Project Appraisal

OLYMPIC GOLF COURSE – RIO 2016

Preparation Stage

Golf Environment Organization

Legacy™ Programme

Produced by: Alexandra Betâmio de Almeida

Date: April 2013

GEO CERTIFIED

Legacy™

Guidance and mentoring
with credible assurance
for golf developments

Contents

1. RECOMMENDATION

The Recommendation of the Verifier further to the initial site visit outlined by this report is that the 2016 Olympic Golf Course at Reserva de Marapendi in Barra da Tijuca, Rio de Janeiro, should be formally enrolled in the GEO Legacy Programme.

The primary reasons for this recommendation are:
All major strategic planning issues have already been examined by the appropriate Brazilian authority. The 2016 Olympic golf course is part of the 2016 Olympic master plan, a new urban area located in Barra da Tijuca, in Rio de Janeiro.

The 2016 Olympic golf course is an initiative of Tanedo S.A., the company responsible for managing and funding construction of the Rio 2016 Olympic golf course. Tanedo aims to introduce a golf course and a Golf Academy that will be the main tool in offering conditions for the people's first contact with the sport.. The golf venue will be conciliated with measures permitting a minimum of non-polluting and/or biodegradable chemical products in order to preserve water resources, generate energy efficiency and reduce waste.

The project is aligned with Tanedo policy on headline sustainability themes including Sustainable Development, through the use of best practices such as rational use of Water and Energy, Improving the quality of life, Protection of the Environment, Promotion of Social and Cultural Integration.

The huge potential of bringing the Olympic Games to this part of the world will demonstrate the unique capacity of golf to leverage a positive effect that will echo for the next generations. That is the greatest payback, the Legacy, that the Olympic golf course can offer to Rio de Janeiro and, more widely, to the growth of the sport in the South America.

Following the conclusion of Rio 2016, the venue is due to become the city's first official golf course with 18 holes and academy that is open to the public. The venue will provide the opportunity to create a huge legacy for the sport in Brazil. This will benefit not only Rio de Janeiro but also the whole region and Brazil.

Tanedo and the project team are strongly committed to protecting and enhancing the natural environment in the area Through a sensitive and professional approach to planning and conceptualization, the project team has correctly identified and defined sustainability outcomes, and commits to realizing them. This is underscored by GEO's confidence in the professional integrity and standards of the project team members who are coordinating the sustainability aspects of the planning and construction process.

Although there are a number of more specific concerns which it is not possible to resolve fully at this stage, I am satisfied that these are not of a fundamental or strategic nature, and that the appropriate mechanisms are in place to address and either remove or adequately mitigate them in the subsequent stages of the programme.

Taking into account both the Vision and Strategy for the 2016 Olympic Golf Course and the strategic importance of the project within its local and regional context, I am confident that given the high standard of sustainable development that commitment to the Legacy Programme demands, the 2016 Olympic Golf Course undoubtedly has the potential to deliver significant multiplier benefits in strengthening the environment, society and economy of the region.

Alexandra Betâmio de Almeida
GEO Sustainability Associate
24.04.2013

2. INTRODUCTION

PURPOSE OF REPORT

The purpose of this Report is to provide a recommendation to the Golf Environment Organization regarding formal enrolment in the GEO Legacy certification programme.

The recommendation is informed by a review of the fundamental sustainability opportunities and challenges the project is likely to generate, to ensure that it has the potential to deliver the very highest standards in sustainable development.

The report has been prepared by a quality assured GEO Sustainability Adviser, who has been trained and accredited by GEO to support the creation of outstanding golf developments which fulfill Legacy requirements.

CLASSIFICATION

The project has been classified as falling within the category "Medium Scale Projects" for the purposes of the GEO Legacy Programme.

SCOPE OF PROGRAMME

It is regarded as fundamental to the aims of the GEO Legacy Programme that the project has the potential to deliver a fully-integrated sustainability concept, in which golf is embodied within a wider community entity.

The 2016 Olympic golf-course site (Photo:http://www.pga.com/golf-courses/golf-buzz/2016-olympic-golf-course-site-seen-above).

Accordingly it is proposed that the Programme should cover all development within the boundary of the golf course area (area located at Reserva de Marapendi in Barra da Tijuca, bordering the Marapendi lagoon, south of the Avenida das Americas, three miles from the Athletes' Village), including:

- 18 hole golf course;
- Driving range/practice facilities,
- Maintenance facility;
- Clubhouse

Moreover, the Legacy programme philosophy requires that the sustainability potential of the project extends "beyond the property boundary", to interface with, and embrace, the wider social, economic and environmental context of the city of Rio de Janeiro and the Parque Nacional Municipal Marapendi, in the Reserva de Marapendi (protected area).

METHODOLOGY

- This report constitutes an initial review of the core aspects of the development project. This process will be extended incrementally to explore the relevant sustainability issues at progressively more detailed levels, corresponding to the specific stages/milestones defined in the programme "roadmap". This report therefore focuses on investigating the broad compatibility of the project with GEO values and aims, rather than detailed specifics.
-
- The initial review of the core aspects of the project included the following key tasks:
- Overview of the policy and legislative context into which the project will fit,
- Review of the main components of the project as currently defined;
- Appraisal of the project against core sustainability concepts;
- Appraisal of key sustainability issues generated by the project, in order to identify and understand the main opportunities and challenges in relation to the GEO sustainability agenda;
- Advice and guidance on fulfilling the project's sustainability potential through the subsequent stages of the process.

3. CONTEXT

INTRODUCTION

The 240-acre (~100 ha) site occupies a sandy, partly marshy area of land inshore from the Atlantic Ocean. The area is located in Barra da Tijuca, bordering the shore of Lagoon Marapendi, the lagoon located between the wooded area (south of the golf course) and the barrier island.

The 2016 Olympic golf-course site (site and its surroundings areas).

The surroundings are predominately urbanized. The local ecosystem forms a specific ecological community, denominated as the Restinga ecosystem, a coastal ecosystem (sandbanks).

The site has already suffered from severe environmental degradation. The current environmental profile indicates that the main environmental problem is loss of biodiversity/degradation of habitats due to deforestation, exotic invasive plants, wetland/woodland mismanagement. This happened mostly due to the presence of sand mining activities carried out in the area, deforestation due to the demographic pressure and human activities (urban areas), etc.

The Marapendi Lagoon – the shores of the lagoon and a potential sand mining area located in the site (slopes covered predominantly by exotic vegetation).

THE RESTINGA ECOSYSTEM

"Restingas" (herbaceous/shrubby coastal sand-dune habitats) have a fundamental role as coastal ecological corridors (Corridors have important functions as strips of a particular type of landscape differing from adjacent land on both sides).

Restingas (i.e. sandbank areas) were formed, along the Brazilian coast, during the Holocene period, as a result of consecutive transgressions and regressions of the sea. They are characterized by large sandy plains of sedimentary origin that are rippled by rows of dunes isolating lagoons, lakes, ponds, bogs and marshes. Such a diversity of physical conditions gives rise to a great diversity of habitats that are colonized by a great variety of vegetal communities. Restingas are thus complex ecosystems in very delicate equilibrium that possess a typical flora, well adapted to the edaphic conditions. The ecosystem is related to a unique complex of flood processes and site-specific conditions – the local edaphic and climatic factors - water cycles, soil nutrient, cycles and biological organisms exist in very dynamic but delicately equilibrium

The difficulty in "defining" the restinga ecosystem is due to the difficulty in studying its ecosystem, since restingas only occur inside what would already be considered "disturbed environment and utterly degraded areas, a direct consequence of human occupation that started more than 500 years ago, during the period of Colonization.

ENVIRONMENTAL LAW

The key policies applicable for the site are:

The CONAMA resolution nº. 7/96 (23/07/1996): "the restinga vegetation definition - the assembly of plant communities, physiognomically distinct, under marine and fluvial-marine influence. These communities are distributed in mosaic, they occur in areas of great ecological diversity, being considered edaphic communities, depending more on the nature of the soil than climate factors."

The Decree 41.612, 23/12/2008: “the restinga vegetation includes a great complexity of vegetation, more conditioned by the nature of the soil than by the local climate, with different physiognomic types ranging from the rural/countryside landscapes to the forest landscape”. Within the salt marshes of Rio de Janeiro were already identified over 1200 species of higher plants belonging to 120 botanical families, especially leguminous plants, bromeliads, Myrtaceae, Rubiaceae and Orchidaceae.

The Decree 10.368/1991 (August 1991) and the Decree 11.990 (24/03/1993) - “The Environmental Protection Area (APA) of the Marapendi Zoo botanic Park includes the mangrove associated ecosystems: beach, restinga, dunes and lagoon, which hold harboring specimens of rare and endangered species of endemic fauna and flora"

The Marapendi Zoo botanic Park has a total area of 704 280 m^2, of which approximately 330 000 m^2 correspond to the Marapendi Lagoon. It is a peaceful and bucolic environment with several trails and tree shades. The park is a nursery for rare and endangered species, preserved by a team of biologists from the Parks and Gardens Foundation. Among these species are pitangas, araçás, cajueiros, ingás, cactuses, filodendros, rabos-de-arara, figueira-brava, ipê-branco. In the park we can also find jacus (guan), tiés-sangue, sabiás-da-praia, lizards, coatis (raccoon like mammal), cormorants, plungeons, heron, teals and frangos d'água (florida gallinule).

4. PLANNING & DESIGN PROCESS

PLANNING CONTEXT

The golf course will be built inside the Marapendi Nature Reserve, in the Barra da Tijuca area, in the same zone that will concentrate the greatest number of Rio 2016™ Olympic Games venues. The project is based in a prior licensing and environmental restoration through an ecogenetic process with the goal of renewing the original vegetal cover.

The course will include an 18 hole Championship Course, which will have the standards and be capable of hosting international competitions, a practice range with target greens, a golf academy, putting and chipping areas. The plan is to have the course ready for a professional tournament in August 2015 as a trial run before the men's and women's Olympic competitions – golf's first Olympiad in more than 100 years – in 2016.

The impact of the golf course on the natural site of the site will be minimal and manageable and will be beneficial in many aspects:

- bringing people in contact with the existing features, biodiversity and ecology of the site;

- ensuring that the ecological health of the site is improved (re-naturalization of the local ecosystem - restinga, the coastal ecological corridor, translocation of sensitive and high-value species in situ);

- and highlighting the natural features of the site (protect and preserve wetlands and herbaceous/shrubby coastal sand-dune habitats, enhance biodiversity).

Despite some slightly hilly terrain, the area is very conducive to golf course walking. The routing of the golf course allows players and visitors to walk through the course, should they prefer not ride in golf carts. Such an approach will provide the golfers the opportunity of enjoying the natural setting within the site, and the scenic views outside the site (lagoon and woodlands)

VISITOR FACILITIES AND CUSTOMER SERVICES

The Clubhouse as been designed to comprise of a basement and a ground flour. The layout will be as follows: electric golf carts area offering parking for 30 carts, golf bag and trolley store, offices for caddie master service, reception area, food and beverage facilities, a pro-shop, staff offices, offices for manager and administration, toilets and gents and ladies changing rooms, lounge area, multipurpose room, parking area, etc.

From the entrance a generous inclined pathway heads towards the golf course, with a privileged view. Through this path the architects implemented successively the gym, restrooms and locker rooms, Pro--Shop and reception, culminating in the plaza which leans onto the course from one side and houses the administrative headquarters and social areas. Above it, the translucent roof captures rain water and provides shade. An internal garden acts as an extension of the surrounding landscape, which can also be appreciated from the roof garden above the restaurant, accessible through a ramp.

The headquarters of the Brazilian Golf Confederation was implemented adjacent to the golf course, in the northern part of the terrain, so as to maintain a certain independence from the other areas of the clubhouse.

All the materials and building techniques will be chosen to be as ecologically-friendly as possible (incorporating several green building techniques). Local material, such as stone and natural and rough timber, etc., will be extensively used in the construction of the buildings.

The artistic drawing allows a more realistic view of the proposed clubhouse – designed, built and operated to be a green building

The maintenance building of ground floor only will encompass: back-of-house facilities, wash-pad area, M&E area and maintenance workshop area (for daily repairs, storing of maintenance materials, small tools and equipment), chemicals storage area (to provide secure storage of all fertilizers and pesticides), compost plant and waste storage area, equipment room, mess room facilities for working personnel and Training Center.

The vast majority of the staging and infrastructure elements needed for the golf event will be located in areas which are zoned as disturbed areas. Consequently there is very little additional impact on the site specifically for the golf event, beyond that already planned for the golf development.

CORE SUSTAINABILITY CONCEPTS

The project is aligned with **Tanedo policy** on headline sustainability themes including:

- Protection and enhancement of Landscape & Ecosystems
- Efficient use of Water for irrigation
- Efficient use of clean Energy & Resources
- Environmental Quality improvements, specifically air, water and soil
- Wider environmental and social benefits through Products & Supply Chains
- Long term net gains to local People & Communities

VISION AND PRINCIPLES

Tanedo (the company responsible for the investment, project development as well as building the golf course) and the project team are strongly committed to protecting and enhancing the natural environment in the area. Sports practice will be conciliated with measures permitting a minimum of non-polluting and/or biodegradable chemical products in order to preserve water resources, generate energy efficiency and reduce waste.

Tanedo will add a prominent leisure option to the city of Rio de Janeiro with a service of exceptional value aimed at being something the general public can also experience, and not restricted to high income segments.

5. SUSTAINAILITY OUTCOMES

LANDSCAPE & ECOSYSTEMS

Through this sensitive and professional approach to planning and conceptualisation, the project has identified and defined the following sustainability outcomes, and commits to realising them.

The whole area is currently under severe stress due to human intervention. In consequence is not considered that the project is likely to have any significant adverse effects on landscape character, i.e. the project can be accommodated without unacceptable adverse impacts on the landscape character. Furthermore, the project has the potential to enhance the landscape character of the area.

Taking into account the ecological sensitivity of the surroundings, the landscape and environmental aspects have led all the phases of the design process in order to plan and design-out environmental impacts and to minimize the needs for technological fixes, e.g. buildings will include passive design features, topographic change and disturbed areas across the entire site have been minimized and all buildings, external walls and fences will present materials and colours to promote their integration with their surroundings, with prevalence for colours corresponding to natural local materials (wood, stone, clay, sand) reducing the visual impact of buildings in such a sensitive landscape.

The course routing has been laid out to align with natural characteristics of the ground, to benefit from the stunning natural topography and landscape character, and to minimising the overall hectarage intensively-maintained areas. The projected area of intensively-managed turf (greens, tees, fairways and semi roughs) will be appropriate to the staging of an international competition but will be as small as possible.

The earth-movement will be minimized in order to retain and enhance the authentic sense of place and natural beauty of the site. The total disturbed land area prevents any unnecessary change to the existing terrain. The golf course (greens, tees, fairways, and semi-roughs/roughs and lakes) will occupy the already cleared and degraded areas, adapting to the morphological and topographical characteristics of the ground, protecting whenever possible areas of higher density of vegetation and wetlands.

The project represents an opportunity to re-establishing the natural landscape in the lagoon area. The existing local ecological network (ecological corridors), inside and outside the golf course area will be maintained linked with the surrounding park area - The Marapendi Zoo botanic Park, and will be enhanced through the implementation of a re-naturalization plan. The plan will promote the Marapendi lagoon's genetic integrity.

The re-naturalized areas located outside the area of overall disturbance will be restored as natural habitats, utilizing the dominant naturally occurring species on site. These areas will not have permanent irrigation and will not be intensively maintained as the turf areas will be.

A research programme will be developed to collect seeds and propagate this species in order to augment its establishment on the golf course (degraded areas due to previous interventions and areas located within the area of overall disturbance to build the golf course).

Areas located outside the area of overall disturbance will be restored as natural habitats, utilizing the dominant naturally occurring species on site and within the Marapendi lagoon area. Seeds will be collected and native plants will be produced in a local nursery. Additional experiments with other native species will be undertaken to create a seed and plant bank to use during construction.

The freshwater features on site are the keystone of the local ecosystem. Buffer zones of renaturalized natural vegetation will be established adjacent to the water features, lakes included.

Staging areas close to the golf course will be developed as part of the golf course construction works and afterwards will be allowed to re-naturalise until they are required just prior to the golf event.

Once the golf event has ended and all staging and infrastructure has been cleared from the site, all temporary and permanent surfacing not required to be retained as part of the golf course will be broken out and removed and all damaged areas of the site will be repaired.

All building materials removed will be reused or recycled. In addition, within the golf course, spectator pathways will be removed and spectator areas and other out of play areas around the golf course which have been damaged during the event will be repaired and allowed to regenerate with native vegetation.

WATER

The strategy for management of the water consumption associated with the irrigation of the golf course provides for use of lower quality surface water (top 10-20 metres) as the only source of water supply.

The use of the latest cultivar of Seashore Paspalum grass (greens) and Zeon Zoysia grass (fairways, roughs and tees, 80% of the grassed area) will reduce the use of subterranean water to minimum values.

The most suitable turfgrass species selection for the course was determined following a report made by an Agronomist, Dr. Frank Rossi, associate professor in the Department of Horticulture at Cornell University and consulting agronomist on the project.

Given the existing soil characteristics it has been possible to omit the requirement for a comprehensive piped drainage system.

All the surrounding water bodies will be complemented with vegetative buffers (bio filters using vegetated filter strip with native local species to help remove nutrients and other pollutant elements).

ENERGY AND RESOURCES

The main source of energy is the electric power (about three quarters of Brazil's power comes from hydro-electric dams) but the primary objective will be to reduce energy consumption from non-renewable resources, e.g. maintenance facility and clubhouse will use renewable energy sources (solar) to heat water (baths and kitchens).

The irrigation system will be pressurized with the most up-to-date energy efficient pump system in order to adequate the pressure demand to a minimum, thus having the effect of reducing pressure loss by friction in pipework.

The buildings will include passive design features, e.g. good thermal insulation, correct choice of materials, correctly sized roof overhangs and other forms of shading to cut unwanted light and heat, use of thermal mass available in the building's structure to moderate temperatures and provide heating and building shape (cross-flow passive ventilation) .

The use of most energy-efficient equipment and appliances will be promoted.

MATERIALS AND SUPPLY CHAINS

The primary objective will be the use of local materials, natural materials existing on the site or, if available, those produced in Brazil. Therefore, Green procurement Standards shall be widely promote for selecting environmental friendly products and services made with environmentally conscious materials (e.g. local materials such as sand, recycled materials such as wood, plastic and

stone and environmental certified products and services) for buildings construction and for golf furniture acquisition, such as divot boxes, waste receptacles, signs, fences and benches.

Without the sustainability blueprint no further verification on materials and supply chains can be made at this time.

POLLUTION PREVENTION

A specific environmental management system will be implemented during the construction and maintenance phases in order to guarantee an adequate control of the social and environmental aspects.

An environmental management programme will be implemented during golf tournaments and will include action plans for waste management, transport, energy, site preparation, temporary structures, and the sourcing of appropriate local suppliers of materials and services.

Buildings will be built and managed in accordance with the most advanced environmental standards.

PEOPLE AND COMMUNITIES

A primary objective will be that the Olympic course project will lead the promotion of the game in Rio de Janeiro and in Brazil but also in South America, representing a legacy for local communities and an example of the right approach to golf course architecture, i.e. a new type of golf course, serving players and the growth of the game and serving the land and environment.

The project aims to represent a new model in sustainable golf development that multiplies more benefits to people and to the environment. This new awareness of golf and its relation with the environment and local communities will be promoted during the entire golf course's life cycle.

Tanedo will introduce a Golf Academy that will be the main tool in this process of offering conditions for the first contact with the sport, an unlimited access concerning participants' age and length of play. The project's goal is to create ideal conditions for an expressive rise in numbers of people who practise the sport and, at the same time, for athletes to train and improve their technical skills as well as for discovering new sporting promises.

The Olympic Golf Course will be the sport's second that is open to the public, but the first official one, with eighteen holes. The other is Japeri Golfe Clube, founded in 2005 in Engenheiro Pedreira, in Japeri Municipality, which has nine holes.

Getting people motivated about ecological and environmental issues is also part of the project. Expectations are that golf will be seen as a powerful social inclusion agent with a recognised landscaping value. Adapting areas and spaces into natural habitats and good places for the reintroduction of local fauna and flora, the complex will serve as a showcase.

6. SPECIFIC OPPORTUNITIES AND GUIDANCE

The key theme to be communicated with regard to ongoing advice and guidance on this project is simple and clear: continuing commitment to the highest standards of sustainable development.

Prior to the next meeting in July 2013 Tanedo will need to visualize and describe its commitment to the GEO legacy programme with a sustainability blueprint. This short and concise paper should connect vision, ethos and principals leading to a sustainable end product. It should show how the project minimizes its environmental and social impact, maximizes a sustainable relationship with resources, landscape and habitats and the local community and describe the efforts taken for a long term life-cycle of the project.

The sustainable blueprint should be delivered in at least a few days prior to the next site visit (July 2013) and must include the six key areas:

- Landscape
- Water
- Energy
- Supply chains
- Pollution
- Communities

Specific design development issues where GEO will seek to provide continuing inputs in subsequent stages include those already discussed above relating with the detailed design and the implementation of a re-naturalization plan versus the construction plan, harmony landform and visual amenity.

In addition, points worthy of further close attention include:

- The grassing plan and the extent of irrigated areas
- The number of formal "artificial" bunkers
- Water Logistics studies and the Irrigation System (Water Consumption during Construction/ Maintenance)
- The plan for the Olympic event and the contouring and the vegetation for the viewer areas.
- Compatibility and integration, connecting on-site habitats into a wider network - the Parque Natural Municipal de Marapendi
- Development and implementation of a local nursery and habitat restoration programmes
- Integrated Pest Management (IPM) plan
- Other Control Procedures and Best Management

Practices during the construction and maintenance phases related to:

- Waste management
- Turfgrass maintenance
- Water consumption and quality
- Energy consumption
- Playing areas and Re naturalized areas management
- Erosion control and soil quality
- Emergency Preparedness and Response
- Education programs and training programs
- Communication plan
- Environmental and ethical procurement and purchasing policy

7. NEXT STEPS

- Agreement of formal enrolment of project in the GEO Legacy™ programme
- Arrange site visit by GEO Sustainability Associate (GEOSA) Legacy™ verifier
- Preparation of project's Sustainability Blueprint (SBP) from GEO's template. SBP work is supported by your project's GEOSA
- Evaluation and sign off of Sustainability Blueprint by GEO