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16. Abstracts

The Mt. Hartman Estate is the target for tourism development activities given its physical setting (location, topography, climatology etc) and natural scenic beauty. The Grenada Dove National Park is also located within the Estate and hence presents possible resource use conflicts if the two objectives of conservation and socio-economic development are not integrated into a coherent strategy.

A strategy that combines conservation objectives with a resort development project was designed for the area. All areas where Grenada Dove populations have been observed within the dove sanctuary will be protected within the primary reserve. These areas also represent the areas of mature dry scrub habitat of high quality as compared to other areas with more recent disturbance regimes.

Migratory corridors will be developed to link the parcels of land that contain the mature dry scrub forest so that a contiguous dove sanctuary will be established. Degraded areas within the primary reserve, such as those where dumping of garbage, burning of charcoal and removal of top soil has occurred, will be restored and overall habitat quality will be enhanced. Buffer zones will be established around the perimeter of the primary reserve. Upon completion the overall project density will not exceed 40% of the vegetated landscape.

The Developer is committed to protection of the environment and has already demonstrated that commitment by incorporating sound environmental management principles into the planning and design of the project. The overall project will be implemented based on the recommendations of an environmental impact assessment. It is envisaged that by connecting the primary dove habitat, restoration of degraded areas, elimination of destructive resource use practices, the dove population will be enhanced. The project will direct more resources for proper management of the reserve and for undertaking the necessary research. The national importance of the Grenada Dove will be lifted. As presented, the development plan with the integrated conservation areas provides benefits for both conservation and socio-economic development.

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1.0 INTRODUCTION

1.1 Background of the Project

The Mt. Hartman Estate is the target for tourism development activities given its physical setting (location, topography, climatology etc) and natural scenic beauty. The Grenada Dove National Park is also located within the Estate and hence presents possible resource use conflicts if the two objectives of conservation and socio-economic development are not integrated into a coherent strategy.

It is the intent of the Government of Grenada and the Developer to work together on achieving the best practical environmental options for rational land use that will provide a win-win outcome. The opportunity is presented to develop a model for public-private sector partnership in implementing sustainability principles for conservation of biological diversity and economic development. The intention is for this project to integrate a mixture of strategies that will provide benefits across several levels:

1. *Global benefits:* The Grenada Dove is found only in Grenada and the project will provide international exposure and resources for proper management and maintenance of the National Park.
2. *National benefits:* A well designed tourism project will boast the local industry, provide jobs, generate revenues and stimulate the growth of other sectors. The project will also help Grenada realize its stated objectives of conservation of biological diversity by providing resources to do so and lifting the national perception on the importance of the Grenada Dove.
3. *Social benefits:* Through the creation of jobs both directly and indirectly as well as opportunities for social development, a sustainable tourism initiative will provide benefits to a large cross section of people.
4. *Private benefits:* The proponents of the project can achieve great mileage for developing a "green project" integrated into wildlife sanctuary for a species that is found only in Grenada.

For all concerned, there is sufficient justification for this conservation and development strategy which will advance national development.

1.2 Consultants Terms of Reference

The services of the environmental management and development consulting firm JECO Caribbean Inc was retained to work with the relevant stakeholders and arrive at an appropriate conservation and development strategy for the Mt. Hartman Estate. The principal investigator for the assignment is Dr. Valma Jessamy an environmental engineering scientist who also has training in ecology, restoration biology and ecological economics. Professor Thomas Crisman (Environmental Scientist) of the University of Florida, USA serves as an adviser to the JECO Caribbean team.

The consultant's work involved the following activities:

1. An ecological survey of the Grenada Dove habitat within the Mt. Hartman Estate
2. Development of an ecological map of the Grenada Dove habitat
3. Identification of areas for conservation and development
4. Preparation of a non-technical summary and presentation of the conservation and development strategy for the project.

1.3 Study Approach

The assignment was undertaken during the period September – October 2006. A combination of historical data from past studies and maps were reviewed to develop an overall natural history of the Mt. Hartman Estate. Recent reports from the World Bank funded Dry Forest Project were utilized to provided current information on the status of the habitat and population of the Grenada Dove. Satellite imagery combined with field surveys was utilized to develop a vegetation zonation map for the Estate. The quality of different habitat types were used as the basis for determining areas that should be conserved, restored or utilized for development activities.

2.0 OVERVIEW OF THE GRENADA DOVE

The Grenada Dove, *Leptotila wellsi*, is found only on Grenada. It is considered one of the most endangered doves in the world, according to the Conservation Assessment and Management Plan of the Pigeon and Dove Specialist Group of the IUCN (International Union for the Conservation of Nature (Rusk, 1998, Toone et al., 1994.) First documented in 1886, the Dove was considered rare since 1943.

Description: (Lawrence 1884) Length 28-31 cm. The throat is white, face & forehead a pale pink shading to grey & to brown on the crown & nape. Neck, upper breast pinkish buff shading to white on lower breast belly & under tail coverts. Flanks are light brown; upperparts bronzy olive brown. Under wing chestnut; irides whitish yellow; eye cere & eye line to bill red. Legs & feet carmine or coral red. Bill back. Female similar but much duller. Juvenile darker & duller with buff fringes to the feathers.

2.1 Biology and Ecology of the Dove

Observations have located doves on successional stages of seasonal formations from dry areas in the South of Grenada to more humid sites in the West of Grenada. The Grenada Doves may be using forest sites according to resource availability. In the South they may be closed canopy forest for perching, open under-storey for feeding grounds and scrubland for nesting. It may have always been confined to xeric, coastal areas where climax vegetation is typically deciduous, seasonal thorn woodlands. Disturbance regimes have kept these vegetation systems in non-climax seral condition.

The Grenada Doves have clutch of two white eggs; Incubation 13-15 days, young fledge within two weeks. Little is known of nest location upon forest or tree architecture. Very little is known about feeding biology in terms of fruits, seeds or grains consumed. Grenada Doves were observed peeking seeds on the ground (Rusk, 2006). Twyman and Hayslette (2006) were able to collect a fecal sample from a Grenada Dove. The fecal sample was orange and gelatinous and contained endocarps of *Bourreria succulenta,* one of the ubiquitous dry forest tree species.

An important resource that has not been taken into consideration in the link between distribution of Dove populations and their habitat is freshwater. There are plenty of water resources (river, creeks) at the western sites but few on the southern sites. It is not sure what water bodies provide freshwater for the dove populations in the Mt. Hartman area.

2.2 Distribution and Abundance

Leptotila wellsi is limited primarily to the dry scrub woodlands and seasonal deciduous forest of the southwest and west coast. Its habitat is characterized by a fairly closed canopy, leguminous vegetation, large areas of open ground and a shrub layer. Based on surveys done by David Blockstein, the Grenada Dove population was estimated at 100 in 1987 and 75-85 in 1989/1990 (Blockstein, 1991), 98 - 124 birds (Rusk 1998). The most recent pre-hurricane Ivan census estimated a larger population size of 182 individuals, or 91 breeding males (Rusk, 2006).

Estimates of the pre-hurricane Ivan population of *Leptotila wellsi* at Mt. Hartman: c 20 pairs in 2004 (22% of the total population). From census conducted 3-4 months post-hurricane Ivan (2004) the population was c 11-20 pairs (Rusk, 2006). However, this number may be an under or over estimate, due to change in calling behavior post-hurricane. The trend in Grenada Dove population is summarized in the Table below (Rusk, 2006). From the data presented there was an increase in Dove population from 1987 to 2003, with declines following the major hurricane disturbance of their habitat. It

is difficult to perform any trend analysis on the data due to inconsistency in the study methodology, timing and location of the different researchers.

Southwest				West				Grand Total
	Mt Hartman	Other	Total	Perseverance/ Woodford	Beausejour	Other	Total	
1987a	39	10	49	---	---		0	49
1988b	32	5	37	---	---		0	37
1988c	25	4	29	---	---		0	29
1989/90d	23-26	2	25-30	10	3		13	38-43
1991e	22-25	—	22-25	---	2		2	24-27
1995f	—	—	—	(Persev) 7-9	0		7-9	---
1998g	29-35	1	30-36	19-26	0		19-26	49-62
2003h	30	25	55	19	(Bow&GVale) 15	2	36	91
*2004i	17-33	12-15	29-48	1-5	(Bow&GVale) 1-6	1	3-12	32-60

aBlockstein 1988; bSievert Unpubl.; cRoberts and Taylor 1988; dBlockstein 1991; eRusk 1992; fRusk & Temple Unpubl.; gRusk 1998 Unpubl.; hClouse and Rusk 2004 Unpubl.; iRusk 2005 this study

*No direct comparison with pervious years should be made. Incorsistent calling behavior due to hurricane.

Table 2. Population counts of Grenada Doves (1987 – 2004).

The following map shows the post hurricane Ivan location of Grenada Doves in the southwest of Grenada (yellow dots).

(Source: Rusk, 2006)

3.0 THE MT. HARTMAN ESTATE

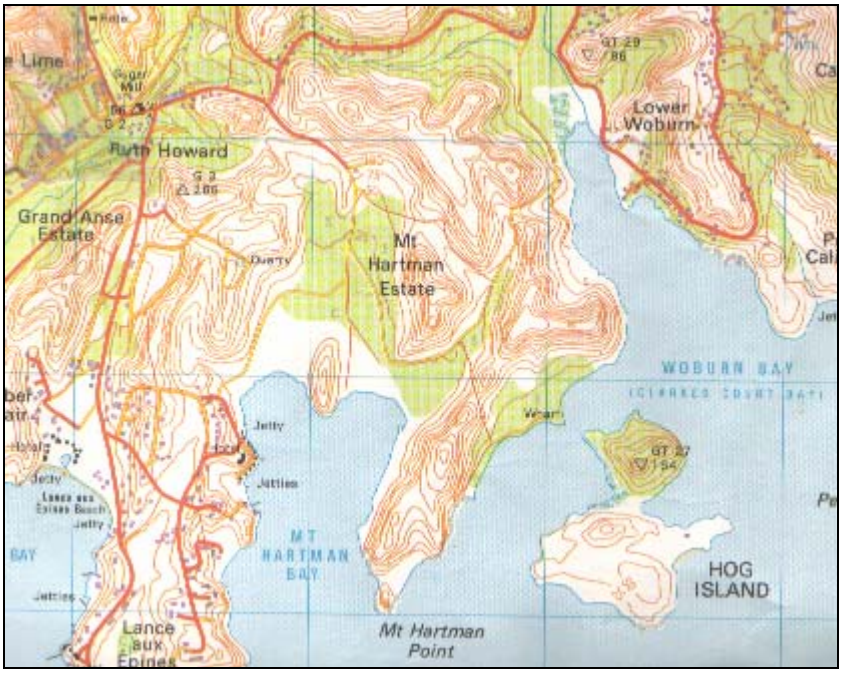
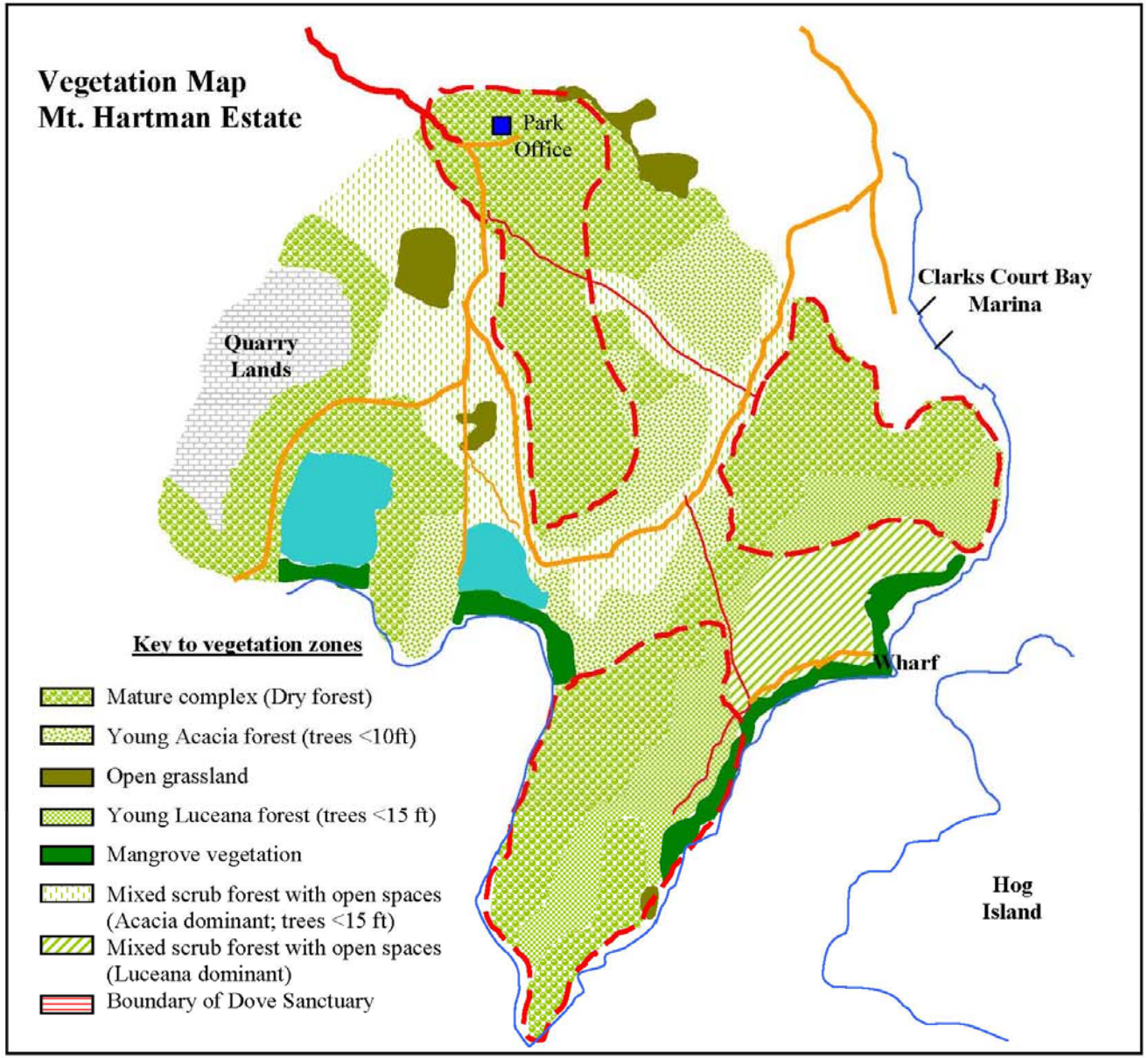


Figure 3.1 Map extract showing location of Mt. Hartman Estate

3.1 Characteristics of Habitat

The Mt. Hartman Estate was an abandoned sugarcane plantation that has grown into deciduous thorn scrub woodlands. This site is predominately secondary scrub woodland and deciduous forest of both native and exotic species. The vegetation is typically characterized by a canopy of 5 – 10 m in height with emergent trees, primarily *Bursera simaruba,* on the steeper slopes, with a shrub layer and large areas of open ground. Common canopy species found include: *Haematoxylon campechianum* (native), *Exostema caribaea, Forrestieria rhamnifolia. Leucaena leucocphala, Pisonia fragans (*native), *Acacia macrantha, Pithcellobium unguis cati (*native), *Genipa Americana,* and *Citharexylum fruticosum* (native). Mid-level vegetation include: *Chomelia fasciculate, Bourreria succulenta* and *Randia acueata.* Shrubs found in open areas include *Cordia curassavica* and *Croton flavens.* A vegetation map showing the major zones is included on page 7 of this report.


Vegetation Map
Mt. Hartman Estate
Park Office
Clarks Court Bay Marina
Quarry Lands
Wharf
Hog Island
Key to vegetation zones
Mature complex (Dry forest)
Young Acacia forest (trees <10ft)
Open grassland
Young Luceana forest (trees <15 ft)
Mangrove vegetation
Mixed scrub forest with open spaces (Acacia dominant; trees <15 ft)
Mixed scrub forest with open spaces (Luceana dominant)
Boundary of Dove Sanctuary

3.2 Current Uses

The Mt. Hartman Estate is primarily a wooded pasture which is used by the residents in the nearby communities for livestock rearing, hunting, foraging and fruit gathering, charcoal production and limited recreation. Three parcels of land totaling 154.18 acres have been demarcated as dove sanctuary for the Grenada Dove National Park. With the exception of the headquarters for the Grenada Dove National Park, there are no buildings and development within the Estate. There are historical ruins from the sugarcane plantation era, and a pig farm.

Photos taken during field surveys are included on the following page. They depict some of the human activities that are being carried out within the areas demarcated as the dove sanctuary. Despite these disturbances, the continued survival of dove populations suggests that the Grenada Dove is adapted to disturbance regimes and human activities. However there is the need to better manage the dove sanctuary and improve habitat quality post hurricane Ivan thus ensuring a healthy population of doves.

3.3 Adequacy of the Site

Using pre-hurricane census data, it is estimated that 22% of the dove population are located within the National Park boundaries. It is clear that the areas formally protected only represent a small (approximately 29%) percentage of the total population. Grenada Doves are found outside the protected areas, both on government owned land and on privately owned land, in similar habitat. The Mt. Hartman National Park is comprised of separate patches of habitat, a situation that is undesirable for maintaining a viable Dove population. Habitat critical to the Grenada Dove, outside the formally protected areas, should also receive special management. Migratory corridors and vegetated zones are thus required to link the dove habitats.

Photos showing current activities taking place within the National Park

Photo 1. Burning of garbage within the National Park

Photo 2. Illegal disposal of garbage within the National Park

Photo 3. Removal of top soil within the National Park

Photo 4. Animal grazing result in open pasture areas within the National Park

4.0 CONSERVATION AND DEVELOPMENT STRATEGY

4.1 Key Conservation Objectives

As noted in the introductory comments, the need for land uses that provide maximum benefits for conservation and socio-economic development is necessary. From the review of existing literature and field work the following are considered key objectives to be met:

1. A primary reserve of continuous dove habitat must be retained within the Mt. Hartman Estate.
    a. The area measuring 45.09 acres bordering the park headquarters is recommended as the primary reserve.
    b. This area will be linked to other habitat reserves via migratory corridors containing suitable scrub habitat.
    c. Rusk (2006) reports that the regions north of the Mt. Hartman Estate have more Doves than that found within any area of comparative size in the national park. It is recommended that this zone be extended further North over the ridge. The lands in that area are private, and considerations should be given for acquiring the land or special management arrangements.
    d. The survey plots that were established under the Dry Forest Project in that area should be monitored regularly.
2. Buffer zones must be established and maintained between the dove sanctuary and the areas that are targeted for Four Seasons Resort Project.
3. There are other wildlife species of ecological significance within the Mt. Hartman Estate. Representative habitat types and green areas should be retained in addition to the preferred dove habitat.

4.2 The Development Strategy

The proposed development plan and conservation area is included on page 12 of this report. The golf course, residential lots, hotel and ancillary facilities will be integrated into the conservation areas through the use of buffer zones and vegetated areas throughout the landscape. The following project attributes must be noted:

- All areas where Grenada Dove populations have been observed within the dove sanctuary will be protected within the primary reserve (area shaded dark green). These areas also represent the areas of mature dry scrub habitat of high quality as compared to other areas with more recent disturbance regimes (see vegetation map on page 7).
- Migratory corridors will be developed to link the parcels of land that contain the mature dry scrub forest so that a contiguous dove sanctuary will be established.
- Degraded areas within the primary reserve, such as those where dumping of garbage, burning of charcoal and removal of top soil has occurred, will be restored and overall habitat quality will be enhanced.
- Buffer zones will be established around the perimeter of the primary reserve.
- The residential lots will range in size from 10,000 sq ft to 25,000 sq ft, with average house size being 3,000 sq ft. This will allow for additional greenery and habitat for wildlife to colonize. The villas will be pavilion style with very low vertical impact, separated by vegetation and nestled into the trees.
- Construction of the entire project including the villas will take place by the developer so the required guidelines will be maintained.
- All roads will have a five-feet vegetated reserve on each side through which services will be located.
- The existing quarry lands will be restored into functional space and habitat that can be colonized by wildlife. Additional the reduction of dust and noise will enhance the tranquility of the dove sanctuary.
- Upon completion the overall project density will not exceed 40% of the vegetated landscape.


PARK OFFICE
CONSERVATION AREA WITH 10M BUFFER ZONE
RESORT HOTEL
RESIDENTIAL LOTS
GOLF CLUBHOUSE
REMOTE SERVICES
HOTEL RECEPTION
HOTEL VILLAS
OVER WATER VILLAS
HOTEL VILLAS
OVER WATER VILLAS
HOTEL VILLAS
SPA
BEACH CLUB
SCALE 1:4000 - A1
SCALE 1:8000 - A3
DEVELOPMENT PLAN & CONSERVATION AREA OF MOUNT HARTMAN AND HOG ISLAND ESTATE
GKA
GROUNDS KENT ARCHITECTS

4.3 Recommendations for Site Development

The following are general guidelines for development around the dove habitat/ conservation zones:

- From the disturbance regime observed at the Perseverance and Mt. Hartman Estates there is evidence that the doves are adapted to human civilization and will be able to survive through the construction period. However, this will only happen if suitable habitat is left undisturbed and connected to refuges in nearby vegetated areas.
- Migratory corridors should be no less than 50 feet in width and flanked by buffer zones 20-30 feet wide.
- Migratory corridors must be managed to retain a closed canopy with an open under-storey with representative species found in mature habitat in the area.
- Buffer/transition zones must be designed around all reserves and should be maintained as shrub habitat with dense ground cover. This will restrict movement of animals and other sources of disturbance into the dove habitat.
- Residential lots around buffer zones should maintain at minimum 20% of the native vegetation and overall impervious surfaces should not exceed 35% of the lot size.
- Lights must be oriented away from trees in buffer zones to prevent disturbance of roosting and nest sites.
- Where roads intercept the migratory corridors, the width should be designed for the minimum possible thus reducing the width of open space to be traversed by wildlife.
- Vegetated corridors along the fairway of the golf course must be linked to migratory corridors and conservation areas, thus effectively increasing the permanent wildlife habitat

5.0 CONCLUSION

The Developer is committed to protection of the environment and has already demonstrated that commitment by incorporating sound environmental management principles into the planning and design of the project. The overall project will be implemented based on the recommendations of an environmental impact assessment.

It is envisaged that by connecting the primary dove habitat, restoration of degraded areas, elimination of destructive resource use practices, the dove population will be enhanced. The project will direct more resources for proper management of the reserve and for undertaking the necessary research. The national importance of the Grenada Dove will be lifted.

As presented, the development plan with the integrated conservation areas provides benefits for both conservation and socio-economic development.

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1. Grenada Dry Forest Biodiversity project ***4 – P Workshop Report***
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