



**Multiple-Use Diamante Property, San Salvador, Costa Rica:
Hydroelectric, Organic Permaculture, and Ecotourism: a Prospectus**



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Diamante Falls

INTRODUCTION AND PURPOSE

The subject of this prospectus is a 61 hectare tract of land in south central Costa Rica. It is one quarter primary tropical rain forest, the rest in secondary, pasturage, and agriculture. It has around 1.5 km of frontage on the Rio Diamante and many views of Costa Rica's highest waterfall, Diamante Falls, to the east. Across the river frontage and an adjoining 10-hectare tract, there are 420 feet of vertical relief. High wet season flow provides for a hydroelectric potential of around 700 kilowatts. The acreage is ideally suited for agricultural as well as tourism operations and currently sustains sugar cane, coffee, banana, other fruit plantations and a small amount of livestock. Two bungalows on the property are equipped American style and used currently as the offsite owner's residence and a vacation rental. For hydroelectric development, the main property is of limited value without the adjoining ten hectare property, ideally located for a water intake.

The return on investment projected—with the price of the primary property and estimated market value of the secondary properties included in project capitalization—is 10 %, with a payback period of 10 years, in power cogeneration revenues alone. The central location, strong hydroelectric economics,

versatility of the property for multiple uses, all combine to make this property an ideal candidate as a showcase for sustainable development and environmentally responsible stewardship. With Costa Rica anxious to develop renewable energy sources and wean itself from Venezuelan crude, yet hamstrung over environmental and social opposition to conventional hydro dam construction, River Run Hydro seeks to push the existing power generation envelope to further the development of small to medium sized run-of-river style hydroelectric facilities nationwide.



Rio Diamante, target intake location



Rio Diamante waterfall

Our analysis has shown that in most cases such projects are untenable economically if the land must be purchased. Correspondingly, RRH promotes joint ventures with existing landowners. However, where the land in question has multiple uses, the economics are more favorable to installations requiring outright land purchase. The Diamante property is unique in that it has not just one additional use in agriculture, but is ideally situated to capitalize as well on Costa Rica's famous ecotourism industry.

THE PROPERTY



View from property slopes over lowlands



Pasture

Location



Figure 1. Map of Costa Rica showing regional inset.

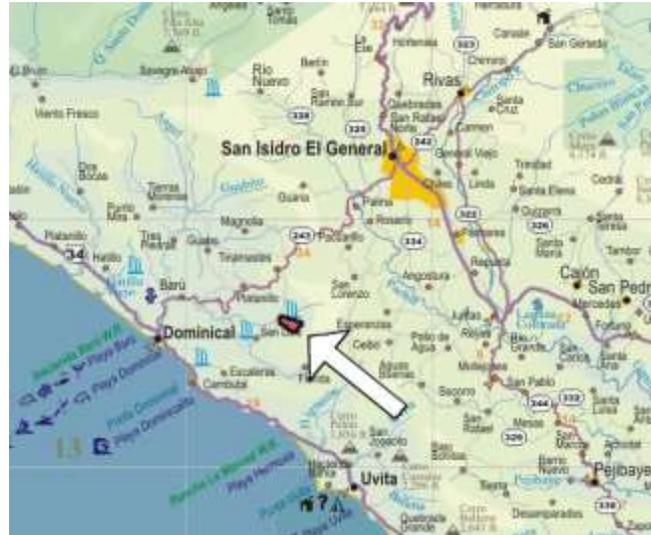


Figure 2. Regional inset showing location of target property in red with black outline

As shown in Figures 1 and 2, the property is located in southwest Costa Rica in rolling hills of the coastal mountain range. The primary property is 61 hectares with an asking of 1.3 million, and the second adjoining property is 10 hectares that is not formally on the market but is projected to have a fair market value of around \$250,000. The properties have 1.5 km of frontage on Rio Diamante, the waterway that drains the famed Diamante Falls—Costa Rica’s tallest waterfall—itsself visible from many points on the property. The property is located within fifty meters of the gravel road that connects the local hamlet of San Salvador to the town of Tinamastes, 5 km away. Highway 243 connects Dominical and San Isidro.

River Run Hydro has walked this property several times as it has been on our radar for more than one year. The most recent field investigation was undertaken April 27 2014 on horse and by foot. Our route is superimposed in red on the outline of the property boundary in Figure 3. Our objectives for this field work were: to visit the highest and lowest points on the river, corresponding to idealized intake and generation sites; and to document property features apt for hydroelectric, permaculture, and tourism property development.

The San Salvador region is a sleepy rural backwater with a stunning array of waterfalls, breathtaking vistas, and prolific wildlife. One of the local tourist attractions, San Cristobal Falls—or Nauyaca Falls, if you prefer its commercial sobriquet—is within one km of the property. Though difficult to access due to steep terrain, the property river frontage boasts a series of spectacular waterfalls itself, a resource that has been tapped for extreme adventure canyoneering and waterfall rappelling. Diamante Falls, the highest waterfall in Costa Rica, is just three km from the property. The coastal surfing mecca of Dominical is only twenty minutes away. San Isidro, the southern zone’s largest city at 135,000 residents

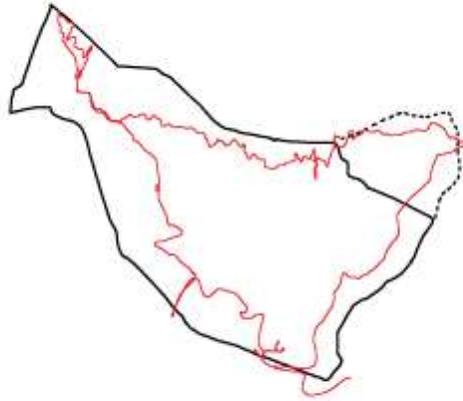


Figure 3. Property outline showing overlay of the route taken during fieldwork for this report.



Figure 4. Overlay of property boundaries on Google Earth satellite imagery.

is also the nation's fastest growing city and provides a source for all things; the nation's capital, San Jose, is a two hour's drive further.

As the satellite imagery of Figure 4 demonstrates, around 40 percent of the property is pasturage. Stands of primary drupe down the slopes to bound the river and comprise about one quarter of the property. The remaining acreage is in secondary reforestation and agriculture. Several creeks drain the slope of the property, and one of these has been developed for micro-hydroelectric power supply, though the project remains unfinished.

Property Attributes

The property boasts a number of modest structures built within the last two decades. Two bungalows, nestled apart from one another in the hills, are simple but modern living spaces well-suited as vacation rentals. A four-bedroom Costa Rican style home currently houses the property caretaker and his family, and a rustic bunkhouse stands near the edge of the forest.



Owner's residence



Owner's residence

Non-residential structures include a stable, a pigpen, and a workhouse in which the *trapiche* (sugar mill) is contained.



Caretaker's home



Corral and stable

Along with reasonably well-maintained internal roads for 4WD vehicles, quads, or horses, that connect all the structures on the property, a network of trails provide access through the forest to various waterfalls and swimming holes along the Diamante.



Bungalow interior



Room with a view

Sugarcane and coffee comprise the majority of the farm's agricultural endeavors; the sugarcane is currently processed on location, using the ox-driven sugar mill included with the sale of the property. Additional to the cane and the 400 coffee plants, two hundred fruit trees bear Valencia oranges, mangos, bananas, star fruit, and cacao. A mature pineapple grove is also under cultivation and bearing fruit.



Internal road



Entrance road, view from southwest property boundary

A small, active quarry provides road ballast directly from the property.

Five adult and two juvenile horses belong to the property. There are three adult dairy cow, two oxen, and four pigs.



Rolling countryside



Flower

The rolling top of the mountain has a number of widely separated building sites with stunning views, the best of which has a 360-degree view from a knoll with gentle slopes, ideal for a master residence. Many sites have views of both Diamante Falls to the east and the rolling hills that cascade down toward the coast.

RUN OF RIVER HYDROELECTRIC POTENTIAL

Rainy season diversion of 11,000 gpm of water through a 30" pipeline across the 420 feet of head provide for a hydroelectric potential of around 700 Kw. Across eight months of power generation at the projected facility capacity, this corresponds to a yearly production potential of 4000 Megawatt-hours with a conservative wholesale market value of \$475,000. Engineering variables are fleshed out in Table 1. A conceptual diagram of the proposed system is shown in Figure 5.

Development of this resource is expected to carry a capital cost of around \$3 million. With property costs of \$1.6 million factored in and the overall investment adjusted for contingencies and conservatism to \$5 million and abstracting for the moment: 1) relatively minor hydroelectric operations and maintenance costs; 2) annual inflation in the price of power and concomitantly greater revenues; and 3) non-hydro revenues generated from multiple uses, the resource provides across a standard 20-year renewable contract with ICE a payback period of 10 years, an ROI of 10%, and a profit over the contractual period of around \$4.5 million, in addition to the value of the property itself.

Table 1. Engineering and design variables of the Diamante run-of-river proposed hydroelectric facility

VARIABLE	UNITS	VALUE
Available Head	feet	420
Pipeline Diameter	inches	30
Flow velocity	feet per second	5
Penstock Flow	cubic feet per second	25
Flow Rate	gallons per minute	11010
Pipeline Length	feet	5750
Head Loss	feet per 100 feet	0.20
Total Head loss	feet	11.5
Effective head	feet	409
Turbine efficiency	percentage	85%
Hydroelectric Potential	kilowatts	688
Annual operation period	months	8
Sell rate	\$/ kilowatt hour	\$0.12
Annual Revenues	dollars	\$475,620
Capital Cost	dollars	\$5,000,000
Payback period	years	11
Return on Investment	percentage	10%

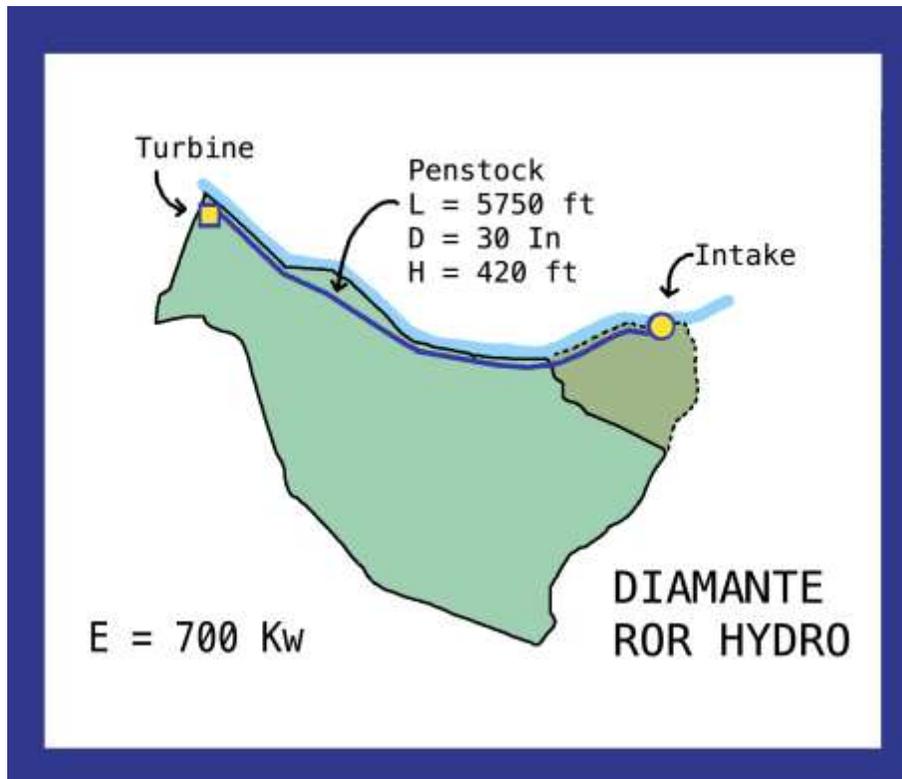


Figure 5. Conceptual design of Diamante hydroelectric system

MULTIPLE USE ALTERNATIVES

Organic Permaculture



Organic agriculture: stock image (not of property)



Idealized organic gardening layout: stock image (not associated with property)

Beyond the modest existing agricultural production, the Diamante property has considerable land that is apt for expansion of sustainable permaculture facilities. With fertile volcanic soils, over 4000 mm of rainfall per year, and an elevation range from about 1000 to 2500 feet above sea level, a wide variety of both native conventional crops are possible (fruits, tropical vegetables) and non-traditional organic cultivation as well, including a wide range of herbs and spices, hot chilies, tomatoes, sweet pepper, cucumber, asparagus, melons, eggplant, squash. Some species (lettuce, onions, carrots, others) are not expected to be productive due to climatic disadvantage for certain agricultural stock. Extensive pasturage provides for land that is suitable for considerable expansion of existing livestock as well. In this manner, goat and cattle dairy operations are expected to be strong, likely components of a permaculture operation, as well as poultry and other fowl and pigs. The climate and soils are ideal for vermiculture. The considerable amount of vegetable waste associated with sugar cane production and routine property maintenance provides for composting operations to support relatively large organic gardening operations.

Organic fruits, vegetables, dairy products, and canned goods enjoy a robust market regionally owing to the abundance of expats demanding such products that live in the Central Pacific region. Likewise, many top-shelf lodges and restaurants increasingly purchase organic products for their menu items. Regional organic markets are currently active in Tinamastes, San Isidro, and Quepos, all of which provide a direct outlet for organic goods produced on site.

Ecotourism

The mid-Pacific coastal region has been one of the fastest growing regional Costa Rican areas of tourism expansion in recent years. A large number of travelers from North America and Europe flock to the coastline that stretches from Manuel Antonio as far down the coast as Ojochal for splendid beaches, world-class surf, unspoiled natural vistas, and the abundance of wildlife still harbored by the extensive rain forest ecosystem habitat that has been affected relatively little by development. In addition to the more than 100 hotels and lodges in this swath, there are presently also over 100 private vacation rentals on the market for visitors seeking greater privacy and versatility in their lodging.



Nauyaca Falls

The region encompassing and adjacent to the Diamante property is particularly noted for its array of spectacular waterfalls. In addition to Diamante Falls, nearby Nauyaca Falls receives from 50-100 visitors daily during the high season that arrive on either guided tours on foot and horseback, or that pay admittance to reach the waterfalls on self-guiding trips. In recent years, an extreme adventure outfitter has sponsored a full-day guided waterfall rappelling and canyoning expedition on the stretch of Rio Diamante bounding the property. The rolling countryside is picturesque with many trails and small roads that make horseback riding tours also popular and a local economic contribution to wranglers and tour operators. Nearby tourist attractions also include a private serpentarium about twenty minutes away. Within an hour and a half drive, Costa Rica's highest mountain, Chirripó forms part of a national park that is one of the nation's most popular, where three-day guided mountain climbing expeditions as well as a variety of other activities are outfitted from San Gerardo de Rivas. This region also sponsors a large number of organic farming operations. The nearby towns of Uvita and Dominical sponsor the annual Envision Music Festival, which draws several thousand visitors annually for the weeklong event.

In order to fully exploit the owner/operator multi-use model of hydroelectric development and sales to the grid, property management would ideally design a model that integrates permacultural and

sustainable development practices with tourism through the construction of bungalows to use as vacation rentals and perhaps as lodging for retreats, seminars, and volunteer tourism to work the farm.



Envision Fest 2013: Uvita; held north of Dominical in 2014

PROPOSAL

Provided that both properties can be acquired, River Run Hydro considers this site an ideal showcase for renewable power development by an owner/operator in combination with the additional property uses of either agriculture and/or tourism. Even without revenues from tourism and agriculture, hydroelectric development alone is profitable. However, given the considerable property resources, best management practices are capable of transforming the Diamante property from its present somewhat neglected state into an ideal case study and example for responsible and sustainable development in harmony with a sensitive and important rain forest ecosystem while contributing green energy to the nation's power grid.

In fact, we think the property is ideally suited to serve as an example and would favorably consider the property as headquarters for River Run Hydro operations as we develop the hydroelectric resource onsite and promote the run-of-river paradigm in the nation's and planet's evolving appetite for carbon-free energy resources. Our resources enable us to provide oversight as needed or desired in key property development goals, including improvement and maintenance of existing property roads and trails, construction management for additional onsite facilities, such as bungalows, living quarters, and a main owner residence.

CONCLUSION



Rio Diamante pool and waterfall

Old growth forest

The multiple-use development model summarized in this report is viable only in the event that the adjacent 10 hectare property can be purchased or if that owner is willing to co-venture in the hydro in exchange for the right to install the intake at this part of the property. A robust run-of-river hydroelectric facility is not viable if this ideal site for an intake cannot be secured. We are in contact with the property owner's agents but have not had confirmation about a willingness to sell or an asking price. The conservative budget included in the economic valuation includes considerably more than the property's actual expected market value. Still, this is an uncertainty that we have not been able to resolve at the time of this writing and remains subject to further development in accordance with further interest from a prospective buyer.

Assuming that the adjacent property can be acquired or a mutually beneficial joint venture negotiated, the Diamante property presents an unusual opportunity to develop and exploit a renewable resource and enjoy a relatively robust return on investment of 10%, without counting the value of the property itself and its inflation as improvements are made. Also, this figure does not account for multiple use revenues derived from agricultural and tourism commercial activities, nor does it take into account the roughly 5% annual inflation in domestic electricity costs.