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Romanza Condominium and Hotel Project

Kaitlin Corporation, Providenciales, Turks and Caicos Islands

Graduate Term Paper
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Executive Summary

The Turks and Caicos Islands (TCI) have experienced exponential growth in the tourism sector over the past few decades. Tourism fuels the economy, and tourism accommodation alone now accounts for at least 34% of GDP (Batas & Forbes, 2007). However, such growth is also associated with environmental, economic and social impacts. The population of the main tourism island, Providenciales, has increased 4,589% over the past 50 years (TCIG, 2012). Most of this increase is attributable to foreign immigration, which places a strain on public infrastructure and has led to social discontent. Pristine coral reefs are being degraded by pollutants and tourism impacts (Kairi, 2000; Nautilus, 2005). Exponential growth in the sector continues, with stay-over tourism arrivals increasing 30% in the first quarter of 2014 over previous years (TCTB, 2014).

Seeking to maximize on the investment potential of the burgeoning tourism industry, Kaitlin Corporation, a Canadian-based development company, has applied for permission to develop the Romanza, a $47 million, 12-story, 243-room hotel and condominium. Such development was previously not allowable under TCI law and breaks with an existing low-density development model. The Turks and Caicos Islands government (TCIG) has recently revised regulation to allow for higher-density development, believing increased building heights and densities will result in improved revenues for government from accommodation tax and stamp duties.

A quantitative analysis of three leading externalities, including coral reef degradation, increased strain on public and social infrastructure and increased production of greenhouse gasses (GHGs) associated with electrical production, reveals that as proposed, the Romanza development will result in gross external costs related to the above variables in the amount of $3,872,591/year.

A green certification program, similar in scope to Green Globe and other established tourism certifications, containing guidelines for wastewater management, public awareness, staff training, use of renewable energy and integrated landscaping management, would minimize externalities significantly. Furthermore, such measures would translate into significant financial savings and benefits to developers. Measures such as implementing solar hot water heating for the proposed development can result in savings of $296,068/year. Integrated sustainable management of landscaping could save $28,000/year, and costs associated with the training of local labor are less than current work permit fees. The viability of these measures is enhanced by ensuring that the baseline environmental values, upon which the TCI economy depends, are sustainably managed for the tourism industry and for future generations.

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1.0 Introduction

Grace Bay, Providenciales, in the Turks and Caicos Islands (TCI), has repeatedly been voted among the top beaches in the world (CNN, 2014; Guides, 2014; News, 2014). The beach has been described as, "a paradise-perfect mix of sugary sand and transparent water (Guides, 2014)," and over the past few decades, TCI has built a successful tourism model, based on low-density, high-end and environmentally sensitive accommodation. TCI's tourism motto is "beautiful by nature," and this motto is reflected in the pristine white sand beaches of Grace Bay that border the crystal-clear, oligotrophic, unpolluted, coastal water of the Princess Alexandra National Park (PANP).

Figure 1 - Grace Bay, Providenciales - The Proposed Development Site

Even paradise has its problems. As with many developing countries, the economic downturn of 2008 severely impacted TCI's fragile tourism economy. Revenue for public expenditure remains severely constrained, and on 8 October 2014, the Cabinet of the Turks and Caicos Islands (TCI) approved a change to long-standing development policy, raising maximum allowable building heights from seven stories to twelve stories. The government is hopeful that increased accommodation densities will result in greater revenues from accommodation tax and stamp duties. The new policy has opened the door for high-density coastal development, which was previously not allowable under TCI law.

In response to the new regulations, in October 2014 the Kaitlin Corporation applied for planning permission to build the Romanza, a $47 million, 12-story, 243-room condominium/hotel on Grace Bay, Providenciales in TCI. In addition to the direct government revenues noted above, the developers indicate that benefits will include jobs for skilled and unskilled labor during pre-construction, construction and operational phases. On the other hand, costs will be realized as an already-strained public infrastructure is further stressed, social issues arise from increased immigration, and the natural environment degrades.

The following analysis of the proposed procurement will provide baseline information regarding the TCI environment and tourism industry. Environmental, social and economic externalities and benefits will be summarized. Externalities related to coral reef degradation, greenhouse gas emissions, increased costs of public services and social impacts will be quantified. Kaitlin Corporation does not have a track record of sustainable development, and does not indicate that it will incorporate any measures for environmental sustainability in the Romanza project; however, for the purposes of this analysis, the proposed development will be contrasted with an existing, low-density model. Finally, a “green” alternative model that adopts the existing low-density baseline and incorporates other sustainable options will be recommended.

2.0 Project Background

The Kaitlin Corporation is a Canadian company with 25 years’ experience building and designing residential developments throughout Canada. In recent years, they have expanded their portfolio and have now added hotel/condominium development in TCI. The Romanza will be their second development in TCI, and they are seeking to capitalize on increasing demand for hotel accommodation on Providenciales, as indicated by 30% growth in the sector in the first quarter of 2014 (TCTB, 2014).

The condominium/hotel development style is the predominant type of tourism development along Grace Bay. The model allows developers to pay for the cost of development via the sale of condominium units, prior to and during construction. Purchasers can use the premises as their personal residences or put them into a hotel rental scheme and receive income. The proposed 12-story development will comprise 243 guest rooms, reception, conference center, spa, gym, retail stores, restaurants, and associated infrastructures. The land associated with the project, Parcel 60900/258, is 4.8 acres. As such, the proposed development will be the tallest building and will have the highest density of any development in TCI.

THE PHYSICAL PLANNING ORDINANCE (CAP. 73)

THE PHYSICAL PLANNING ORDINANCE (CAP. 73)

REGULATION 7 OF THE PHYSICAL PLANNING (DEVELOPMENT PERMISSION) REGULATIONS, 1990

NOTICE OF APPLICATION FOR OUTLINE DEVELOPMENT PERMISSION

An application, PR #12031, by SUNSET POINT DEVELOPMENT COMPANY LTD. for the development of a two hundred and fifty (250) key hotel/ condominium building with two hundred and fifty (250) bedrooms, reception and conference building, spa building, gym and retail stores, three restaurants, associated parking, two pools, rooftop patio and lounge, and landscaping, has been submitted to the Department of Planning for consideration of Development Permission on Block #60900, Parcel #258, Leeward going through, Providenciales.

Anyone wishing to make representations concerning this application may do so in writing to the Director of Planning, South Base, Grand Turk or through the Department of Planning, Downtown, Town Center Mall, Providenciales within 28 days of publication of this notice.

Figure 2 - Planning Notice for the Proposed Development

3.0 Environmental Baseline

TCI rests upon two limestone platforms, the Turks Bank and the Caicos Bank, created over millennia via the metabolic processes of marine organisms. Limestone is a highly porous rock, and ocean water permeates the bedrock of TCI, similarly to a sponge sitting in a bowl of water. Therefore, all activities that take place on land, are also connected to the sea. The country is surrounded by the third-largest barrier reef in the world, which until recently has remained in close-to-pristine condition. In 1960, the island of Providenciales had no paved roads, automobiles or airport and a population of 518 people. (DEPS, 2011). A 1971 environmental study described TCI as "…as close to the natural state as is likely to be the case for any similar islands within the American tropics due to relatively light utilization by man" (Ray & Sprunt, 1971, p. 6). They also forewarned:

"Their [the islands'] value lies in their still retained beauty and relative remoteness. Their ecology and small size makes mandatory that development not violate ecological integrity or natural beauty. Their remoteness makes mandatory that they not imitate or compete with the massive developmental schemes in the more accessible Western Hemisphere tropics. In short, these islands are a special case. They deserve to be treated in a very special way" (Ray & Sprunt, 1971, p. 20)

4.0 Economic Baseline

Unfortunately, development in Providenciales has not progressed in an entirely special way. Today, the human population has grown to 23,769 (TCIG, 2012), and illegal immigration and crime are rampant (Rosindell, 2010). Development and exponential growth have been fuelled by tourism accommodation, which is the leading industry in TCI, accounting directly for as much as 34% of GDP (Batas & Forbes, 2007). Little of the development that has taken place to date can actually be considered sustainable. However, TCI has successfully marketed itself as a high-end, environmentally sensitive destination, largely based on the high baselines of environmental integrity that existed before development took place.

The country's tourism motto is "beautiful by nature" (Tyson, 2014), and nature's beauty comes at a high price. In a recent Trip Advisor analysis, TCI was ranked fourth-highest in cost for a week-long vacation for a family of four ("Trip Advisor's Most and Least Affordable Caribbean Destinations," 2014). High costs are associated with airfare, accommodation, food and dining out. TCI has no commercial agriculture or manufacturing; therefore, all consumer goods must be imported, which dramatically increases the cost of living and conducting business. Historically, high operating costs have discouraged low to mid-priced tourism ventures, which has helped to maintain TCI's high-end reputation and branding. Furthermore, because of the high cost of conducting business, TCI cannot compete with lower-priced, mass-tourism markets elsewhere in the Caribbean. Environmental integrity and exclusivity must be maintained if TCI is to continue to thrive in the often-fickle tourism market. A survey of departing visitors confirms this. The factors that visitors identified in terms of choosing TCI for their holiday included beautiful, uncrowded and unspoiled beaches (53%), climate/weather (16.2%) and previous trips (11.4%).

Tourism generates government revenue directly via hotel and restaurant taxes (approximately $41 million in budget year 2013-14 (TCIG, 2014)), representing 20% of government revenue, and indirectly via import duties, employment and multiplier effects across the economy. Government revenue is also generated via a stamp duty on the sale of real estate (8% on sales between $250,000 - $499,000 and 10% on values greater than $500,000). Thus, condominium/hotel developments generate continued revenues for government from both sales and occupancy.

5.0 Social Baseline

The 2012 census records the total population of TCI as 31,618. This represents a 63 percent increase over the previous census conducted in 2000. In 1970, 96.4 percent of the population were

TCI nationals or "Belongers" (TCIG, 2012). In 2012, more than half the population was comprised of foreign immigrants (57.5 percent). 75 percent of the population lives on the island of Providenciales.

The exponential increase in immigration is attributable to the dramatic rise of tourism development over the past two decades. Because TCI has a small native population, development requires immigrants for both skilled and unskilled labor. Kairi reported in 2000 that the rapid rate of foreign immigration in TCI was having "an enormous psychological effect on the population." Belongers reported having a feeling of being under siege by immigrants. Locals also felt that the bulk of benefits from development were going to foreigners and that they were becoming increasingly marginalized in their own country.

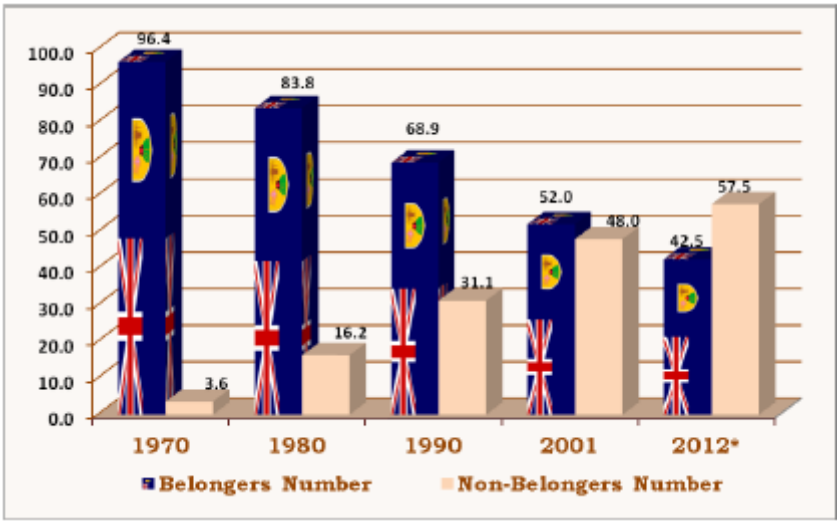

Figure 3 - Percentage of Belongers vs. Non-Belongers (TCIG, 2012)

The fact that more than half of the children born in TCI are born to foreign mothers exacerbates public education issues. At the entry level into schools, a majority of the children are Haitian immigrants, who do not speak English, and schools do not have adequate resources to be able to teach English as a second language. Overwhelmed by a lack of resources and social problems, the educational system does not adequately prepare students for higher education. Skilled labor must then be filled by immigrants from the North Atlantic in order to meet the demands of TCI's rapidly growing economy. 73.7% of employed persons are foreign immigrants (Forbes, 2008).

The massive influx of immigrant workers creates a strain on public infrastructures. Critical infrastructures such as schools and hospitals are already considered over-crowded, and government funds for expansion are scarce (Jones, 2013). In spite of the plethora of jobs available, Belongers continue to experience high unemployment and underemployment (Kairi, 2000). Belongers attach a stigma to menial labor jobs, which are considered to be for Haitians only, and they would rather be unemployed than to engage in such jobs (Kairi, 2000, p. xix). Due to a lack of adequate education, many are also not qualified for higher-paying jobs, meaning that some are currently unemployable.

6.0 Business as Usual

In order to remain viable in the tourism market, TCI must balance economic development with environmental sustainability. Rapid tourism development in TCI has come with associated environmental costs, including deterioration of coral reefs from physical impact and nutrient and other water pollution. Although direct discharge of untreated sewage is illegal under TCI law, there is no municipal wastewater treatment; therefore, each development is responsible for treating and disposing of sewage effluents in a responsible manner. A lack of government oversight and negligible penalties for non-compliance has resulted in inadequate treatment and nutrient pollution in coastal waters, leading to coral degradation. Marine ecosystems are also threatened by physical damage from tourists trampling seagrass beds and coral reefs. Runoff from sediment and pollutants due to land clearance and use of landscaping maintenance chemicals, such as pesticides, herbicides and fungicides, further compromise water quality.

Other environmental externalities associated with tourism development include significant contributions to greenhouse gas emissions (GHGs, all electricity in TCI is generated via the combustion of diesel fuel), land clearance of pristine ecological communities, losses of biodiversity, extirpation of rare, threatened, endangered and endemic species and the introduction of nuisance exotic species. With scant rainfall, all municipal water in TCI is produced via reverse osmosis (RO), which has a high energy demand and consequent production of GHGs. Hypersaline effluent from RO is disposed of via deep well injection and is not considered to be an environmental threat. To date, the low-density nature of development, coupled with a small population has kept environmental impacts to a relative minimum; however, the general trajectory is towards degradation, and without alteration of the status quo, this negative environmental trajectory will continue.

From an economic standpoint, the generation of revenue to support public infrastructure is a significant obstacle for government. The public sector is only marginally operable, unable to perform basic responsibilities, such as environmental monitoring and enforcement (Roe, 2010). Each new development places additional strain on public infrastructure. As noted previously, approximately three-fourths of the labor force is comprised of immigrants. Each new immigrant to the country must be provided with healthcare, family education, housing, sanitation, electricity and other public services.

Healthcare services in TCI are provided via a public/private partnership, under a single-payer plan. Employed persons are charged a monthly rate as a percentage of their income. The total cost of healthcare is not adequately covered by individual contributions and is therefore heavily subsidized by government (PAHO, 2012). In budget year 2013-14, a total of $55,657,474 was spent

on healthcare services in TCI, representing approximately 1/3 of the national budget or $1,760.31 per person. The total cost of education was $21,349,083 or $675.22 per person. Total annual government expenditure was $182,422,178 or $5,769.57 per person (TCIG, 2014).

A comprehensive list of environmental impacts associated with tourism development in TCI is attached as Appendix I. Appendix I also includes a summary of Priority Externalities, mitigation measures to address externalities and responsible parties to undertake mitigation, which are addressed in further detail in the following sections.

7.0 Priority Externalities

Due to the scope of this assessment, priority externalities are limited to increased costs to public infrastructures, increased greenhouse gas emissions and impacts to coral reefs. Each of these priority externalities is elaborated upon in a separate section below. The values of externalities associated with the proposed three-star, high-density development are quantified and compared to those from a typical five-star, low-density condominium/resort on Grace Bay. One such existing development (hereafter referred to as Resort X) agreed to provide financial and other information but requested anonymity in reporting. Resort X is a locally owned and operated hotel/condominium on Grace Bay, Providenciales, which sits on approximately 12 acres of land, with approximately 164 hotel rooms (note that the number of rooms is flexible, based on the number of condominium owners that place units in the rental pool). The comparison allows for further insight into the potential effects that revised building height and density regulations may have on the community and environment. For brevity's sake cost/benefit analyses include only revenue from hotel rooms. Other hotel services, such as restaurants, spas, etc. are not included.

7.1 Cost to Public Infrastructures

Costs to public infrastructures are estimated below, based on the cost per individual of the public infrastructure, as cited in section 6 ($5,770). It is assumed that each new immigrant will contribute this cost proportionately. This estimate is conservative, as immigrants usually settle with family members, who are not considered here. Costs are compared with potential revenues and benefits for both developments. All data for Resort X are taken directly from information provided by the developer, and rates for the proposed development are estimated from existing 3-star accommodation in TCI. Costs and benefits are also defined on a per acre basis in order to allow for the discrepancies between the two resorts. 60% occupancy is the national average.

Table 1 – Cost/Benefit Comparison of Low Density vs High Density Development

Variable	***Resort X***	***Proposed 3-star Resort***
Cost of development	$54,363,875	$47,000,000
Number of Rooms Total	164	243
Cost per room (construction)	$331,487	$193,415
Number of Rooms/Acre	13.7	50.6
Revenue at 60% occupancy	$18,189,546	$10,293,232
Revenue at 60% occupancy/acre	$1,515,795	$2,144,423
Accommodation Tax Revenue (12%)	$2,182,746	$1,235,186
Accommodation Tax Revenue/Acre	**$181,895**	**$257,330**
Average sales price per sq. ft.	$690.50	$250*
Total square feet	127,915	189,533
Total revenue from sales (at 20% turnover/year)	$17,665,062	$9,476,650
Total revenue from sales/acre	$1,472,088	$1,974,302
Total stamp duty from sales	$1,766,506 (10%)	$758,132 (8%)**
Total stamp duty/acre	**$147,209**	**$157,944**
Total number of staff	278	412
Total number of immigrant staff	170	304***
Public medical cost per staff	$1,760****	$1,760
Public educational cost per staff	$675****	$675
Total public cost per staff	$5,770****	$5,770
Total public cost of immigrant staff	$980,900	$1,754,080
Total pubic benefit/acre	**$329,104**	**$415,274**
Total public cost/acre	**($81,741)**	**($365,433)**
Total public benefit-cost/acre	**$247,363**	**$49,841**
Adjusted total to include opportunity loss/acre	**$247,363**	**($197,522)**
Total public benefit-cost /development	**$2,968,356/year**	**($948,106)/year**
Total revenue (to developer)	**$35,844,608**	**$19,769,882**
Total revenue/acre	**$2,987,051**	**$4,118,725**

*Based on existing sales prices of 3-star Grace Bay Condominiums (see http://www.turksandcaicossir.com/eng)
**Stamp duty increases with sales price
***Based on national average of 73.7% foreign labor (Forbes, 2008)
****Based on per person value of total cost (TCIG, 2014). Actual costs will be higher, as immigrant labor arrives with family members.

The above table reflects that costs and benefits to public infrastructure associated Resort X and the Romanza are largely density-dependent. Higher revenues are realized at higher densities because more rooms are sold; however, these figures are significantly offset by the higher value per unit associated with 5-star, lower-density development. While the developer receives higher revenues with the high-density model, the public costs are also significantly higher. Note that Resort

X has implemented Belonger training and incentive programs that reduce the immigrant work force to 61%. The difference in the public benefit minus cost between the two projects ($197,522) also represents a public cost as unearned benefit that would otherwise be realized with the conventional low-density model.

7.2 Greenhouse Gas Emissions from Electrical Consumption

In 2013, Resort X consumed a total of 4,680,777 kWh in electricity, at an average cost of $0.462 per kWh, for a total cost of $2,162,519. Basing consumption on the number of rooms and using similar pricing, the proposed resort will consume approximately 6,935,706 kWh, at a cost of $3,204,297/year. Electricity on Providenciales is generated entirely from diesel fuel, which produces 22.38 pounds of GHG for every gallon of diesel fuel burned ("How much carbon dioxide is produced by burning gasoline and diesel fuel?," 2014).

In 2009, hotels consumed a total of 51 GWh, consuming a total of 3,315,000 gallons of diesel fuel and producing a total of 74,189,700 pounds of carbon dioxide (Castalia, 2011). GHG emissions for Resort X and the proposed development are determined by extrapolating per room values, based on approximately 3,000 hotel rooms on Providenciales.

Estimates for the social costs of carbon emissions vary widely, between low values of $5.50 and a recent study, which suggests costs as high as $893 per ton (Ackerman & Stanton, 2011). For the purposes of this exercise costs associated with GHG production have been estimated conservatively at $28/ton (Fankhauser, 1994). Values could be higher or lower, depending on the actual cost of GHG emissions.

Table 2 – Electrical Consumption and GHG Production: Resort X vs Proposed Development

Variable	***Resort X***	***Proposed Development***
Total electrical consumption	4,680,777 kwh/year	6,935,706 kwh
Total electrical cost	$2,162,519	$3,204,296
Total electrical cost per room	$13,186	$13,186
Total electrical consumption per acre	390,064 kwh/year	1,444,939 kwh/year
Total lbs. GHG produced/acre	**337,975 (153 t)**	**1,251,951 (568 t)**
Public cost of GHG/acre	**($4,284)**	**($15,904)**
Total Cost/Development	**($51,408)**	**($76,339)**

Based on density alone, Resort X produces fewer GHGs per acre than the Romanza by a factor of approximately four. Associated public costs are also proportionately lower. Mitigation measures to reduce GHG emissions are discussed in Section 8 and represent significant potential savings for developers.

7.3 Coral Reef Ecosystem Decline

In 2005, the coral reefs in the Turks and Caicos Islands were valued at $47.3 million/year, based on tourism, biodiversity, coastal protection, fisheries and recreational values. The total economic value of Providenciales coral reefs was determined to be $19,393,000/year. Adjusted for inflation by the average inflation rate of the Turks and Caicos Islands (3%), a current economic value for the coral reefs surrounding Providenciales is estimated to be approximately $25,210,900/year.

As mentioned previously, nutrient pollution and tourism impacts from trampling, solid waste and other indirect effects are particularly damaging to coral reefs, and increased tourism densities have been linked to declining coral health (Juhasz, Ho, Bender, & Fong, 2010). For the purposes of this assessment, therefore, the value of Providenciales coral reefs is considered a replacement value per year, based on the above-determined values, extrapolated over the number of rooms for Resort X and proposed development. It is assumed that, without alteration, the status quo will eventually lead to complete coral death due to the above impacts, such as has already taken place at other Caribbean locations (Lapointe et al., 2010). The results appear in the following table.

Table 3 – Comparison of Coral Reef Degradation Values for Resort X and Proposed Development

Variable	***Resort X***	***Proposed Development***
Total value of Providenciales coral reef	$25,210,900	$25,210,900
Reef value per PLS room*	$8404	$8404
Total reef value/development	($1,378,256)	($2,042,172)
Total reef value/acre	**($114,854)**	**($425,453)**

Both Resort X and the proposed development have the potential to result in significant costs associated with coral reef degradation over time. These costs are also density dependent. Methods to mitigate these costs are outlined in section 8.3 below.

8.0 Select Mitigation Measures

8.1 Mitigation for Social Costs

As discussed, social costs accrue mainly in the form of pressure on public services and infrastructure and are density-dependent and associated with increases in population due to legal and illegal immigration. Recommended mitigation measures to lower these costs therefore include reduced development densities, which in turn require less labor input. Adopting initiatives to encourage the employment of local labor, including training programs, can further reduce social costs and accrue social benefits.

While investment costs for lower-density, higher-quality accommodation are higher on a square foot basis, increased costs are offset by lower overall development costs per acre and higher sales prices per unit. Furthermore, the apparent higher profitability of the proposed resort is masked by associated higher development costs per acre. Therefore, in practice, return on investment is significantly higher for low-density development. Other factors, such as operating costs and availability of land must also be taken into consideration for a full evaluation; however, in general, increased investment in quality will yield similar increases in profitability. The superior return on investment of higher-quality developments should incentivize the development of lower-density, high-end development over high-density development. The following table compares return on investment for Resort X and proposed resort:

Table 4 – Return on investment for low-density vs high-density resorts

Variable	***Resort X***	***Proposed Resort***
Cost of development	$54,363,875	$47,000,000
Total square feet	127,915	189,533
Cost per square foot	$450	$248
Cost of development/acre	**$4,530,322**	**$9,791,667**
Number of Rooms Total	164	243
Hotel Revenue at 60% occupancy	$18,189,546	$10,293,232
Average sales price per sq. ft.	$690.50	$250 (based on extg. 3-star sales values)
Total revenue from sales (at 20% turnover/year)	$17,665,062	$9,476,650
Total annual revenue	**$35,844,608**	**$19,769,882**
Total annual revenue/acre	**$2,987,050**	**$4,118,725**
Return on Investment per year (profit/cost)	**0.6593**	**0.4206**

The cost of work permits for immigrant staff are also a considerable expense for resort operators. The local community college offers training courses in hospitality and related industries for as little as $1,000 per year. Such training compares favorably with the cost of foreign work permits, which have an average cost of $1,254 for Resort X. Hoteliers can actually save money by sponsoring education for Belongers, as opposed to hiring foreign immigrants, as demonstrated in the following table.

Table 5 - Cost of Social Infrastructure Mitigation Measures

Variable	***Resort X***	***Proposed Development***
Total number of staff	278	412
Total number of immigrant staff	170	304
Total cost of work permits	$213,236	$381,316
Cost per work permit	$1,254	$1,254

Cost of tuition at Community College	$1000/year	$1000/year
Cost of training local staff for all immigrant positons	$170,000	$304,000
Savings on training vs. work permit	($43,236)	($77,316)

8.2 Mitigation for Green House Gas Emissions

TCI is an arid country with an average of 350 sunny days per year, and the cost of electricity is among the highest in the Caribbean region (Castalia, 2011). As such, the country is perfectly poised for the development of renewable energy technologies. Net metering does not currently exist in TCI; therefore, photovoltaic technologies are not addressed here, but do hold significant future potential for electrical generation in TCI, For the purposes of this assessment, cost and energy savings associated with heating water are highlighted for mitigation against the production of GHGs.

Castalia determined that solar hot water can be produced on a commercial scale for a relative cost of $0.13 per kWh (Castalia, 2011). For medium-size hotels, electric water heating accounts for approximately 10 percent of energy use; therefore, a total of approximately 7,418,970 pounds of carbon dioxide emissions, directly attributable to electric water heating at Providenciales hotels, could be eliminated by switching to less-costly solar technologies. The following table illustrates proposed savings associated with solar hot water vs. conventional electric hot water generation.

Table 6 - Cost of GHG Emission Mitigation Measures

Variable	***Conventional hot water***	***Solar hot water***
Total electrical consumption per room	28,541 kWh/year	0 kWh/year
Total electrical consumption hot water	2854 kWh/year	0 kWh/year
Total cost per kwh	$0.462	$0.13*
Total hot water kwh/Resort X	468,056 kWh	0
Total cost hot water Resort X	$216,242	$60,847
Total savings for Resort X		**($155,395)**
Total hot water kwh/Proposed Development	693,522 kWh	0
Total cost hot water Proposed Development	$320,407	$90,158
Total Savings for Proposed Development		**($230,249)**

*Cost per kwh for solar is determined by extrapolating capital cost, operating and maintenance cost over the lifetime of the system and assuming a loan to cover capital cost at 10% interest (Castalia, 2011, p. 71).

Upfront capital expenditure from hotel operators will be required to make the above transition to solar hot water; however, the above figures are based on a loan over the lifetime of the technology at a conservative interest rate of 10%. Adoption of this technology can therefore be made in a cost-effective manner, particularly when included in the preliminary budget for the project. Government can further incentivize sustainable technologies and participation in stewardship by eliminating import duties on green technologies, such as solar water heaters, low-energy lighting, efficient cooling and refrigeration systems, etc. Such measures will make these technologies even more economically competitive with less-sustainable products.

8.3 Mitigation for Coral Reef Degradation

Figure 4 - A typical undeveloped Providenciales landscape with native flora

Recommended mitigation measures for coral reef damages include incorporating native floral species in landscaping applications, eliminating the use of toxic landscaping maintenance chemicals, developing public awareness materials and implementing monthly effluent wastewater testing.

Native vegetation is drought tolerant (Providenciales receives only 25-30 inches of rainfall on average per year) and is characterized by biodiverse assemblages of hardwood trees, palms, cacti, orchids, agave and other species. On the other hand, preferred landscaping species at Grace Bay resorts include a variety of imported exotic species, particularly royal palms, coconut palms, bougainvillea, hibiscus and other ornamental flowering species that require significant applications of pesticides, fertilizers, fungicides and irrigation water.

Figure 5 - A typical artificial landscape at a Grace Bay resort

A landscape maintenance contractor who wishes to remain anonymous provided information about the use and cost of pesticides and fertilizers at a resort in Grace Bay. The contractor indicated that typical chemical applications include Chloropyrifos, Talstar, Sevin, Merit, Roundup, Daconil, chelated palm nutrients and 20:20:20 fertilizer, applied every 6-8 weeks. Each of the above chemicals has proven toxicity to marine organisms (Ernst et al., 1991; Markey, Baird, Humphrey, & Negri, 2007; Mercurio, Flores, Mueller, Carter, & Negri, 2014; Stachowski-Haberkorn et al., 2008; Velisek, Svobodova, & Piackova, 2009). The impacts of nutrient pollutants from fertilizers on coral reefs are also well-documented and indicate that where pollution takes place, algae overgrows reefs, reducing the amount of coral cover, decreasing biodiversity and reducing overall productivity of reef ecosystems (Dadhich & Nadaoka, 2012; Lapointe et al., 2010; Liu, Meng, Liu, Wang, & Leu, 2012; Rawlins et al., 1998).

Costs of artificial landscaping include the initial price of installation ($150,000/acre), the cost of chemicals and their application ($3,000/acre/year) and externalities to the environment ($8,404 per hotel room) associated with coral reef degradation. By reducing density and building footprints, tourism developments not only reduce pressure on coral reefs but also retain additional natural vegetation, saving both in installation costs and maintenance costs and avoiding the costs associated with pollution.

Inadequate wastewater treatment is another cause of nutrient pollution leading to the degradation of coral reefs. Although tourism developments are required by law to treat sewage effluent to a tertiary level (*The Physical Planning Ordinance*, 1998), due to a lack of resources and inadequate staffing for enforcement, nutrient loads in effluents are not tested and enforcement is,

for all practical purposes, non-existent. Adequate maintenance of wastewater treatment facilities and appropriate disposal of sewage effluents therefore depend on the level of commitment by the hotel operator. While many operators engage in responsible practices, maintain their facilities adequately and use effluent for irrigation of landscaping (thus saving on fertilizer costs as well), others are illegally disposing of untreated or inadequately treated effluent.

Given the current revenue available to government, the above scenario is not likely to change over the next several years; therefore, hotel operators should be incentivized to adopt responsible wastewater treatment practices and to self-monitor. While the brunt of the cost associated with best practices will be borne by hotel operators, incentives in the form of "green" certifications and awards for best practices can be developed by local NGOs and government. Mitigation for coral damages can also be achieved via education and awareness initiatives for tourists regarding best practices, for example educating tourists not to touch or step on coral and to use non-toxic sunscreen. The cost of brochures to be placed in each hotel room is estimated to be approximately $1 per copy.

Figure 6 - An Example of Public Awareness Material (Source: http://coral.org/)

The costs of proposed mitigation measures to prevent coral reef degradation are outlined in the table below:

Table 7 - Costs of Coral Reef Mitigation Measures

Variable	***Cost***
Value of coral reef	$114,854/acre/year
Cost of artificial landscaping installation	$150,000/acre
Cost of native landscaping installation	$75,000/acre
Savings for native landscaping installation	($75,000/acre)
Cost of artificial landscaping chemicals	$6,000/acre/year
Cost of native landscaping maintenance chemicals	$0/acre/year
Savings for native landscaping maintenance	$6,000/acre/year
Cost of printing public awareness information	$1/brochure
Cost of printing per hotel room/year (at 60% occupancy)	$219
Cost of wastewater testing	$12,000/year

9.0 Recommendations

A number of green certifications exist that are applicable to the tourism industry. Green Globe offers sustainable certification based on four criteria and indicators, including sustainable management, social and economic, cultural heritage and environmental variables. Appendix II outlines Green Globe's indicators and criteria. TCI currently lacks any national green certification program; however, such a certification has been envisaged by the TCI government's Department of Environment and Maritime Affairs (DEMA), and a Community Conservation Partner Program (CCPP) has been established in order to promote and encourage citizen stewardship. In association with local NGOs, the CCPP could develop and implement a green certification program that will incentivize sustainable practices. The program can adopt standards from existing certifications such as Green Globe. Recommendations for the proposed Romanza resort in order to comply with proposed green standards would include the following components:

- Lowering overall densities to conform to traditional development models (64 rooms or 13.3 rooms/acre),
- Preservation of native floral species at the development site and use of native species for landscaping purposes,
- A ban on the use of landscape maintenance chemicals,
- Use of renewable solar energy for hot water,
- Implementation of training programs to encourage employment of Belongers,
- Development of public awareness materials for coral reefs, and
- Monthly water quality testing of waste water.

Alternative costs and benefits below are based on extrapolated figures from Resort X for low-density, high-end development. The following table compares costs and benefits associated with the above recommendations:

Variable	***Proposed Development***	***Alternative***
Cost of Development	$47,000,000 (243 rooms)	$21,798,585 (64 rooms)
Cost of Landscaping	$720,000 (non-native)	$360,000 (native)
Total Investment Cost	**$47,720,000**	**$22,158,585**
Total Savings with Alternative		**$25,561,415**
Total Revenue (60% occupancy)	**$19,769,882**	**$14,341,842**
Return on Investment (revenue/cost)	**0.420635787**	**0.657925365**
Work Permits/Training	$381,316/year (work permits)	$68,000/year (training)
Cost of Hot Water	$320,407/year (electric)	$24,339/year (solar)
Cost of Landscaping Maintenance Chemicals	$28,800/year	$0
Cost of Public Awareness Materials	$0	$14,454/year
Wastewater Testing	$0	$12,000/year
Total Operating Costs	**$730,523**	**$118,793**
Total Savings with Alternatives		**$611,730**

Although the higher-density model yields higher revenue, it does so at a considerably higher investment cost, resulting in a lower return on investment when compared with the lower-density model. A sustainably certified development may also achieve higher occupancy rates than the national average, thus increasing economic benefits even further. Low-density development, coupled with sustainable strategies, such as renewable energy use, green landscaping, staff training and public awareness initiatives, will actually realize savings, rather than costs. The proposed alternative also has the advantage of significantly lowering public externalities. A comprehensive breakdown of costs and benefits associated with the recommended development model are annexed as Appendix III.

10.0 Conclusions

The above analysis demonstrates that the true costs and benefits associated with tourism development are frequently masked by the costs of externalities. As proposed, the Romanza hotel/condominium development on Grace Bay, Providenciales will result in significant public costs associated with coral reef degradation ($2,042,172), increased strain on public infrastructure ($1,754,080) and GHG emissions ($76,339). The proposed alternative will reduce these costs significantly, eliminating GHG emissions from hot water heating, reducing immigration effects on public infrastructures and minimizing lethal impacts to coral reefs.

The above assessment is based on only a few key factors of development; however, economies of scale exist, and the results of the above analysis can therefore be translated broadly across the myriad variables associated with tourism development in TCI. Although it would seem that developers would gain higher profitability by increasing development densities, loss of quality values associated with higher densities actually reduce profitability and return on investment, when compared with lower-density models. Sustainably certified hotels may also realize additional economic benefits, associated with positive image branding, in the form of increased occupancy rates.

As currently envisioned, the proposed Romanza development will represent a false economy that will undermine the fragile tourism model and environmental integrity upon which the economy of TCI is built. The benefits from the proposed development in the form of tax revenues and employment are overwhelmed by quantifiable potential costs, including externalized costs of pollution, public infrastructure costs and other externalities. The analysis suggests that high-end, low-density, low-impact developments that maximize efficiencies of scarce resources and incorporate sustainable alternatives are the best economic fit for TCI, for both developers and society as a whole.

Sources Cited

Ackerman, F., & Stanton, E. (2011). Climate Risks and Carbon Prices: Revising the Social Cost of Carbon. In E. f. E. a. Environment (Ed.), (pp. 25). Stolkholm: Stockholm Environment Institute Tufts University.

Batas, M., & Forbes, K. (2007). National Accounts Statistics In D. o. E. P. a. Statistics (Ed.), (pp. 80). Turks and Caicos Islands: Statistical Office - Department of Economic Planning and Statistics, Turks and Caicos Islands Government.

Castalia. (2011). Development of an Energy Conservation Policy and Implementation Strategy for the Turks and Caicos Islands. In C. S. Advisors (Ed.), (Draft Final Report ed., pp. 147). Turks and Cacios Islands: Government of the Turks and Caicos Islands.

CNN, S. (2014). World's 100 best beaches. *CNN Travel*. http://www.cnn.com/2013/05/28/travel/100-best-beaches/

Dadhich, A. P., & Nadaoka, K. (2012). Analysis of Terrestrial Discharge from Agricultural Watersheds and Its Impact on Nearshore and Offshore Reefs in Fiji. *Journal of Coastal Research, 28*(5), 1225-1235. doi: 10.2112/jcoastres-d-11-00149.1

DEPS. (2011). Turks and Caicos Islands 1960 Census. Retrieved November 1, 2011, from http://www.depstc.org/index.html

Ernst, W., Doe, K., Jonah, P., Young, J., Julien, G., & Hennigar, P. (1991). The toxicity of chlorothalonil to aquatic fauna and the impact of its operational use on a pond ecosystem. *Archives of Environmental Contamination and Toxicology, 21*(1), 1-9. doi: 10.1007/BF01055550

Fankhauser, S. (1994). The Social Costs of Greenhouse Gas Emissions: An Expected Value Approach. *The Energy Journal, 15*(2), 157-184. doi: 10.2307/41322881

Forbes, K. (2008). Labour and Employment Situationer (pp. 88). Turks and Caicos Islands: Department of Economic Planning and Statistics.

Guides, R. (2014). World's Best Beaches. *Rough Guides*. Retrieved from Rough Guides website: http://www.roughguides.com/gallery/the-worlds-best-beaches/#/0

How much carbon dioxide is produced by burning gasoline and diesel fuel? (2014). *US Energy Information Administration.* Retrieved November 29, 2014, from http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11

Jones, C. A. (2013). Education Sector Strategic Plan: 2013 - 2017. In T. a. C. I. M. o. Education (Ed.), (Draft ed., pp. 83). Turks and Caicos: Ministry of Education.

Juhasz, A., Ho, E., Bender, E., & Fong, P. (2010). Does use of tropical beaches by tourists and island residents result in damage to fringing coral reefs? A case study in Moorea French Polynesia. *Marine Pollution Bulletin, 60*(12), 2251-2256. doi: http://dx.doi.org/10.1016/j.marpolbul.2010.08.011

Kairi. (2000). Poverty Assessment Report. In K. C. Limited & N. A. T. o. t. T. a. C. Islands (Eds.), (Vol. Final Draft, pp. 157): Turks and Caicos Islands Government.

Lapointe, B. E., Langton, R., Bedford, B. J., Potts, A. C., Day, O., & Hu, C. (2010). Land-based nutrient enrichment of the Buccoo Reef Complex and fringing coral reefs of Tobago, West Indies. *Marine Pollution Bulletin, 60*(3), 334-343. doi: 10.1016/j.marpolbul.2009.10.020

Liu, P.-J., Meng, P.-J., Liu, L.-L., Wang, J.-T., & Leu, M.-Y. (2012). Impacts of human activities on coral reef ecosystems of southern Taiwan: A long-term study. *Marine Pollution Bulletin, 64*(6), 1129-1135. doi: 10.1016/j.marpolbul.2012.03.031

Markey, K., Baird, A., Humphrey, C., & Negri, A. (2007). Insecticides and a fungicide affect multiple coral life stages. *Marine Ecology Progress Series, 330*, 127-137.

Mercurio, P., Flores, F., Mueller, J. F., Carter, S., & Negri, A. P. (2014). Glyphosate persistence in seawater. *Marine Pollution Bulletin, 85*(2), 385-390. doi: http://dx.doi.org/10.1016/j.marpolbul.2014.01.021

Nautilus, C. (2005). Economic Valuation of Environmental Resource Services in the Turks and Caicos Islands. In N. C. Ltd. (Ed.), (pp. 93): Turks and Caicos Islands Government.

News, U. S. (2014). Best Beaches in the World. *U.S. News and World Report Travel*. Retrieved from U.S. News and World Report Travel website: http://travel.usnews.com/Rankings/Best_Beaches_in_the_World/

PAHO. (2012). Health in the Americas 2012 Edition. In P. A. H. Organization (Ed.), *Heath in the Americas* (2012 ed., Vol. Turks and Caicos Islands, pp. 627-636): Pan American Health Organization

. *The Physical Planning Ordinance*. (1998). Turks and Caicos Islands Government Retrieved from http://www.environment.tc/content/root/files/20090622105329-PhysicalPlanningOrdinance.pdf.

Rawlins, B. G., Ferguson, A. J., Chilton, P. J., Arthurton, R. S., Rees, J. G., & Baldock, J. W. (1998). Review of agricultural pollution in the Caribbean with particular emphasis on small island developing states. *Marine Pollution Bulletin, 36*(9), 658-668. doi: http://dx.doi.org/10.1016/S0025-326X(98)00054-X

Ray, C., & Sprunt, A. (1971). Parks and Conservation in the Turks and Caicos Islands (pp. 36). Turks and Caicos Islands: Administrator of the Turks and Caicos Islands.

Roe, A. (2010). *Turks and Caicos Islands Government: Current and Potential Revenue Sources: An Assessment*. Turks and Caicos Islands: Retrieved from http://www.tcgov.tc/content/root/files/20100222150611-Revenue-Study-2010.pdf.

Rosindell, A. (2010). U.K. Parliment, House of Commons Debate: Turks and Caicos Islands. *They Work For You.* Retrieved October 26, 2011, from http://www.theyworkforyou.com/debates/?id=2010-12-03a.1164.0

Stachowski-Haberkorn, S., Becker, B., Marie, D., Haberkorn, H., Coroller, L., & de la Broise, D. (2008). Impact of Roundup on the marine microbial community, as shown by an in situ microcosm experiment. *Aquatic Toxicology, 89*(4), 232-241. doi: http://dx.doi.org/10.1016/j.aquatox.2008.07.004

TCIG. (2012). 2012 Population and Housing Census - Preliminary Report. In T. D. o. E. P. a. Statistics (Ed.), (pp. 37). Turks and Caicos Islands: The Department of Economic Planning and Statistics.

TCIG. (2014). *Budget 2014-2015*. Turks and Caicos Islands: Turks and Caicos Islands Government Retrieved from http://www.caribbeanelections.com/eDocs/budget/tc_budget/tc_budget_2014.pdf.

TCTB. (2014). Robust Growth in First Quarter Tourist Arrivals - Turks and Caicos Tourist Board. *Turks and Caicos Islands Beautiful by Nature*. Retrieved from Turks and Caicos Islands Beautiful by Nature website: http://www.turksandcaicostourism.com/news--ResourceID--7417.html

Trip Advisor's Most and Least Affordable Caribbean Destinations. (2014). *Caribbean 360*. http://www.caribbean360.com/travel/tripadvisors-most-and-least-affordable-caribbean-destinations

Tyson, V. (2014). 12-Storey Buildings will Hurt Providenciales' Image. *Turks and Caicos Sun*. Retrieved from Turks and Caicos Sun website: http://suntci.com/storey-buildings-will-hurt-providenciales-image-p1400-106.htm

Velisek, J. J. U. V. V. U. R. a. H., Svobodova, Z. J. U. V. V. U. R. a. H., & Piackova, V. J. U. V. V. U. R. a. H. (2009). Effects of acute exposure to bifenthrin on some haematological, biochemical and histopathological parameters of rainbow trout (Oncorhynchus mykiss). *Veterinarni Medicina - UZEI, 54*(3), 131-137.

	Appendix I - Table of Externalities			
	Externalities caused by procurement in the supply chain			
	Environmental Impacts of Business as Usual	***Priority Externalities to Include in Product Cost***	***Priority Actions to Mitigate Externalities***	***Responsible Parties to Carry out Mitigation***
1	Loss of pristine coastal habitats due to land clearance and development	Impacts to coral reefs from water pollution and other tourism impacts	Implement wastewater and landscape management plans/public awareness campaigns	Resort owners implement, NGOs, certify, Public sector oversees
2	Nutrient pollution to coastal water from sewage effluent and landscaping fertilizer applications	Increased strain on public infrastructure	Reduce development density, increase per unit benefit	Developer (Kaitlin)
3	Other coastal water pollution from pesticides, parking lot runoff, etc.	Uncontrolled legal and illegal immigration	Reduce development density and implement management and other training programs	Resort owners, Public/Private partnerships, TCI Community College
4	Coral reef death and deterioration from combined tourism impacts	Greenhouse gas production from diesel fuel combustion for generation of electricity	Use green technologies, such as solar water heating and low energy appliances and fixtures, net metering	Resort owners, NGOs certify, Public sector oversees, Utility company (Fortis)
5	Solid waste pollution			
6	Beach erosion from poor development practices			
7	Greenhouse gas production from combustion of diesel fuel for generation of electricity			
8	Energy consumption and creation of hypersaline effluent from water desalination			

Appendix II – Summary of Green Globe Certification

Criteria and Indicator	***Requirement***
Sustainable Management	Implement a sustainability management system
A1 – Sustainability management system	-management system must be implemented that is suitable to circumstance and considers environmental, sociocultural, quality, health and safety -implementation must be transparent and documented and communicated -must guide decision making and daily operations in a sustainable manner
A2 - Legal compliance	-business must comply with all local, regional and international laws
	-compliance with international labor conventions such as International Labor Organization (ILO) including, - No child or forced labor - No discrimination - Health and safety standards - Defined work hours - Minimum pay
A3 - Employee Training	-Periodic training for all personnel for environmental, sociocultural, health and safety practices
A4 – Customer Satisfaction	-Measured customer service and corrective measures where necessary
A5 – Accuracy of Promotional Materials	-Promotional materials must be accurate and not promote false claims about the business
A6 – Local Zoning, Design and Construction - A.6.1 Compliance with Legal requirements - A.6.2 Sustainable Design and Construction of Buildings and Infrastructure	-compliance with local land acquisition, land rights, zoning, protected and heritage areas, etc. -respect for traditional rights, local legislation, zoning -community development plans -minimization of impact -use of locally appropriate construction and design -incorporation of environmentally and economically sound design and development techniques
A7 - Interpretation	-Information about the environment, culture, etc. is provided to customers
A8 – Communications Strategy	-Policy to inform visitors and guests on policies, programs, etc. must be in place
A9 – Health and Safety	-All relevant public health and safety measures to ensure the welfare of staff, guests and the wider community are adhered to
Social/Economic	
B1 – Community Development	-Active promotion of social and community infrastructure development, including education,

	health and sanitation - Creation of opportunity via employment, training, financial assistance and/or in-kind support
B2 – Local Employment	-Local residents are employed throughout all levels and training is offered as necessary
B3 – Fair Trade	-Locally produced and fair-trade services and goods are preferentially procured when possible
B4 – Support Local Entrepreneurs	-Create opportunity for small local businesses to sell sustainable services and products
B5 – Respect Local Communities	-A code of conduct for participation in local communities is to be developed in association with community members
B6 - Exploitation	-A policy that explicitly prohibits commercial, child and sexual exploitation shall be implemented
B7 – Equitable Hiring	-Implement equitable hiring policies that give equal opportunities to women and minorities, including management positions
B8 – Employee Protection	-Legal protection is ensured on a national and international level and employees are respected and paid a living wage
B9 – Basic Services	-Operations must not restrict the use of basic services such as water, power and sanitation to neighboring communities
Cultural Heritage	
C1 – Code of Behavior	-General policy regarding visitation of historic and other important areas to reduce visitor impact and enhance awareness
C2 – Historical Artifacts	-No sale, trade or display of artefacts, except as allowed by law
C3 – Protection of Sites	-Protection and access to important historic and cultural sites is enhanced
C4 – Incorporation of Culture	-Promoting use and respect of traditional cultural elements in design and operations
Environmental	
D1 – Conserving Resources	-Procurement of environmentally friendly materials for building, capital goods, food and consumer products -Purchases are recorded and methods to reduce consumption are continuously updated and practiced -Energy consumption is measures and methods for conservation and reduction are continuously updated and practiced, while use of renewables is undertaken whenever possible -Water consumption is monitored and methods to reduce consumption are implemented

D2 – Reducing Pollution	-GHG gas emissions are measured and procedures to reduce and offset GHG production are implemented -Wastewater is treated effectively and reused where possible -Waste management plans are developed and implemented, implementing the principles of reduce, reuse and recycle -Use of harmful substances, such as pesticides is minimized or substituted for less-harmful products -Methods to reduce pollution from light, noise, runoff and air and soil contaminants are also implemented
D3 – Conserving Biodiversity, Ecosystems and Landscapes	-Native species are to be harvested from the wild for use only in accordance with sustainable guidelines -No wildlife shall be kept in captivity, except by those authorized and licensed to do so -Native floral species shall be used for landscaping and restoration -Introduction of alien invasive species shall be avoided -Interactions with wildlife must not produce adverse effects, disturbance of natural ecosystems is minimized and restoration and compensation are made when damage occurs

Appendix C - Summary of Costs and Benefits

Summary of Costs and Benefits for the Kaitlin Corporation's Romanza Development

Variable	*Cost as Proposed*	*Proposed Alternativ*	*Alternative Cost*	*Difference*	*Responsible Entity/Beneficiary*
Cost of Development	**$47,000,000**	**Low Density**	**$21,798,585**	**-$25,201,415**	**Kaitlin Corporation**
Hotel Revenue at 60% Occupancy	$10,293,232	Low Density	$7,275,818	-$3,017,414	Kaitlin Corporation
Condominium Sales Revenue	$9,476,650	Low Density	$7,066,024	-$2,410,626	Kaitlin Corporation
Total Revenue	**$19,769,882**	**Low Density**	**$14,341,842**	**-$5,428,040**	**Kaitlin Corporation**
Return on Investment profit/cost	**0.420635787**	**Low Density**	**0.657925365**	**0.237289578**	Kaitlin Corporation
Total Cost of Work Permits	$381,316	Training	$85,294	-$296,022	Kaitlin/TCIG/TC Community College
Cost of Training all staff	$0	Training	$68,000	$68,000	Kaitlin/TCIG/TC Community College
Savings work permits - training	**$0**	**Training**	**-$313,316**	**-$313,316**	Kaitlin/TCIG/TC Community College
Total hot water electrical consum	693522	Solar Hot Water	187222	-506300	Kaitlin/Fortis/DEMA/NGOs
Total cost electric hot water	$320,407	Solar Hot Water	$0	-320407	Kaitlin/Fortis/DEMA/NGOs
Total cost solar hot water	$0	Solar Hot Water	$24,339	24339	Kaitlin/Fortis/DEMA/NGOs
Total savings for solar hot water	**$0**	**Solar Hot Water**	**-$296,068**	**-296068**	Kaitlin/Fortis/DEMA/NGOs
Cost of Artificial Landscaping	$720,000	Native Landscaping	$0	-720000	Kaitlin/DEMA/NGOs
Cost of Native Landscaping	$0	Native Landscaping	$360,000	360000	Kaitlin/DEMA/NGOs
Savings native vs artifical landsca	**$0**	**Native Landscaping**	**-$360,000**	**-360000**	**Kaitlin/DEMA/NGOs**
Artificial Landscaping Maintenanc	$28,800	Native Landscaping	$0	-28800	Kaitlin/DEMA/NGOs
Savings native vs artifical landsca	**$0**	**Native Landscaping**	**-$28,800**	**-28800**	**Kaitlin/DEMA/NGOs**
Cost of Educational Materials	$53,217	Public Awareness	$14,454	-$38,763	Kaitlin
Cost of wastewater testing	$0	Wastewater testing	$12,000	12000	**Kaitlin**
Tax Revenue	$1,235,186	Low Density	$873,096	-$362,090	TCIG
Stamp Duty	$758,132	Low Density	$706,603	-$51,529	TCIG
Total Loss of Tax Revenue	**$413,619**				**TCIG**
Public Cost	$1,754,080	Low Density	$392,357	-$1,361,723	TCIG/TCI Public
Total savings public cost	**-$1,361,723**				**TCIG/TCI Public**
Total public savings - loss	**-$948,104**				**TCIG/TCI Public**
Total Public Cost of GHG	$76,339	Low Density	$20,563	-$55,776	TCIG/TCI Public
Total Public Savings GHG	**-$55,776**			$55,776	TCIG/TCI Public
Cost of Coral Reef	$2,042,172	Low Density	$551,229	-$1,490,943	TCIG/TCI Public
Total Public Savings Coral Reef	**-$1,490,943**				TCIG/TCI Public