind turbine. The area lies within the community of Garapan approximately 0.4 miles of the coast.

Tinian Elementary and Junior/Senior High Schools - The proposed projects at the Tinian Elementary and Junior/Senior High Schools consist of two Skystream 2.4 kW wind turbine at each of the two schools. The two schools are located on the north side of the village of San Jose which is located on the southwest coast of Tinian. The schools are approximately 0.3 miles apart.

DOE has determined that the installation of wind turbines at the Tinian Elementary and Junior/Senior High Schools and at the Garapan Elementary School will not affect any threatened or endangered species. Therefore, the mortality monitoring plan will exclude whose project sites.

2.0 Methods

The monitoring program will be implemented by the CNMI PSS with assistance from the CNMI DFW and FWS. DPW and FWS will provide advice and training to PSS staff and students as appropriate. Because the wind turbines are located on school property, school custodial and maintenance personnel should be included in any training in addition to any faculty that will be involved. Custodial and maintenance staff also may be the only personnel available during summer vacation.

2.1 Study Design

The sampling frame for carcass searches will consist of four 2.4 kW turbines with one each at Koblerville and Camacho Elementary Schools, Cha Cha Oceanview Junior High School, and Kagman High School and six 20 kW turbines located at Southern Saipan High School. Study duration will initially be two years. Because of the tropical climate with relatively little seasonal variation in temperature, monitoring should be conducted throughout the year. The area underneath the turbines should be searched for carcasses for 3-4 consecutive days with 3-4 days between searches. This schedule may be adjusted to avoid periods of bad weather (i.e., rain and wind) that would impact search efficiency. This level of effort may be modified with the concurrence of FWS consistent with available resources within the CNMI PSS to perform the monitoring.

Both the search area and search frequency should be modified based on results. If as expected, very few to no carcasses are found, the search area could be decreased and possibly the frequency of searches. Because this program will be implemented through volunteer efforts, it is important to maintain effort consistent with results while maintaining a base level of monitoring.

2.2 Search Protocol

The search protocol for the 2.4 kW and 20 kW turbines will be different because of the size of towers and the layout configuration. Gauthreaux (1996) suggested minimum search radius be determined by tower height. Smallwood and Thelander (2004) found that distance of carcasses from the tower increased with tower height but the linear relationship between tower height and

distance was very poor. Average distance of carcasses from 25-m towers (i.e., comparable to the Jacobs 20 kW turbine towers) was 33 m for large birds and 24 m for smaller-bodied birds. Initially it is recommended that the search radius around the towers equal twice the tower height. For the 20 kW turbines the search radius would be 160 feet and 66 feet for the smaller 2.4 kW turbines. Because the turbines are located in open grass fields and in some cases near parking areas, mortalities should be relatively visible. However, some turbine locations are near the edge of open areas and part of the search area may include trees and shrubs and buildings.

Any carcasses found should be initially marked (e.g., a surveyors flag) and the remaining area searched before recording the data. After the search is completed, any carcasses can then be recorded and processed according to procedures.

Skystream 2.4 kW Turbines – For the smaller 2.4 kW turbines, either a series of concentric circular transects will be walked around the tower starting at the tower base or linear transects that cover a comparable area. At some locations, the search area may require modification to account for areas of trees, shrubs, and buildings. If buildings are located within the search areas, the roofs should be scanned for birds or bats that may have fallen on the roof. Areas of trees and shrubs may be searched more efficiently separately from open areas using transects that best match (e.g., linear or zig-zag) the vegetation characteristics. A transect of 12-20 feet wide should be walked, recording any carcasses found. The width of transect can be adjusted based on visibility. Shorter vegetation such as a mown field and parking areas would allow increased visibility and wider transects. Surveyor flags or brightly colored towels can be periodically placed on the outer edge of the transect to mark the area searched. The markers can be moved to the outer edge of the next transect and continued until the total area is searched. It is expected that searching the area around the small turbines should require no more than 10-20 minutes, possibly less time if groups of students are used. However, areas of trees and shrubs would require more search time because of the decreased visibility. Approximately 900 linear feet of transect would be walked for each small turbine. Additional time would be required if carcasses are found.

Jacobs 20 kW Turbines – The six 20 kW turbines at Southern Saipan High School are configured in a single row between the high school and the adjacent Koblerville Elementary School. Because of the linear configuration, linear transects 12-20 feet wide will be walked along each side of the turbines out to a distances of 160 feet. The transects should extend 160 feet beyond each end turbine in the row to include the entire area surrounding the row of turbines. Approximately 16 – 20 transects would be required to cover the entire area. Transect length will be determined by the spacing of the six turbines. Local modification of transects may be required to accommodate areas of trees and shrubs, buildings, and private property. Surveyor flags or brightly colored towels are suggested for marking the edge boundary of each successive transect to ensure that the entire area is searched. With small groups of staff and students, this area could be searched efficiently in a relatively short time period.

2.3 Recording Survey Data and Processing Carcasses

Because most monitoring will be conducted by volunteers, procedures for processing mortalities and recording data need to be explicit and relatively simple to ensure consistent and repeatable effort. It is anticipated that no carcasses will be found during many surveys. However, it is extremely important that surveyors record that a survey was completed and that no carcasses

were found. Negative survey results are equally important. Standardized data sheets will be used to ensure that comparable data is recorded for all surveys. Because any potential carcasses that may be found will be protected species under either the Endangered Species Act or Migratory Bird Treaty Act, permits or permission to handle carcasses may be required. Should any scientific collection permits be required, PSS will work with CNMI DFW to obtain the permits.

A carcass is defined as any collection of body parts such as feathers, head, body, wings, or legs. If possible, digital photos should be taken of each carcass. The position of the carcass relative to the tower (i.e., direction and distance) should be noted. Distance can estimated by pacing from the carcass to the nearest tower. The direction of the carcass from the nearest tower can either be measured using a compass, estimated from true north using the four cardinal directions, or drawn on a diagram on the data sheet. Using disposal gloves, the carcass should be collected in a sealable 1-gallon freezer bag for later species identification. The date, location, and assigned specimen number should be written in black marker on a stick-on mailing label that is affixed to the bag. Each specimen should be given a sequential number or letter that can be used to relate the subsequent identification of the specimen to the data recorded on the data sheet. Carcass specimens should be placed in a freezer or some sort of cold storage and then transferred to the CNMI DFW for identification of species and if possible, age and sex. After positive species identification, the species name should be entered on the data sheet.

Any weather conditions that occurred between the previous survey and current survey that might impact visibility or flight should be recorded. This might include rain, fog, low clouds, or unusually strong winds. These are conditions that might increase the potential for fatalities and may be important for interpreting the data. Standard weather parameters don't need to be recorded as those are probably readily available from existing weather recording stations.

The data recorded for each survey should include date, time, location, wind turbine type, surveyors, and unusual weather conditions since the last survey. For each carcass found, a sequential specimen number should be assigned, species name (if identifiable), sex and age if identifiable, specimen condition (e.g., what body parts were found, etc.), distance from the nearest turbine tower, direction for turbine tower, and any additional notes. An example data sheet is provided at the end of the monitoring plan. However, the CNMI PSS should develop their own datasheet, possibly as a school project, as a way to promote involvement by faculty and students.

Mortality monitoring kits should be prepared for each school participating in the monitoring effort. The monitoring kits should contain the following items:

1. disposal gloves for handling carcasses
2. surveyors flags or other means to mark the area surveyed and any carcasses found
3. clipboard
4. data sheets and survey log
5. one gallon sealable freezer bags and stick-on mailing labels
6. pen and black marker
7. compass (for estimating direction from tower)
8. identification guides or pictures of common species
9. Copy of any required permit for handling carcasses of T&E species or species protected under the Migratory Bird Treaty Act and CNMI DFW scientific collection permit if required

A survey log (i.e., a listing of dates and start/end times for each survey conducted) should be kept with the monitoring kit to inform surveyors when the last survey was performed.

It is recommended that the CNMI PSS establish a web-based database where data from surveys at all schools can be entered to avoid loss of data and a means to monitor whether surveys are being performed. Information on survey results should also be periodically reported within the PSS (e.g., web site, newsletters) along with the amount of electrical power generated to provide feedback to those that participate. This will help promote interest in the project and the use of renewable energy.

2.4 Reporting

The CNMI will be responsible for reporting monitoring data to the FWS. Reporting requirements may vary depending on the terms and conditions of the biological opinion issued by the FWS for the CNMI Green Energy School Project. Any mortality of a species listed as threaten or endangered must be reported immediately to FWS as take. This reporting should be done in accordance with the stipulations in the biological opinion. The responsible CNMI organization for reporting should be determined by CNMI and FWS.

If not required by the biological opinion, an annual report for the Mortality Monitoring Program should be prepared and submitted to the FWS. This report should be used as the basis for evaluating the monitoring program and for making decisions regarding continuation of monitoring or modification of procedures. This report should also be provided to the DOE. DOE provides financial assistance to many community-scale wind energy projects. Impacts of such projects are poorly understood and this information will be useful for informing future projects.

3.0 TRAINING

Because monitoring is expected to be performed primarily through volunteers and school staff, individuals must be trained to conduct mortality searches, record data, and handle carcasses. It is expected that local wildlife professionals with the CNMI DFW or FWS, if available, will provide appropriate training. Training will focus on how to perform searches, types of data that should be recorded, and protocols for safely handling carcasses. The initial training sessions can also be used to evaluate the best search routine for each site to account for different types of vegetation, buildings, or paved areas (i.e., parking lots or roads) within the search area.

Several important sources of field-sampling biases may occur in monitoring programs that will affect estimates of mortality (Kunz et al. 2007). Most estimators assume that fatalities are uniformly distributed over time. If fatalities are clustered, estimates can be biased high or low depending on whether clusters are included or excluded through the sampling design. For the Green Energy School Project, this is not expected to be an issue because the wind turbines are located on school property and sampling will occur frequently, clusters of fatalities should be observable whether they occur within or outside a sampling period. The other sources of biases are potentially of more concern and are discussed in the following sections.

3.1 Scavenging Rates

Scavenging refers to the removal of carcasses by natural and domesticated (e.g., cats) predators before the carcass can be recorded as a fatality. The higher the rate of scavenging, the more fatalities are underestimated. Morrison (2002) in a review of literature reported highly variable rates but the studies reviewed indicated significant losses of carcasses to predators within a week. Because the study areas are on school property with significant human activity, presence of scavenging predators may be lower. In addition, areas surrounding the turbines will be searched frequently and should reduce impacts of scavenging. If scavenging of carcasses is suspected, a field experiment could be performed to develop a correction factor.

3.2 Searcher Efficiency

Possibly most problematic is the issue of searcher efficiency. Searcher efficiency refers to the fact that searchers often do not find all the carcasses present. This could occur for a variety of reasons including physical ability (i.e., eyesight), training, interest, extreme weather, vegetation (e.g., mown grass vs. shrubs or trees), and size of bird. Morrison (2002) reported that searcher efficiency ranged from 35 – 100% in a variety of studies under different conditions. Because of the relatively small turbines and location in open mown grass fields, search conditions should promote relatively high search efficiencies. However, an estimate of search efficiency could be integrated in the training program if deemed necessary by CNMI DFW or FWS.

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<table>
<tr><td colspan="3">Green Energy School Project
Wind Turbine Mortality Monitoring</td></tr>
<tr><td>Survey Date:</td><td>Time:</td><td>Location:</td></tr>
<tr><td colspan="3">Surveyor(s):</td></tr>
<tr><td colspan="3">Unusual Weather Conditions since last survey: (e.g., heavy rain, low clouds, fog, extreme winds)</td></tr>
<tr><td colspan="2" rowspan="2">Wind Turbine Diagram: (draw in tower(s) and indicate location of any mortalities)</td><td>Specimen #:
Species Name:
Sex: Age:
Specimen Condition:

Distance from Tower:
(estimate by pacing)
Direction from Tower:
(use compass or estimate 0 = North, 90=East, 180=south, and 270=West)
Notes:</td></tr>
<tr><td>Specimen #:
Species Name:
Sex: Age:
Specimen Condition:

Distance from Tower:
(estimate by pacing)
Direction from Tower:
(use compass or estimate 0 = North, 90=East, 180=south, and 270=West)
Notes:</td></tr>
<tr><td colspan="2">Directions:
1. Assign a sequential specimen # to each carcass found and write on label and affix to specimen bag with collection date
2. If no carcasses are found, write NONE in the first specimen field
3. Distance from tower can be approximated by pacing
4. Direction from tower can be measured with a compass or estimated from true north (zero degrees)
5. If species is unknown, ensure that species name is filled in following identification by CNMI DFW biologist
6. Use additional pages if more than three carcasses are found</td><td>Specimen #:
Species Name:
Sex: Age:
Specimen Condition:

Distance from Tower:
(estimate by pacing)
Direction from Tower:
(use compass or estimate 0 = North, 90=East, 180=south, and 270=West)
Notes:</td></tr>
</table>

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

TAKE PRIDE IN AMERICA

In Reply Refer To:
2012-F-0140
2008-F-0033

FEB 0 1 2012

Ms. Melissa Rossiter
U.S. Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401

Subject: Formal Consultation for the Green Energy School Wind Turbine Project on Saipan, Commonwealth of the Northern Mariana Islands

Dear Ms. Rossiter:

This document represents the U.S. Fish and Wildlife Service's (Service) Biological Opinion on the proposed Green Energy School Project on Saipan in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C 1531 et seq.). This Biological Opinion addresses the potential impacts the Green Energy School Project on the endangered nightingale reed-warbler (*Acrocephalus luscinia)* and Mariana swiftlet (*Aerodramus bartschi*). Effects to the nightingale reed-warbler are addressed through the October 23, 2008, *Programmatic Biological Opinion Regarding the Reestablishment, Management, and Use of the Saipan Upland Mitigation Bank, Saipan* (2008-F-0033). Your request for formal consultation was received on January 9, 2012. An informal consultation addressing potential impacts to the endangered Mariana moorhen (*Gallinula chloropsis*) is found in Appendix 1.

The findings and recommendations in this consultation are based on: (1) your Biological Assessment received on January 9, 2012; (2) nightingale reed-warbler survey information from the Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife; (3) prior technical assistance provided to the U.S. Department of Energy (DOE) on June 1, 2011 (2011-SL-0322) and in multiple emails and phone calls; (4) the October 23, 2008, *Programmatic Biological Opinion Regarding the Reestablishment, Management, and Use of the Saipan Upland Mitigation Bank, Saipan* (2008-F-0033) and; (5) other information available to us. A complete administrative record is on file in our office.

CONSULTATION HISTORY

January 9, 2012. We received all necessary information to initiate consultation.

January 5, 2012. A conference call was held between Rachel Rounds (Service), Peter Ashley and Melissa Rossiter (U.S. Department of Energy (DOE)), and Eileen Yoshinaka (Lockheed Martin, DOE contractor) to discuss and make minor changes to the Biological Assessment.

December 30, 2011. We received the Biological Assessment electronically from the DOE.

October 27, 2011. The CNMI Division of Fish and Wildlife sent a letter to the CNMI Energy Division stating they would assist with monitoring at Green Energy School Project sites.

October 13, 2011. DOE sent the Service a No-Effect Determination letter for installation of turbines on Tinian and at Garapan schools. A Biological Assessment will be written for the remainder of the Green Energy School Project sites.

October 11, 2011. The CNMI Energy Division wrote a letter to the CNMI Public School System and CNMI Division of Fish and Wildlife requesting assistance with implementation of the monitoring program for the proposed project.

October 6, 2011. Lee Perlow (CNMI Division of Fish and Wildlife) sent Rachel Rounds (Service) an email with comments regarding the Green Energy School Project and nightingale reed-warbler survey results.

October 4, 2011. A conference call occurred between Rachel Rounds (Service), Peter Ashley and Melissa Rossiter (DOE), Richard Seman and Lee Perlow, (CNMI Division of Fish and Wildlife), Chris Frying (N15 Architects), Vince Attao and Thelma Inos (CNMI Energy Division); and Eileen Yoshinaka (Lockheed Martin, DOE contractor). Rachel Rounds described the consultation process, preliminary effects determinations for each turbine location and species, the required monitoring program, and potential measures to offset take.

September 28, 2011. A phone call was held between Rachel Rounds (Service) and Peter Ashley (DOE) discussing working with local CNMI agencies (Energy Division and Public School System) on the consultation. Determined that consultation will need to be completed by January or early February for construction be completed by April, 2012.

September 27, 2011. Rachel Rounds (Service) wrote an email to Peter Ashley (DOE) describing future steps needed to complete the consultation.

September 26, 2011. Peter Ashley (DOE) sent an email to Rachel Rounds (Service) providing additional project information.

September 21, 2011. Rachel Rounds (Service) sent Peter Ashley and Melissa Rossiter (DOE) an email with comments on the draft Biological Assessment.

September 14, 2011. Peter Ashley (DOE) spoke with Jodi Charrier (Service) regarding an April 2012 deadline for turbine construction and installation.

September 9, 2011. Melissa Rossiter (DOE) sent Rachel Rounds (Service) a draft Biological Assessment for review.

June 1, 2011. The Service sent a species list to the DOE for the proposed Green Energy School Project.

May 26, 2011. The DOE sent a species list request to the Service for the Green Energy School Project.

May 25, 2011. Rachel Rounds (Service) sent an email to Kathy Iverson (DOE) with clarifications and further details on the information required to initiate consultation under sectio 7 of the ESA.

May 25, 2011. Lee Perlow (CNMI Division of Fish and Wildlife) sent Rachel Rounds (Service) an email with pictures of the turbine foundations at Saipan Southern High School and information about a local permit request for turbine installation.

May 9, 2011. Rachel Rounds (Service) sent Cathy Iverson (DOE) an email stating that installation of solar panels on school rooftops could proceed without further consultation.

April 13, 2011. Rachel Rounds (Service) sent an email to Cathy Iverson (DOE), Steve Blazek (DOE), and Melissa Rossiter (DOE) providing information on steps required for a section 7 consultation under the ESA.

March 30, 2011. Cathy Iverson (DOE) provided Rachel Rounds (Service) via email with a list of the 10 schools participating in the Green Energy School Project.

March 28, 2011. Rachel Rounds (Service) wrote Cathy Iverson (DOE) an email regarding the Green Energy Project on Saipan and asking whether a section 7 consultation had been completed for the proposed project.

March 25, 2011. Rachel Rounds (Service) sent an email to Faride Kraft (Office of Insular Affairs) trying to find a contact from DOE for the Green Energy School Project on Saipan.

March 25, 2011. Rachel Rounds (Service) sent an email to Chris Fryling (N15 Architects) asking if a section 7 consultation had been completed for the Green Energy School Project.

March 24, 2011. Rachel Rounds (Service) sent an email to Paul Radley (CNMI Division of Fish and Wildlife) asking if they had processed a permit request for construction of six wind turbines at Saipan Southern High School. Paul Radley responded that the CNMI Division of Fish and Wildlife had not processed a permit request for this project.

March 24, 2011. Rachel Rounds (Service) read an article in the Saipan Tribune (dated March 15, 2011) describing the installation of six turbines at Saipan Southern High School.

ACTION AREA

The action area includes the five schools on Saipan that will have wind turbines installed: Saipan Southern High School, Koblerville Elementary School, Kagman High School, Cha Cha Oceanview Junior High School, and Gregorio T. Camacho Elementary School. The action area includes each turbine location plus a radius of 50 meters around the 20 kilowatt (kW) turbines and 20 meters around the 2.4 KW turbines. The action area also includes a one hectare (ha) lot adjacent to the wind turbines that will be cleared at Saipan Southern High School.

DESCRIPTION OF THE PROPOSED ACTION

The DOE is providing funding to the CNMI through the State Energy Program under the America Recovery and Reinvestment Act of 2009 to develop renewable energy sources to improve reliability of energy supply and reduce energy costs in the CNMI. The CNMI will use a portion of their funding for the Green Energy School Project. The proposed project will install six 20-kW and four 2.4-kW wind turbines at the public schools on the island of Saipan.

Six Jacobs 20-kW wind turbines will be installed in an open maintained grass field between the Saipan Southern High School and Koblerville Elementary School in southern Saipan. The Jacobs turbines are monopole-mounted on 25 meter towers with a top mounted 9.5 meter rotor diameter turbine. These turbines are 29.1 meters tall at full blade extent and have a rotor swept area of 70 square meters.

One Skystream 2.4-kW turbine will be installed at four schools on Saipan (Koblerville Elementary School, Kagman High School, Cha Cha Oceanview Junior High School, and Gregorio T. Camacho Elementary School). The Skystream turbines are monopole-mounted with a tower height of 10 meters and a rotor diameter of 3.7 meters. The Skystream turbines are 39 feet tall at full blade extent and have a rotor swept area of 10 square meters.

At Kagman High School the turbine would be located on the north side of the school property on an existing disturbed or small grassy area. At Cha Cha Oceanview Junior High School the turbine would be located on the south side of the school property in a grass field. At Gregorio T. Camacho Elementary School the turbine would be placed in a large open field between the school and the ocean. At Koblerville Elementary the turbine will be installed adjacent to the six Jacobs 20-kW turbines.

No lighting will be installed on any of the towers. The operational lifespan of the wind turbines is estimated to be 20 years. If the turbines are still operational after 20 years the consultation will be reinitiated to address the additional time. Once the turbines are no longer operational, they will be removed.

The proposed project will also clear 1.0 ha of nightingale reed-warbler habitat in order to minimize the effects of wind turbines on nightingale reed-warblers at the Saipan Southern High School. Project activities include clearing vegetation and use of heavy equipment. Future activities may include construction of school facilities. Project impacts are assessed by determining the number of territories directly and indirectly affected by the action. For this

project, ESA responsibilities will be addressed by using one CNMI Government Credit in the Saipan Upland Mitigation Bank (SUMB) commensurate with the direct and indirect impacts associated with the project, and by implementing associated SUMB conservation measures.

Roles and Responsibilities

The DOE is funding the CNMI Green Energy School Project and therefore is the lead Federal agency for the consultation. The implementation and operation of the Green Energy School Project is the responsibility of the CNMI Public School System. The CNMI Public School System, along with other CNMI agencies and organizations, has agreed to assume responsibility for the long-term implementation and monitoring of the Green Energy School Project and will actively participate in implementation of conservation measures and terms and conditions described in this Biological Opinion.

Mortality Monitoring Plan

The Mortality Monitoring Plan (MMP) is provided as an Appendix to the Biological Assessment. The MMP describes the procedures, methods, and roles and responsibilities for monitoring potential wildlife fatalities during the operation of wind turbines at five schools on Saipan. The program will monitor wildlife mortality or injury at the 10 turbines proposed for Saipan Southern High School, Koblerville Elementary School, Kagman High School, Cha Cha Oceanview Junior High School, and Gregorio T. Camacho Elementary School.

The monitoring program will be implemented by the CNMI Public School System with technical assistance from the CNMI Division of Fish and Wildlife and the Service. The CNMI Division of Fish and Wildlife and the Service will provide advice and training to Public School System staff and students as appropriate. Because the wind turbines are located on school property, school custodial and maintenance personnel will also be included in monitoring training as they may be the only personnel available during summer vacation.

The initial MMP study duration will be two years. Monitoring will be conducted year-round. The area underneath the turbines will be searched for injured animals or carcasses and be completed for three to four consecutive days with three to four days between searches. This schedule may be adjusted to avoid periods of bad weather (i.e., rain and wind) that would impact searcher efficiency. This level of effort may be modified with the concurrence of the Service consistent with available resources within the CNMI Public School System to perform the monitoring.

The search radius around the towers will equal twice the tower height. For the 20 kW turbines the search radius would be 49 meters and 20 meters for the smaller 2.4 kW turbines. Because the turbines are located in open grass fields and in some cases near parking areas, downed wildlife should be relatively visible. However, some turbine locations are near the edge of open areas and part of the search area may include trees and shrubs and buildings.

Searches around the four Skystream 2.4 kW turbines will consist of either a series of concentric circular transects around the tower starting at the tower base or linear transects that cover a comparable area. The search areas may require modification to account for trees, shrubs, and buildings. If buildings are located within the search areas, the roofs will be scanned for downed

wildlife. Areas of trees and shrubs may be searched more efficiently separately from open areas using transects that best match vegetation characteristics. A transect of six meters wide will be walked, recording any injured wildlife or carcasses found. The width of transect will be adjusted based on visibility. Shorter vegetation, such as a mown field and parking areas, will allow increased visibility and wider transects. Surveyor flags or brightly colored towels can be placed on the outer edge of the transect to mark the area searched. The markers can be moved to the outer edge of the next transect and continued until the total area is searched. It is expected that searching the area around the small turbines should require no more than 10 to 20 minutes, possibly less time if groups of students are used. However, areas of trees and shrubs may require more search time because of the decreased visibility. Approximately 274 meters of transect would be walked for each small turbine.

The six 20 kW turbines at Southern Saipan High School are configured in a single row between the high school and the adjacent Koblerville Elementary School. Because of the linear configuration, linear transects three to six meters wide will be walked along each side of the turbines out to a distances of 48 meters. The transects will extend 48 meters beyond each end turbine in the row to include the entire area surrounding the row of turbines. Approximately 16 to 20 transects would be required to cover the entire area. Transect length will be determined by the spacing of the six turbines. Modification of transects may be required to adjust for trees and shrubs, buildings, and private property. Surveyor flags or brightly colored towels are suggested for marking the edge boundary of each successive transect to ensure that the entire area is searched.

Downed wildlife detection and processing

When downed wildlife is located a surveyor flag should immediately be placed at its location. Digital photos will be taken as soon as possible in case scavenging by ants or other insects or predation continues to degrade or remove the carcass. The CNMI Division of Fish and Wildlife will be immediately notified to come retrieve the carcass. If the CNMI Division of Fish and Wildlife is unable to come retrieve the carcass, the carcass will be collected in a sealable one-gallon freezer bag for later species identification using disposable gloves. The date, location, and assigned specimen number will be written in black marker on a stick-on mailing label that is affixed to the bag. Each specimen will be given a sequential number or letter that can be used to relate the subsequent identification of the specimen to the data recorded on the data sheet. Carcass specimens will be placed in a freezer or some sort of cold storage and then transferred to the CNMI Division of Fish and Wildlife for identification of species and if possible, age and sex. After positive species identification, the species name will be entered on the data sheet by CNMI Public School System staff. If injured wildlife is found, the CNMI Division of Fish and Wildlife will be contacted to receive the injured animal and transport it to a veterinary facility if necessary.

The position of the injured wildlife or carcass on the ground relative to the tower (i.e., direction and distance) will be noted. Any weather conditions that occurred between the previous survey and current survey that might impact visibility or flight will be recorded. This might include rain, fog, low clouds, or unusually strong winds. The data recorded by CNMI Public School System staff for each survey will include date, time, location, wind turbine type, surveyors, and unusual weather conditions since the last survey. For each carcass found, a sequential specimen

number will be assigned, species name (if identifiable), sex and age if identifiable, specimen condition (e.g., what body parts were found, etc.), distance from the nearest turbine tower, direction for turbine tower, and any additional notes.

The CNMI Public School system will prepare mortality monitoring kits for each school participating in the monitoring effort. The monitoring kits should will the following items:

1. Disposal gloves for handling carcasses
2. Surveyors flags or other means to mark the area surveyed and any carcasses found
3. Clipboard
4. Data sheets and survey log
5. One gallon sealable freezer bags and stick-on mailing labels
6. Pen and black marker
7. Compass (for estimating direction from tower)
8. Identification guides or pictures of common species

A survey log listing of dates and start/end times for each survey conducted will be kept with the monitoring kit to inform surveyors when the last survey was performed.

Reporting

The CNMI Public School System and Division of Fish and Wildlife will be responsible for reporting monitoring data to the Service. Any mortality of a threatened or endangered species will be reported immediately to the Service's Pacific Islands Fish and Wildlife Office. A Mortality Monitoring Program annual report will be prepared and submitted to the Service by December 31 of each year. For the first year, a report will also be submitted six months after turbine operation begins. This report will be used as the basis for evaluating the monitoring program and for making decisions regarding continuation of monitoring or modification of procedures.

Training

Volunteers, students and school staff will be trained to conduct mortality searches, record data, and handle carcasses. It is expected that local wildlife professionals with the CNMI Division of Fish and Wildlife or the Service, if available, will provide appropriate training to all monitoring personnel. Training will focus on how to perform searches, data recording, and protocols for safely handling carcasses. The initial training sessions can also be used to evaluate the best search routine for each site to account for different types of vegetation, buildings, or paved areas within the search area. Training should occur prior to turbine operation in the first year, and at the beginning of the school year for future years.

Conservation Measures

The following conservation measures, developed in coordination with the Service, will avoid or minimize effects to the nightingale reed-warbler and Mariana swiftlet. They are considered part of the project description. Any changes to, modifications of, or failure to implement these conservation measures may result in a need to reinitiate this consultation.

1. The CNMI government will donate one CNMI Government Credit in the Saipan Upland Mitigation Bank prior to any site disturbance at Saipan Southern High School. In

accordance with the Nightingale Reed-Warbler Programmatic Consultation and Saipan Upland Mitigation Bank Agreement and Addendum, the agreed-upon credit transfer will be as follows:

a. Prior to the start of any vegetation clearing or earth-moving activities at the project site, the CNMI Public School System shall secure one CNMI Government Credit at the Saipan Upland Mitigation Bank that is intended to provide 1.75 nightingale reed warbler territories within the Bank boundary.

b. Upon written notification that the credit has been secured (i.e., a CNMI Government Transfer Document has been signed by all necessary authorities and copy has been sent to the Service), the Service will provide acknowledgement to the DOE and CNMI Public School System indicating the credit obligation has been fulfilled and on-site project activities may begin as outlined in the project description above and the remainder of the conservation measures listed below.

2. Clearing of vegetation adjacent to Saipan Southern High School will only occur between October through December or April through June, when nesting activity is not at its peak.

3. Adequate plastic construction fencing will be placed and maintained around any habitat that is to be avoided (including buffer areas and adjacent parcels) to prevent impacts to habitat from construction equipment and personnel.

4. All on-site construction personnel will receive instruction regarding the presence of listed species and the importance of avoiding and minimizing impacts to these species and their habitat.

5. The CNMI Public School System will ensure that no unauthorized take of nightingale reed-warbler or destruction of their habitat occurs. The CNMI Public School System and DOE will have the authority to stop all activities that may result in such take or destruction until appropriate corrective measures have been completed. The CNMI Public School System and DOE will be required to report immediately any unauthorized impacts to the Service and CNMI Division of Fish and Wildlife.

6. All construction equipment arriving from Guam will have proper brown treesnake (*Boiga irregularis*) inspection conducted by CNMI Customs or Quarantine personnel under established CNMI procedures. All on-site personnel will receive instruction to kill any brown treesnake and to contact the CNMI Division of Fish and Wildlife immediately upon a sighting.

7. A litter-control program will be implemented during construction. All tools, gear, and construction scrap will be removed upon completion of work in order to prevent the attraction of non-native pests (e.g., rats).

8. All workers will ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash from the project area are deposited in covered or closed trash containers. The

trash containers shall be removed from the project area and disposed of off-site at an approved landsite at the end of each working day.

9. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats will result from project-related activities.

10. No invasive plant species other than tangantangan (*Leucaena leuocephala*) shall be planted and every measure should be taken to ensure these species are not established on the property.

11. Studies have indicated that painting one blade black and the other two white increases the visible perception of the rotating blades (Hodos 2003). However, the actual effectiveness of the improved blade visibility in decreasing bird collision has not been well established yet. The CNMI Public School System and its contractor will ensure that, prior to erection and installation of the turbines, one blade will be painted black and two blades painted white in an effort to improve visibility during daylight hours.

12. Because suitable nightingale reed-warbler habitat exists around the project locations, annual surveys will be conducted adjacent to each school to determine whether reed-warblers have established territories near the project sites. Currently, the Southern Saipan High School is the only site with a known nightingale reed-warbler territory. Surveys will be conducted by qualified individuals from the CNMI Division of Fish and Wildlife. If nightingale reed-warblers are detected in the future near project locations, appropriate management actions will be cooperatively determined by the CNMI Public School System, CNMI Division of Fish and Wildlife, and the Service. Results of surveys will be shared with the Service.

13. The CNMI Public School System, in coordination with the CNMI Division of Fish and Wildlife, will implement predator control program at Mariana swiftlet caves on Saipan. Within six months of turbine operation, the CNMI Public School System and CNMI Division of Fish and Wildlife will work with the Service to develop and implement the predator control program.

STATUS AND ENVIRONMENTAL BASELINE OF THE SPECIES

Mariana swiftlet

Listing Status

The Mariana swiftlet was federally listed as endangered on August 27, 1984 (USFWS 1984). A five-year status review was completed in 2010 (USFWS 2010) and a recovery plan for the Mariana swiftlet was completed in 1991 (USFWS 1991b).

Historic and Current Distribution

The Mariana swiftlet is endemic to Guam and the four southern islands of the CNMI (Cruz et al. 2008, p. 233). A population also became established on Oahu, Hawaii, between 1962 and 1965 (Wiles and Woodside 1999, p. 57). Most historical information on the species comes from Guam, where it was reported as being common and the third most abundant species seen during roadside counts, but declined to approximately its current levels by the late 1970s (USFWS

1991b, p. 7). The total number of Mariana swiftlets occurring within its historical range is currently over 6,000 individuals and it currently occurs on Guam (in three known caves within the Naval Munitions Site), Aguiguan (in nine known caves), and Saipan (ten known caves), and is considered extirpated from Tinian and Rota (CNMI DFW 2010, pp. 45-46; Navy 2011, p. 4; USFWS 1991b, pp. 8, 13–14; Engbring et al. 1986, pp. 58–59). Long-term data from swiftlet surveys at 10 caves on Saipan shows that swiftlet numbers have been steadily increasing, to a total count of over 5,500 individuals in 2010 (CNMI DFW 2010).

Ecology and Life History

The Mariana swiftlet nests and roosts in limestone caves with the following characteristics: entrances typically a minimum of 2 m (6.2 ft) high; chambers with dark zones; and fresh air (USFWS 1991b, p. 2). Most birds leave their cave at dawn and return at sunset, but often return from foraging to roost in caves during the day. Swiftlets navigate through the darkest portions of caves using echolocation (Vogt and Williams 2004).

Mariana swiftlets capture prey while flying, and foraging has been observed to occur over a wide variety of habitat types, including cleared and forested areas, but they appear to favor ridge crests and open grassy savanna areas (USFWS 1991b, p. 6). Large flocks have been reported to form in the evening with birds congregating and feeding close to the ground until it is dark (Chantler and Driessens 1995, p. 130). Little data on foraging height is available for the Mariana swiftlet. Swiftlets have been observed foraging from ground level to well above the forest canopy (Rounds 2011, pers. com.). Swift species are primarily higher airspace feeders, though foraging declines above 100 meters (at least in Europe) as insect number decline significantly above this level (Chantler and Driessens 1995, p. 20; Chantler 1999, p. 402). Many tropical swift species will feed just over the forest canopy, and some swiftlets will feed under the canopy at dusk (Chantler and Driessens 1995, p. 20).

An analysis of swiftlet guano collected from occupied caves on Saipan found that the remains of flying ants (*Formicidae*) were common, as were the remains of beetles (*Coleoptera*) (Kershner et al. 2007). Kershner et al. (2007) speculated that Mariana swiftlets use a foraging strategy of seeking out pulses in insects and that such dense concentrations of prey could be important resources to swiftlets. Worldwide, swifts are opportunist feeders that will exploit swarms and hatching whenever possible (Chantler and Driessens 1995, p. 20).

Eggs are laid in cup-shaped nests made of moss and saliva attached to cave walls or ceilings. A single egg is laid, usually between January and July, which is incubated for approximately 23 days with fledging occurring after 47 days (Reichel et al. 2007). Both adults care for the nestling which is, on average, fed by each adult 1.8 times a day (Morton and Amidon 1996).

Threats to the Mariana Swiftlet

The restricted distribution of Mariana swiftlets, along with its small population size and dependence on caves, makes the species vulnerable to threats. The causes for the decline of Mariana swiftlets are mostly unknown, but human disturbance, predation, pesticides, and disease have all been hypothesized as having a role. Swiftlets have been documented to flush or fail to enter their caves when humans are near or within their caves (Wiles and Woodside 1999, pp. 57,

61). Swiftlet sensitivity to human presence has resulted in injuries to chicks and adults and could result in damage to eggs (Wiles and Woodside 1999, p. 61). Sources of human disturbance have included Japanese soldiers during World War II, guano mining, hunters, hikers, and vandalism.

While the introduction of brown treesnake is known to have caused the extirpation of many bird species in Guam and CNMI, it is not known whether it has significantly affected swiftlets. Brown treesnake predation on Mariana swiftlets is considered to be a regular event and only those birds able to find nest or roost sites on high, smooth walls and ceilings are able to avoid snake predation. In August, 2011, seven brown treesnakes were observed climbing the walls of the Mahlec cave on Guam (Mosher 2011, pers. com.). The use of pesticides such as DDT has been suspected of causing the decline of swiftlet populations on Guam (Diamond 1984, p. 452), but the concentrations of pesticide residues found in swiftlet guano have not supported this hypothesis (Grue 1985, p. 301). On Saipan, non-native cockroaches are known to destroy swiftlet nests by consuming the saliva that holds the nests to the walls or ceilings (Cruz et al. 2008, p. 242). Savidge (1986, p. 9) investigated the role of disease in the decline of birds on Guam and found that there is no evidence that it has played a significant role. The typhoons that frequently occur in the area may cause periodic declines in swiftlet populations, but are not expected to threaten the species as a whole since the species has survived numerous such events during its evolutionary history (USFWS 1991b, p. 22).

Conservation Needs

The primary threats to the species continue to be predation by the brown treesnake and disturbance at nesting caves. However, other introduced predators and introduced insect species also may have negative impacts to the species. Efforts to minimize disturbance and control snakes and other predators at some nesting colonies have been undertaken. However, additional efforts are needed to help recover the species.

Ongoing Conservation Actions

Brown treesnake trapping occurs at the three occupied swiftlet caves on Guam on the Naval Munitions Site. No predator trapping currently occurs at caves on Saipan or Aguiguan. Quarterly swiftlet departure counts are conducted on Saipan and Guam to monitor swiftlet population numbers.

Environmental Baseline

Swiftlets have been detected foraging over most areas of Saipan, though they are less frequently detected in urban areas (Marshall 2011, pers. comm.). Ten caves are known in Saipan, in the central portion of the island; however, swiftlets are regularly seen foraging in areas where no caves have been found. The nearest swiftlet cave to a proposed turbine location is 3,000 meters (1.8 mile) away (Table 2). No swiftlet surveys were completed for the proposed project, and the CNMI Division of Fish and Wildlife's Breeding Bird Survey data does not cover all the areas where turbines will be located. Island-wide surveys conducted by the Service and CNMI Division of Fish and Wildlife on established transects on Saipan detected swiftlets primarily in the central parts of the island, but swiftlets were also detected in the vicinity of all proposed turbines (USFWS 2008). Overall, there is limited information available on swiftlet presence at the proposed turbine locations.

Table 2. Approximate distance from project sites to a Mariana swiftlet cave

Project site	Closest known Mariana swiftlet cave	Distance (meters)
Saipan Southern High School and Koblerville Elementary School	Hourglass	7,000
Cha Cha Oceanview Junior High School	Tin Can	2,900
Kagman High School	Tin Can	3,000
Gregorio T. Camacho Elementary School	Japanese Tunnel	5,400

Nightingale reed-warbler

A complete Status of the Species for the nightingale reed-warbler can be found in the October 23, 2008, *Programmatic Biological Opinion Regarding the Reestablishment, Management, and Use of the Saipan Upland Mitigation Bank, Saipan* (2008-F-0033). The nightingale reed-warbler was federally listed as an endangered species in 1970 (Service 1970, p. 18321). No critical habitat has been designated for this species. The main threats currently facing the nightingale reed-warbler are: (1) habitat loss and degradation *(e.g.,* wetland destruction, upland forest conversion, habitat destruction by feral ungulates, and habitat degradation by non-native invasive plant species); (2) potential for the establishment of the brown treesnake on Saipan; and (3) predation by introduced animals such as rats *(Rattus* spp.), cats *(Felis catus),* and possibly monitor lizards *(Varanus indicus).* Island-wide surveys for the nightingale reed-warbler were completed on Saipan in 1982, 1997, and 2007 (Engbring et al. 1986, USFWS 1998a, Camp et al. 2009). These data indicate that nightingale reed-warbler populations on Saipan have declined by approximately 61 percent since 1982.

Environmental Baseline

Surveys conducted by the CNMI Division of Fish and Wildlife in the spring of 2010 indicate that one nightingale reed warbler territory is located adjacent to the proposed turbine location at Saipan Southern High School (Rounds 2011, pers. com.). The territory may contain an estimated one pair of adults and up to four juveniles. The CNMI Division of Fish and Wildlife conducted additional surveys at proposed Green Energy Project sites in October, 2011, and detected no nightingale reed-warblers at these locations (Perlow 2011, pers. com.).

EFFECTS OF THE ACTION

Mariana swiftlet

Foraging swiftlets fly within the height of the rotor-swept zones of both proposed turbine sizes, and therefore, a swiftlet could collide with a turbine blade and suffer injury or death. Two swift species and six swallow species, with similar foraging habitats to Mariana swiftlets, have been killed by turbines in Canada and the mainland United States (Erikson et al. 2001, p. 58 and 62; Stantec 2011, Table 3.5). There is very little information regarding the impacts of small turbines on birds. Barclay et al. (2007, p. 381) looked at data from multiple wind farms and found that the height of turbine had no effect on bird fatalities per turbine. Anderson (2008, p. 5) reported that surveys under a small turbine (37 meter tower height) in Pennsylvania for 1.5 year found one avian mortality in the search area.

There is some evidence from the mainland United States that insects may be attracted to turbines. Kunz et al. (2007, p. 318) report that some flying insects may be attracted to the heat produced by nacelles. Some insects are attracted to the tallest structure in a landscape in a phenomenon known as "hill-topping" (Cryan and Barclay 2009, p. 1335). Horn et al. (2008, p. 127) found that the level of insectivorous bat activity at turbines could be predicted by the level of insect activity around a turbine, and suggested that bats may be attracted to insects at turbines. Rydell et al. (2010, p. 823) found that mortality of bats at wind turbines may be connected to accumulations of migrating insects at turbine towers. Long et al. (2010, p. 323) found that the common turbine color white was most attractive to insects. Aggregations of insects around turbines could serve as learned and consistent food sources (Cryan and Barclay 2009, p. 1335).

The research on insect attraction to turbines has focused on insectivorous bats. It is still not clear how and when insects are attracted to turbines, and whether this would affect swiftlet behavior. Swiftlets are believed to seek out dense concentration of insects (Kershner et al. 2007, p. 21) so it is possible if insects were attracted to the proposed turbines that swiftlets would approach the turbines to forage.

Due to the distribution of swiftlets around the island, their foraging heights and pattern, and the potential for insects to be attracted to turbines, we cannot discount the potential for swiftlets to collide with the proposed wind turbines. However, collision rates are likely to be low given that none of the proposed turbine locations is located near a swiftlet cave or near preferred swiftlet foraging areas of ridge crests and open grassy savanna areas. We do not expect more than four adult swiftlets to collide with a proposed turbine over the 20-year lifespan of the project. If a swiftlet dies after a collision with a wind turbine there is the possibility for indirect take of a swiftlet egg or nestling. The adult swiftlet lost to direct take could have been tending to an egg or nestling. The loss of this adult would then also likely lead to the loss of an egg or nestling. Loss of an egg or nestling would be indirect take attributable to the proposed project. Both adults attend nests and feed nestlings, swiftlets can breed year-round, and parental attendance after fledging is minimal (Morton and Amidon 1996, p. 9). In a worst case scenario, each adult swiftlet killed by a turbine could have been tending a nest which would then fail as a result of loss of the adult. Therefore, for each adult taken by a turbine there is the potential for take of one nest (one egg or one nestling).

Nightingale reed-warbler

Nightingale reed-warblers may be affected by turbine operation and vegetation clearing. Turbine operation could cause direct mortality or injury to reed-warblers that collide with rotating turbine blades. Tangantangan dominated forested areas with potential nightingale reed-warbler habitat are found adjacent to proposed turbine locations. Within forested areas, nightingale reed-warblers primarily are found skulking below the canopy (USFWS 1998b). Reed-warblers have a body type suited for maneuvering in dense vegetation, and are usually concealed in thick vegetation making them difficult to detect except via sound (USFWS 1998b). However, numerous passerine species have been killed by wind turbine operations. Information on mortality for similar species is difficult as no *Acrocephalus* species are present on the United States mainland where turbine monitoring reports are available.

There is currently only one occupied nightingale reed-warbler territory adjacent to a proposed wind turbine location. Habitat for this territory will be cleared as part of the proposed project to minimize the chance of collision. It is possible that over the 20-year lifespan of the project reed-warblers could move into some of the forested areas adjacent to the proposed turbines. Reed-warblers are declining on Saipan (Camp et al. 2009) reducing the risk that an area adjacent to the turbines will become occupied.

Given that there are currently no nightingale reed-warblers using habitats adjacent to the proposed wind turbines (except for the territory that will be cleared), the infrequency of nightingale reed-warblers flying in open areas, and the small rotor-swept-zone of the turbine blades, it is unlikely that a nightingale reed-warbler flight path would pass directly into the rotor-swept-zone of a proposed turbine and result in a collision.

Evaluation under Programmatic Consultation
Due to vegetation clearing of the one occupied adjacent territory, one nightingale reed warbler territory will be subject to direct impacts including habitat loss, fragmentation and degradation. Indirect impacts to this territory and potential adjacent territories include increased noise during clearing and increased risk of non-native invasive species. Project impacts are assessed by determining the number of territories directly and indirectly affected by the action. For this action, ESA responsibilities will be addressed by using one CNMI Government Credit in the Saipan Upland Mitigation Bank commensurate with the direct and indirect impacts associated with the project, and by implementing conservation measures.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future non-Federal actions that are reasonably certain to occur within the area of action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the ESA and, therefore, are not considered cumulative for the proposed action. Within the action area, the only non-Federal actions would be locally-funded educational activities, recreational sports, or school construction projects. Because the action area consists primarily of mowed lawns, buildings, and paved areas. there are unlikely to be any future actions that would affect listed species within the action area.

CONCLUSION

The Service anticipates that the direct and indirect effects of the proposed action will result in take of the Mariana swiftlet in the form of death or injury and take of the nightingale reed-warbler in the form of harassment. For the nightingale reed-warbler, the Service has determined that the proposed action conforms with the Programmatic Biological Opinion based upon the nature of the action and the incorporation of avoidance, minimization, and offsetting measures as described in that document. Additionally, the status, baseline, and potential project impacts are current and consistent with those evaluated within the Programmatic Biological Opinion.

Population numbers for the Mariana swiftlet on Saipan have been steadily increasing over the last 10 years (CNMI DFW 2010). The loss of four adult Mariana swiftlets and four nests will

not change the overall trajectory of Mariana swiftlet population numbers. After reviewing the current status, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the proposed action discussed herein is not likely to jeopardize the continued existence of the nightingale reed-warbler or Mariana swiftlet.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations promulgated pursuant to section 4(d) of the ESA prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

Based on the proposed project description and the analysis of the effects of the proposed action provided above, the Service anticipates that the installation of operation of the 10 wind turbines on Saipan may cause take of Mariana swiftlet and nightingale reed-warbler. The breakdown of potential annual take for each activity is as follows:

1. The Service estimates that up to four Mariana swiftlets and four Mariana swiftlet nests (1 egg or nestling) may be taken as a result of the proposed project.
2. The Service is tracking the loss of the nightingale reed-warbler and its habitat permitted under the Programmatic Biological Opinion, and we evaluate each project to ensure that continued implementation will not result in unacceptable effects to the listed species. Actions of the proposed project may result in direct effects to one territory of the endangered nightingale reed-warbler. The conservation measures appropriate to avoid, minimize and offset project impacts as identified in the Programmatic Biological Opinion have been included within the project description above. However, it is still possible that a nest could be destroyed when reed-warbler habitat is cleared.

Effect of the Take

Mariana swiftlet
The Service has determined that this level of anticipated take is not likely to jeopardize the continued existence of the Mariana swiftlet.

Nightingale reed-warbler
The level of Incidental Take (i.e., direct effects to a portion of one territory resulting in harassment of up to two adults and up to four juveniles) anticipated from this project is authorized and accounted for within the Programmatic Biological Opinion and will not jeopardize the survival or recovery of the nightingale reed-warbler. No additional Terms and Conditions are necessary due to the conservation measures incorporated within the project description above.

Reasonable and Prudent Measures
The reasonable and prudent measures given below, with their implementing terms and conditions, are designed to minimize the impacts of incidental take that might otherwise result from the proposed actions. If, during the course of the action, the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review the reasonable and prudent measures provided. In addition, the action that caused the taking must cease; the action agency must immediately provide an explanation of the causes of the taking; and must review with the Service the need for possible modification of the reasonable and prudent measures. The following reasonable and prudent measures are necessary and appropriate to minimize the effect of take on Mariana swiftlet.

1. The DOE and CNMI Public School System shall minimize the potential for harassment, harm, or mortality of Mariana swiftlets.

Terms and Conditions
In order to be exempt from the prohibitions of section 9 of the Act, the Service and any subsequent project applicant, must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following terms and conditions implement reasonable and prudent measure number one.

1(a) All CNMI Public School System maintenance crews and janitors at the five schools will be trained in carcass detection and the Mortality Monitoring Program.

1(b) The CNMI Public School System will provide the Service with the name and contact information for one person at each Public School System school with a wind turbine who is lead for each year for the Mortality Monitoring Program.

1(c) An annual report for the Mortality Monitoring Program will be prepared and submitted to the Service and the CNMI Division of Fish and Wildlife by December 31 of each year. In addition, an initial report will be submitted six months after turbine operation begins.

1(d) Dead Mariana swiftlets found under a wind turbine will be collected by and given to the CNMI Division of Fish and Wildlife to send to Dr. Thierry M. Work at the National Wildlife Health Center, Honolulu Field Station (U.S. Geological Survey-

Biological Resources Discipline) for a necropsy. The method of shipment and preservation will be determined in coordination with Dr. Work.

1(e) The CNMI Public School System will notify the CNMI Division of Fish and Wildlife and the Service of all wildlife mortalities found under the turbines.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as suggestions from the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for these species.

1. The CNMI Public School System should conduct scavenger removal trials to determine the rate that scavengers might be removing carcasses from beneath the turbines. The Service's Pacific Island Fish and Wildlife Office can help with setting up this program.
2. The CNMI Public School System should conduct search efficiency trials to determine if the monitoring program is detecting all carcasses beneath the turbines. The Service's Pacific Island Fish and Wildlife Office can help with setting up this program.
3. The CNMI Public School System should set up a web-based database where data from surveys at all schools can be entered to avoid loss of data and to provide a means to monitoring whether surveys are being performed.
4. The CNMI Public School System should put up signs around the turbines requesting that all wildlife injuries or mortalities be reported to the responsible school officials.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation on this action. As required in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

As stated in the Conclusion (above), the Service's finding of non-jeopardy is based in large part on the conservation measures. Should there be a failure to carry out any or all of the described measures, or if the measures are not effective, or if these measures are modified in any way without Service coordination, reinitiation of consultation will be required. If you have any questions regarding this Biological Opinion, please contact Rachel Rounds at (808) 792-9400.

Sincerely,

Loyal Mehrhoff
Field Supervisor

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Appendix 1. Not Likely to Adversely Affect Determination for the Mariana common moorhen

This Appendix is in response to your request for our concurrence with your determination that the Green Energy School Project, as described above, will not adversely affect the endangered Mariana common moorhen (*Gallinula chloropus*). The findings and recommendations in this consultation are based on: (1) your Biological Assessment dated December 30, 2011; and (2) other information available to us. A complete administrative record is on file in our office. This response is in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*).

The Mariana common moorhen was federally listed as an endangered species in 1984 (USFWS 1984). The recovery plan for the Mariana common moorhen was finalized in 1991 (USFWS 1991a, 55 pp.). A five-year status review completed in 2009 determined that the Mariana common moorhen still meets the definition of endangered (USFWS 2009, p. 9).

The Mariana common moorhen is currently found on Saipan, Tinian, Rota, and Guam. The Mariana common moorhen is believed to be extirpated from Pagan due to the volcanic eruption in May, 1981, and destruction of vegetation by feral ungulates (Stinson et al. 1991, pp. 41–42). In 2004, it was estimated that there were approximately 90 Mariana common moorhen on Guam, 154 on Saipan, 41 on Tinian, and only two individuals on Rota (Takano and Haig 2004a, p. 247 (Table 9)). On Guam, the number of Mariana common moorhens has recently decreased at the Fena Valley Reservoir potentially due to the loss of *Hydrilla verticillata,* a wetland plant used as a nesting substrate, as a result of eutrophication of the lake after a typhoon (Brooke and Grimm 2008, p. 2). While it is possible that the Fena Reservoir birds moved to other wetlands and the Guam population has not declined overall, comprehensive surveys on Guam would be needed to determine the impact of the loss of habitat at Fena Lake to the overall population. Moorhen surveys are conducted by the CNMI Division of Fish and Wildlife at 22 wetland sites on Saipan. Data from these surveys shows that population numbers were stable on Saipan from 2007-2010 (CNMI DFW 2010).

The Mariana common moorhen prefers wetlands with diverse, non-persistent, emergent vegetation containing deep and shallow water areas with equal areas of vegetation cover and open water (Ritter and Savidge 1999, p. 286; Stinson et al. 1991, p. 39). Primary habitats (as defined in the recovery plan) include: Agana marsh, Fena Valley reservoir, and the Naval Station Marsh, Guam; Lake Hagoi on Tinian; and Lake Susupe, Puntan Muchot, and Garapan wetlands on Saipan (USFWS 1991a, pp. 4–16). Several secondary wetland habitats were identified on Guam and Saipan; only one secondary wetland (Magpo) on Tinian was considered important for the recovery of the species (USFWS 1991a, pp. 4–16).

Mariana common moorhens feed on plant and animal matter in or near wetlands (USFWS 1991a). Seale (1901, p. 31) found grass, insects, and larvae in the stomachs of the Mariana common moorhen on Guam. Pratt et al. (1987, p. 128) reported that Mariana common moorhen eat mollusks and plants. Little is known about the reproduction of the Mariana common

moorhen (USFWS 1991a, p. 17). Nests have been constructed in *Scirpus litoralis*, *Panicum muticum*, and *Cyperus* spp. (Ritter 1994, p. 128; USFWS 1996, p. 7). Birds often nest multiple times in a year and juveniles from early broods are known to stay on their natal territory and help rear siblings from later broods (Ritter 1994, p. 130; Takano 2003, pp. 4–5).

Takano and Haag (2004b, p. 659) found that most radio-tagged moorhens on Guam and Saipan remained at capture sites during the dry season but moved between sites during the wet season. Moorhens tended to move alone (and not in pairs) and during the night. Two adult moorhens moved from Saipan to Tinian. Rallidae family species tend to migrate at night and fly at low altitudes (Taylor 1996, p. 113 and 134).

Currently, the main two threats to the Mariana common moorhen are: (1) loss and degradation of wetland habitat, including filling, alteration of hydrology, invasion of habitat by non-native plants, and unrestricted grazing of domestic and feral ungulates; and 2) predation by introduced species (USFWS 1991a, p. 19; USFWS 1996, pp. 11–12).

Only interim recovery objectives were identified in the recovery plan due to a lack of data necessary to fully understand the needs of viable populations of this species (USFWS 1991a, p. 21). The primary task is to promote the survival of the species by providing stable, productive habitat throughout the historical Mariana common moorhen range. This entails 1) securing and managing all primary habitats to maximize the habitat conditions; 2) maintaining the secondary habitats as wetlands or creating new wetlands for those that are lost; and 3) minimizing mortality from predation, poaching, and other factors including human disturbance.

Environmental baseline
In 2001, an island-wide survey produced an estimate of 154 Mariana moorhens on Saipan (Takano and Haag 2004a, p. 245). The CNMI Division of Fish and Wildlife conducts quarterly surveys at 22 wetlands on Saipan. From 2007 to 2010 the total number of moorhens detected at these sites has remained stable between 70 to 80 moorhens per survey (CNMI DFW 2010, p. 44). There are no wetlands or other moorhen habitat located at the project sites.

Not Likely to Adversely Affect: Mariana common moorhen
Mariana common moorhen wetland habitats are found scattered throughout Saipan, but are primarily located in the central and south of the island. Takano and Haag (2004b, p. 659) documented that moorhens move between wetland sites, primarily during the wet season. However, moorhen flight paths and flight heights are unknown.

The closest known Mariana common moorhen habitat to each turbine site is shown in Table 1. Cha Cha and Kagman schools are not on any direct flight paths between wetlands or known moorhen sites. There are National Wetland Inventory mapped wetlands north and south of Gregorio school (but not on a direct path) but it is unknown if these wetlands are still present or occupied by moorhens. Based on aerial photos it appears these wetlands may be filled in with *Phragmites karka* and unsuitable moorhen habitat. There are no records of moorhens at these sites as of 2004 (Takano and Haig 2004a, p. 247; USFWS 1991a, p. 11).

Table 1. Approximate distance from project sites to Mariana common moorhen habitat

Project site	Closest known Mariana common moorhen habitat	Distance (meters)
Saipan Southern High School and Koblerville Elementary School	Coral Ocean Point Golf Course ponds	1,100
Cha Cha Oceanview Junior High School	Lau Lau Bay Golf Course ponds	350
Kagman High School	Lau Lau Bay Golf Course ponds	950
Gregorio T. Camacho Elementary School	Nikko wetland	400

We have determined it is discountable that a Mariana common moorhen would pass through the rotor-swept-zone of the proposed turbines given the small number of moorhens on Saipan, the distance from the proposed turbines to wetland habitats, the infrequency of moorhens flying between wetlands, and the small rotor-swept-zone of the turbine blades.

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