

**IN THE MATTER OF AN ARBITRATION UNDER THE DOMINICAN REPUBLIC
AND CENTRAL AMERICA FREE TRADE AGREEMENT AND THE UNCITRAL
RULES OF ARBITRATION (2010)**

**DAVID R. AVEN, SAMUEL D. AVEN, CAROLYN J. PARK, ERICK A. PARK,
JEFFREY S. SHIOLENO, GIACAMO A. BUSCEMI, DAVID A. JANNEY AND
ROGER RAGUSO (United States of America) (Claimants)**

vs.

THE REPUBLIC OF COSTA RICA (Respondent)

FIRST EXPERT’S REPORT

GERARDO BARBOZA JIMENÉZ

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OPINION OF EXPERT WITNESS: CASE OF LAS OLAS CONDOMINIUM PROJECT, WEST ESTERILLOS, PARRITA, PUNTARENAS, COSTA RICA.

A. Expert's Qualifications and Experience.

1. The complete name and address of the Expert Designated by the Party.

Gerardo Barboza Jiménez, address: 300 m east of the Hojanca Cemetery, Guanacaste, Costa Rica.

2. Declaration of past and present relationship with parties and advisors.

I was an employee of the National System of Conservation Areas (SINAC Spanish acronym) of the Ministry of the Environment and Energy (MINAE Spanish acronym) until 2008 and for the last six years a have been a member of the board of the Tempisque Conservation Area Regional Council (CRACT-SINAC Spanish acronyms) in representation of civil society.

In this position I have worked as a SINAC advisor and collaborator on strategic planning matters and in the current formulation of the national wetlands policy. This is a voluntary position and does not limit or constrain the independence of my opinions and criteria.

To date I have not had any relations with the Batalla Abogados firm or with Vinson & Elkins, or with the Claimants in this case.

3. Qualifications:

Bachelor's degree in Marine Biology from the National University of Costa Rica (UNA Spanish Acronym) and Master's in Regional Rural Development from the same University. My theses, "*Sustainability of Grazing in Tropical Wetlands. Case of Palo Verde, Costa Rica*" consisted of analyzing a new management technique through grazing for the Palo Verde Wetlands, one of the most important RAMSAR wetlands in Costa Rica and a National Park. The thesis was financed by the RAMSAR Convention, Wetlands for the Future Fund Program.

In addition I have taken a series of training and qualified training courses, including: (i) Management of natural forests for non-timber products and services (UPEACE, 1993), UPEACE Campus and Regions of Costa Rica. (ii) Post graduate course in Tropical Biology

and Ecology (OEY-UR, 1994), Biological Stations of Costa Rica. (iii) Scientific internship at the, Barro Colorado Island, Smithsonian Biological Station in Panama (1994). (iv) Course on Conservation through Use of Dry Tropical Forests (Oxford Institute, England and CONSEFORH of Honduras, 1995), Honduras. (v) Course on the Restoration of Fire Degraded Ecosystems (CIHEAM, 1995), Zaragoza, Spain. Bird Monitoring (TNC, 1997), Belize; and (vi) Upper Management Course (INCAE, 2000), Costa Rica.

4. Experience:

I have worked for 30 years, mainly in Costa Rica, in management positions with the National System of Conservation Areas (SINAC), in planning, management and development of Conservation Areas, protected areas and wetlands and subsequently have worked independently. From 1988 to 1995 through the National Park Foundation, from 1995 to 1998 with the Organization for Tropical Studies (OET Spanish acronym). Afterwards from 1999 to 2008 through an official Government position with SINAC in Costa Rica, specifically as Head of the Bagaces Sub Regional Office and Director of the Palo Verde National Park. Since 2009 I have worked as a private consultant on environmental and development matters, including wetland projects. Scientific Advisor on Palo Verde National Park planning and management (for many years) and a member of the Scientific Advisory Committee for the OET, Palo Verde Biological Station (1992-1995) – one of the most relevant wetlands in Costa Rica and Central America. From 1985 to 2006 I was an occasional professor at UNA and UCR giving courses on Marine Biology, Conservation, Ecology and Tourism and Environmental Education. I have also been an expert assigned by the Attorney General's Office of the Republic of Costa Rica in a case on filling in the mangrove swamps in Playa Samara, Guanacaste, Costa Rica vs. Stephan Jaikel, 1996.

5. Experience and Projects I have participated in related to planning and management of Protected Wildlife Areas and Wetland Restoration Projects.

I am the co-author of the Management Plan for State Protected Wildlife Areas containing wetlands: case of the Palo Verde National Park in 1996 and the Iguanita National Wildlife Refuge in 2005.

Author of the following management plans on private land for the creation of National Private Wildlife Refuges that contain wetlands in Costa Rica:

- a) Malambo Private Refuge. 2009. In Rio Cañas, Malambo Tourist Project, in Santa Cruz, Carillo, Guanacaste, Costa Rica;
- b) Bolson Ecotours Project. 2009. Coastal marine wetlands site located in Bolson, Santa Cruz, Guanacaste, Costa Rica.
- c) Hacienda Venecia Management Plan in Roblar, Nicoya. 2013. Coastal marine site

located in the Lower Tempisque River Basin, Guanacaste, Costa Rica.

- d) From 1990 to the present, I have been a promoter and leader of active management projects, research, planning and restoration of wetland ecosystems at the Palo Verde RAMSAR Site and other wetlands in the Tempisque Basin.

I have been a restoration project planner complying with Costa Rican national policies and RAMSAR guidelines, with excellent results in the following research studies:

(2011-2015): Corral de Piedra RAMSAR Wetlands, SINAC, in the Lower Tempisque Basin, Guanacaste, Costa Rica.

(2011-2013): La Bolsa Wetlands in the Hacienda El Viejo National Wildlife Refuge, Guanacaste, Costa Rica.

(2015-Present): Proposed and Coordinated Project: Environmental Management Plan and Control of the Salt Marsh Mosquito (*Aedes taeniorhynchus*) in Lower Tempisque Basin Wetlands, Guanacaste, Costa Rica 2015. In progress.

From 1995 to 1999 I was the head of the Bagaces Sub Regional Office for the Tempisque Conservation Area and Director of the Palo Verde National Park that includes the most important wetlands in Costa Rica and the first to register with the RAMSAR Convention in 1991.

Internationally, I have experience with wetlands in: (i) Panama, Scientific Internship at the Barro Colorado Island Smithsonian Biological Station on Lake Gatun. (ii) Italy, Visit and situational analysis of Punta Alberete Wetland management. (iii) United States (Florida): Paper on the experience of managing and restoring the Palo Verde Wetlands presented at the Society for Ecological Restoration, International Conference and visit to management experiences and conservation of the Everglades Wetlands; Experiences in the restoration of the Key Biscayne mangrove swamps. (iv) Haiti, CATIE-PNUD instructor for planning and developing a practical theoretical course on the Planning and Restoration of Haiti Mangrove Swamps, with a subsequent situational analysis tour on the protection, planning and management of projects associated with mangrove swamps in Golfo Nicoya, Costa Rica.

Currently, I am a private environmental adviser and consultant in biology, planning, conservation and rehabilitation of wetlands and rural development projects.

B. Instructions and Protocol Guidelines for Experts

The Batalla Abogados firm hired me as an expert for the purpose of introducing me as an expert on wetlands, to issue an opinion on the “Las Olas” case. I met with the Batalla

Abogados legal advisors, who provided me with information on the case, in addition to a series of documents, and access to administrative case files.

I hereby declare as an expert that I am totally independent from the parties and the legal advisors to issue an opinion pertaining to the case and that this report solely reflects the knowledge acquired through my years of experience.

I declare that I base my opinions and conclusions as an expert on: (a) the documents referred to me or that I requested or researched and that were available to me. I evaluated them and these documents are described in the Appendices to my report; and (b) in addition to my field experience on wetland research and restoration, particularly in Costa Rica.

The report was originally prepared and submitted in Spanish. Subsequently Vinson & Elkins translated it into English and it was sent to me for review.

I declare that the opinions expressed in this expert report are based on my genuine convictions regarding the facts reviewed in the documents available to me. Likewise, my opinions are based on my wide-ranging professional experience on the subject of wetlands.

This Expert's Report was signed solely by Gerardo Barboza Jimenez.

C. Methodology

The methodology used to evaluate the case and issue an opinion included:

- One: Meeting with Batalla Abogados legal advisors on the “Las Olas” case, to establish the terms; and review and initial consultation of the documentation provided and additional information requested.
- Two: Analysis of the documentation provided and other documents, such as administrative files from government entities, maps and plans as described in the Appendix to this report.
- Three: Preparation of a location map for the project and the supposed wetlands area, using Plat P-1244761-2007, the coordinates of the supposed wetlands area reported and certified by SINAC authorities and 2005 and 2013 Google Earth images, using the CRTM05¹ Coordinate System. An expert on the Geographical Information Systems (GIS) collaborated with us on this.
- Four: Detailed analysis and examination of the reports and additional documentation as related to Executive Decree No. 35083-MINAET that establishes the technical criteria for the identification, classification and conservation of wetlands in Costa Rica.

¹CRTM 05: The official projection for the cartography of Costa Rica. It is established by Decree No. 7788 of 04/23/98).

- Five: Review of the project environmental viability document approved by SETENA and the respective Environmental Management Plan, as well as the protocols for the environmental protection of existing nature and humans in SETENA File No. 1362-07.
- Six: Preparation of responses to the series of questions submitted by Batalla Abogados for evaluation and analysis of the case.
- Seven: Submittal of draft Expert's Report for review by Batalla Abogados advisors, who made a series of comments and requests for clarification.
- Eight: Preparation of the Final Expert Opinion Report on the "Las Olas" Project supposed wetlands case.

D. Legal Framework for Wetlands

Costa Rica has a well-established record in the management and conservation of natural resources. With reference to wetlands, in 1991 it signed the World Wetlands Convention, known as the RAMSAR Convention (Environmental Magazine No. 43, 2012). In 1995, within the Constitutional Environmental Law (Law No. 7554, 04-10-1995), it incorporated a definition for wetlands and declared wetlands and their conservation of public interest (Articles 40-41). Later in 2001 Costa Rica established the National Wetlands Policy.

The Costa Rica Wetlands Strategy (SINAC, 2006) was developed in compliance with and based on the National Wetlands Policy (MINAE, 2001) and the Central American Policy for the Conservation and Rational Use of Wetlands (CCAD, 2002).

As part of the evolution of the legal framework on wetlands, in 2010, Costa Rica established Technical Criteria for the identification, classification and conservation of wetlands (**Decree N° 35803-MINAET**).

Of interest in the jurisprudence is the 12/8/2011 Ruling No. 16938 of the Constitutional Court that declared wetlands in Costa Rica as part of the Natural State Heritage and therefore must be protected, whether or not they were declared as Protected Wildlife Areas; therefore: "*Wetlands located on private property are affected by constitutional limitations of social interest, making it mandatory for owners to preserve them and manage them in accordance with international treaties approved by Costa Rica and with national legislation*". (Constitutional Court Ruling No. 16938 on 12/8/2011).

Institutionally, SINAC is responsible for wetland protection. SINAC has Regional and Sub Regional Offices in each one of its areas, with at least one professional responsible for determining the existence of wetlands and the protection measures to be taken. Likewise, MINAE has a National Wetlands Program working mainly on research and keeps records of declared wetlands.

To comply with the care and handling of national wetlands, the country is currently in the process of formulating a National Wetlands Policy. Its objective is: *“that it contain the guidelines and strategy that the country must follow for correct wetland conservation and management in the search for rational use of these ecosystems, and to continue to have the services they provide in a sustainable manner.”* (INFO@POLITICAHUMEDALES.CR).

The foregoing is a clear indication that at least during the last 25 years, Costa Rica has been very interested in the subject of wetland conservation and protection and in updating and strengthening the policy and strategy for their management, conservation and development.

E. Part I. General: Technical, Legal Aspects, Procedures and Sampling to Determine a Wetland Area.

Questions and Answers by the Wetland Expert: General

1. Pursuant to Costa Rican Law, what criteria must be satisfied to consider that a zone or area is a wetland?

In accordance with current Costa Rican law and Decree No. 35803-MINAET, Gazette No. 73 of Friday, April 16, 2010, the ecological criteria and characteristics that permit the definition and determination that an area is a wetland are: combined presence of Hydrophyte Vegetation, Hydric Soils and Water Conditions. (Decree 35803- MINAET, Article 5, Definitions defines each of these concepts). This decree is the official tool used by SINAC and the Ministry of the Environment and Energy to determine wetland areas. It is done through the official responsible for wetlands in each sub regional office of the SINAC Conservation Areas or with the support of the Coordinator of the National Wetlands Program, through requests made by each Conservation Area.

Before Decree N. 35803- MINAET was enacted in April 2010, there was no official criteria to determine whether an area was a wetland. There was a legal framework for their conservation and protection, specifically the Constitutional Environmental Law (Law No. 7554 of 10/04/95) that declared wetlands and their conservation of public interest and the Biodiversity Law (Law No. 7788, of 04/23/98).

2. Were the legal criteria used to determine the existence of a wetland in 2010, the same as those in 2011 and 2012? If the answer is no, please explain the criteria

that have been used in each year, as well as the date when those changes were introduced.

Yes, in effect the legal criteria to determine the existence of a wetland were the same in 2010, 2011 and 2012. Decree No. 35803-MINAET, referred to in the prior point has been in effect since April 16, 2010 until the present. This decree constitutes: the Technical Criteria for the identification, classification and conservation of wetlands.

3. How are the boundaries of a wetland delineated? Do all of the criteria have to exist in the entire wetlands?

To identify, classify and delimit wetlands we need to review Decree No. 35803-MINAET, which establishes the following in its Article 4 *“The location, identification and classification of wetland ecosystems. The technical criteria established under Articles 6, 7 and 8 of this decree will be used to identify and classify wetland ecosystems. The support tools to be used in delimiting and locating wetlands ecosystems are wetland inventories and others. This is done through:*

- a. Field information and geographical information systems used to obtain polygons delimiting the lands where wetlands ecosystems are located.*
- b. Printed and digital maps are prepared using the information obtained from the above point, containing scale (not less than 1:15,000), visible geographical coordinates, and using CRTM 05 projections.*
- c. Each Conservation Area must handle this information on the location, delimitation and classification of wetlands in their Geographical Information System (GIS).*
- d. The SINAC Executive Secretary must establish an Official Geographical Information System containing national information.*
- e. Wetland ecosystems that are part of the State Natural Heritage must be included within the corresponding cadaster maps.”*

In particular, for palustrine wetlands, such as the one supposedly identified by SINAC-ACOPAC at the “Las Olas” project, which is outside the Land-Maritime Zone, the following three ecological characteristics must exist: (i) Hydrophyte Vegetation², (ii)

²**Hydrophyte Vegetation:** Species of flowering plants that grow and develop in aquatic environments are called hydrophytes. They are defined as those plants with life cycles, particularly in reproduction aspects, that occur in association with an aquatic environment. These plants have developed structural adaptations and have a limited tolerance to environmental factors, such as temperature, acidity, luminosity, and oxygen concentration.

Hydric Soils³; and (iii) Water Conditions.⁴ My professional opinion is supported by the legal requirement established under Article 6 of Decree No. 35803-MINAET⁵.

4. What is the normal procedure followed to determine the existence of wetlands? Please explain the standard methodology followed.

The procedure is established by Decree No. 35803-MINAET, under Article No. 4 (Location, identification and classification of wetlands). The article contains a general methodology used by SINAC to determine the existence or nonexistence of wetlands.

Although the decree does not provide a formally established protocol, the procedure must be consistent with the occurrence of the three wetland ecological characteristics explained under point 3 and follow the indications in that decree. There is no order of steps, but it must respect what the referenced decree establishes for the results to be objective.

Based on my professional experience, an approximation of the typical procedure normally followed is:

- a) First observe the three basic elements that define a wetland in the specific area of interest. This initial step will determine whether a wetland exists on a particular land. If

³**Hydric Soils:** A hydric or hydromorphic soil is defined occurring under natural conditions of saturation, flooding, waterlogged or pooling for a long time, which situation permits them to develop anaerobic conditions in their upper zones. The determination of whether a soil has hydric conditions could be very important for mapping, classification and delimitation of a wetland.

Based on the Land Use Capacity Classification (Executive Decree No. 23214-MAG-MIRENEM of June 06, 1994), in general, wetlands have Class VII and VIII soils. Therefore, these lands are only useful as flora and fauna conservation areas, aquifer recharging areas, genetic reserves and scenic beauty.

⁴**Water Condition:** All wetlands, as a minimum, have a seasonal abundance of waters that can be sourced from rainfall, unusual flooding, rainwater runoff, drainage of soil waters or from tides. The frequency and duration of flooding and soil saturation varies broadly from permanent flooding or saturated to irregular flooding.”

⁵Article 6 of Decree No. 35803-MINAET: “Article 6 – Ecological Characteristics of Wetlands. The essential characteristic that an area must have to be considered a wetland are: (a) Hydrophyte Vegetation composed of types of vegetation associated with aquatic and semiaquatic environments, including phreatophyte vegetation that develops in permanent layers of water or superficial water tables. (b) Hydric Soils, defined as those soils that develop under very wet conditions up to the level of saturation and (c) Water Conditions, characterized by climatic influence on a particular land area, where other variables are involved including geomorphological processes, topography, soil source materials and occasionally other extreme processes or events.

these three elements do not occur in the area of interest, the conclusion would be that it is not a wetland. This is a purely qualitative process.

- b) If there is a possible wetland, then an accurate field, qualitative and quantitative assessment is made to confirm and start to delimit the perimeter of the area where the above-mentioned three characteristics occur.
- c) This requires the determination and logging of:
 - i. The presence of species of Hydrophyte Vegetation composed of types of vegetation associated with aquatic and semiaquatic environments, including phreatophyte vegetation that develops in permanent layers of water or zones of superficial water tables.
 - ii. The presence of Hydric Soils, defined as soils that develop under high moisture up to highly saturated conditions.
 - iii. The Water Conditions, characterized by climatic influence on the particular territory, where such variables as geomorphological, topographic processes, soil source material and occasionally other extreme processes or events.

This procedure includes the participation of trained or expert personnel or the support of experts to: identify and log the hydrophyte vegetation species present and to discern in the field the area of land that corresponds to hydric soils. This is done through sampling by soil specialists or persons duly trained for that purpose, the same is done to determine water conditions.

- d) The delimitation or determination of the extension of the wetlands is done by walking through the perimeter of the specific area of interest where the Hydrophyte Vegetation, Hydric Soils and Water Conditions occur. This will determine the boundaries of the area of interest.
- e) Once the limits and territory of the wetlands are discerned, a survey of the area is made using GPS or topographical equipment. This procedure makes it possible to establish the area, with coordinates for each point. A CRTM 05 projection must be used to do this. Finally, the specific area of the wetlands is calculated and established. This results in a precise delimitation of the wetland area of interest.

The process described in point “e” is necessary to comply with Article 4b of Decree 35803-MINAET that provides *“Using the information resulting from the above point (field information and areas obtained from the GPS that locates the wetlands) prepare digital and*

printed maps containing scale (at least 1:15,000), visible geographical coordinates, and using CRTM 05 projection.” (Addition and underlining by expert).

- f) Finally, they are classified, depending on the characteristics of the wetlands, as indicated under Article 7 of Decree No. 35803-MINAET, as follows: *“Article 7 Wetland Classification System. The System for the Classification of Types of Wetlands will be the one proposed by the RAMSAR Convention, approved under Recommendation 4.7, issued by Resolutions VI. 5 and VII. 11 of the Conference of Contracting Parties described below: “The types of wetlands are classified into the following systems: a. Fluvial System, b. Estuarine System, c. Marine System, d. Lacustrine System and Palustrine System.”*

In that regard, with reference to this report, the same Article 7 defines palustrine wetlands as: *“Palustrine Systems include all non-tidal wetlands, with the following characteristics: 1) may contain vegetal cover or not, the vegetation may be represented by a predominance of trees, shrubs, persistent emergents, emergent mosses or lichens. 2) Water levels in deepest parts are less than two meters. 3) Salinity values due to ocean-derived salts are less than 0.5% (yolillales (palm swamps), fresh water swamp forests, swamps).”* The referenced decree refers to the following ecosystems as palustrine wetlands:

- *“Swamps/estuaries/permanent saline/brackish/alkaline pools.*
- *Swamps/estuaries/seasonal pools/intermittently saline/brackish/alkaline.*
- *Swamps/estuaries/permanent fresh water pools; pools (less than 8 ha),*
- *Swamps and estuaries on inorganic soils, with emergent vegetation underwater at least during the majority of the growth period.*
- *Swamps/estuaries/seasonal pools/intermittent freshwater on inorganic soils; includes flooded depressions (charge and discharge lagoons), potholes, seasonally flooded plains, cypress swamps.*
- *Treeless marshes, includes shrub or open bogs, fens, bogs and lowland marshes.*
- *Fresh water forest wetlands, includes fresh water swamp forests, seasonally flooded forests, tree swamps on inorganic soils.*

(Decree 35803-MINAET, 2010). The latter must be the case of the supposed wetland under study.

These six steps constitute, in my professional opinion, a typical procedure for determining a palustrine wetland.

Attached is the official definition of hydrophyte vegetation, hydric soils and water conditions under Article 5 of Decree No. 35803-MINAET.

5. Is it necessary to take soil samples (is it necessary to provide the technical details to take samples)? In addition, how do you determine where to take these samples?

Yes, it is necessary to take soil samples. The soil sampling locations are determined in the field based on the observations of the soils specialist, who may be a specialist in edaphology⁶, an agronomical engineer or a forest engineer specializing in soils, preferably a certifier of soils registered with INTA. The sampling methodology and sample custody although not specifically mentioned in the Decree, is governed by the respective scientific and statistical rules. Normally, a .80 x 1.0 meter trial pit⁷ or trench is made to determine soil morphology and other characteristics. It may be necessary to make several exploratory trenches.

Based on the results of the trench or trenches and the extension of the land under study, the type of sampling is then defined. It may be done by 10 x 10 meter quadrants in the entire study area or sectors of the area. Samples are taken at each corner of the quadrant for random sampling. They are taken up to the depth permitted by the soil, which can be just over 1.0 meter. The number of samples will depend on the heterogeneity of the study area.

Soils are described up to the level permitted by the physical conditions of the soil and may be limited by the water table⁸ or by rocks. Using the description, the soils are classified taxonomically in accordance with the USDA Soil Taxonomy System⁹, official soil

⁶**Edaphology:** Science that deals with nature and soil conditions as related to plants.

⁷**Transverse Section or Quadrant:** excavation made in the soil of varied size, generally 1x1x1 meters, with a depth that permits the evaluation of the soil profile.

⁸**Water Table:** This is the surface that comprises the upper limit of underground water / height of the most superficial underground water level.

⁹**USDA soil taxonomy system:** This is a soil classification system developed and coordinated internationally by the Ministry of Agriculture of the United States and its subsidiary the National Cooperative Soil Survey. It was published in 1975 and subsequently used by FAO to establish international standards. It is a hierarchical classification that groups together similar soil types into general categories and it is used in geology and engineering in the United States, Latin America and other countries.

diagnostic and classification method.

In addition to this taxonomic classification, the land is classified by class of “*Capacity of Use in accordance with the Methodology for the Determination of Soil Use Capacity of Costa Rica, the official classification system for Soil Use Capacity Classes*” of Decree No. 23214-MAG-MIRENEM, to determine their current and future use or the natural limitations they have.

The description of a soil profile by a specialist gives us an understanding of its formation genesis and the influence of the five soil forming factors¹⁰: source material, organisms, relief, climate and time.

To characterize and describe a soil profile and evaluate the formation genesis to discard or certify the the presence of a hydromorphic soil¹¹, one of the unavoidable criteria for determining that it is a wetland is that the soil was formed or has been at some time during its development and formation under the influence of surface water. If that condition is not present in the first 60cm of the soil horizon, it cannot be classified as a wetland.

Physical and chemical aspects of the soil must be evaluated. An auger is used to drill holes at previously located sites to describe the morphological characteristics of the soil. Genetic horizon¹² texture, color, effective depth, presence of compacted strata and permeability. In addition, the depth, pH, organic matter, grain size, density and porosity and content of chemical elements are analyzed.

Also analyzed are climate aspects, the geological and geomorphological context, current land use, water table and texture. The above leads to the taxonomic classification and the classification of the Land Use Capacity. With the foregoing it is possible to deduce the ecological characteristics of the water conditions of the soil.

6. How are the vegetation surveys done?

The methodology for the vegetation surveys can vary. It can be done by establishing

¹⁰**Soil Forming Factors:** This is the Hans Jenny (1940) soil model that establishes five factors to define soil conditions and history.

¹¹**Hydromorphic Soil:** According to Article 5 of Decree No. 35803-MINAET, hydromorphic soils are defined as: “*those that under natural conditions are saturated, flooded or waterlogged or pooled for a long time, which situation permits them to develop anaerobic conditions in their upper levels.*”

¹²**Genetic Horizon:** These are normally horizontal layers of deposition that form the soil profile. They have different colors and characteristic and are the result of soil evolution from the source material.

transverse sections or quadrants or by direct observation.

In my experience, typically, they are inventoried by direct observation, field classification and the respective log of the species. In addition, and particularly in palustrine wetland sectors where there may be a mixture of hydrophyte species with non-hydrophyte species, sampling may be done in transverse sections or quadrants, established systematically or randomly. The results must be that the land or area (areas) where there is a predominance of Hydrophyte Vegetation, in combination with Hydric Soils and Water Conditions will be where the limits of the wetlands are established as compared to non-wetlands.

F. Part II. Analysis of Reports

Among the duties that I have been asked to perform as an expert on wetlands is the analysis of the different documents issued by state authorities with regard to the existence or nonexistence of palustrine wetlands (and their possible fill) on the property where the “Las Olas” project is developed.

1. Was the methodology used during the inspection indicated in the SINAC-GASP - 093-11 report dated 03/18/11 appropriate for determining the existence of wetlands?

A review of the referenced report shows that the following methodology was used:

- Cartographic location of the site and reference to prior report (ACOPAC-CP-003-11 of 113/03/11) on the prior inspection where water flows had been detected, interviews with neighbors in the area that refer to the supposed existence of wetlands in the area, plant species: sarsaparilla and *Paspalum fasciculatum* grasses, two species of birds (jacana and grey egret).
- There is a theoretical reference to the functions of wetlands and their importance to conservation; its threats and the three criteria for identification of wetlands along with legal aspects.
- With regard to vegetation, they say "*with a predominance of grasses, and some shrubs*" and that "*at the time of the inspection no source of surface water was detected*".
- With regard to soils "*we detected the presence of land fill in different sectors of the Palustrine Wetland and the presence of Hydromorphic soils.*"
- The field comments included the location of Plat 1244761-2007 stating "*that the land has an irregular to flat topography with the presence of trees typical to the*

zone, shrubs, palms and grasses”, the current use of the area is urban development with the delimitation of lots; “we detected the presence of a supposed non-tidal palustrine wetland, with a superficial water table”,

Based on my experience and field knowledge with respect to wetlands, in my professional opinion the methodology used in the 03/18/11 SINAC-GASP- 093-11 report was not appropriate and adequate, because only partial, very limited descriptions were made of the ecological characteristics present on the land, required to determine whether or not it is a palustrine wetland, in accordance with Decree No. 35803-MINAET.

They limited themselves to referring to: “*grasses, palms and some shrubs*”, the presence of hydromorphic soils and the current urban development use, with trees typical of the area, shrubs, palms and grasses and that they did not detect surface water.

In my opinion, this determination of a wetland consisted of a simple reference to having “*detected a palustrine wetland*” without any information to support it and without describing the ecological characteristics present on the land, which is basic for the identification and classification of wetlands. This seems to demonstrate that the opinion of the authorities was to force the supposed existence of a wetland in this area of the “Las Olas” project, when in reality it probably does not exist.

The following is a description of shortcomings in the SINAC report (SINAC-ACOPAC-GASP-093-11), based on my experience and knowledge:

- a) First requirement to determine that there is a palustrine wetland is the presence of Hydrophyte Vegetation:

The SINAC-GASP-093-11 report of 03/11/11 did not identify and did not it make the respective log of species of this type of vegetation, it merely indicates: “*detected that there is a non-tidal palustrine wetland..., with a predominance of grasses, palms and some shrubs.*”

In relation to the ecological characteristic of Hydrophyte Vegetation to determine that there is a wetland, the referenced report neither describes nor identifies hydrophyte vegetation species. The foregoing, because grasses, palms and shrubs, include plants that because of their characteristics are present in different types of lands and were not described as hydrophytes, nor do they report hydrophytes. Consequently this ecological characteristic of a palustrine wetland is not confirmed as required under Decree No. 35803- MINAET.

In a palustrine wetland, corresponding to the study area, some species of hydrophyte vegetation may be reported, including *Typha dominguensis*, *Achrosticum sp*, *Calathea insignis*, *Eichornia crassipaes*, *Heliconia sp*, *Hibiscus tiliaceus*, etc. (Córdoba,1998. Crow,

2002 and Gómez, 1984).

Therefore, it is not clear whether it was a technical omission on the part of the SINAC authorities, or if those species were not present in the area of the supposed palustrine wetland. In any case, this is a deficiency in the report.

In addition, the ACOPAC-OSRAP-371-2010 report dated 07/06/10, reports that during the walk through the property where the “Las Olas” project will be developed, to determine if there is any area with wetland characteristics, it reports the following: “*Among the arboreal vegetation, we observed the following species of trumpet tree (Tabebuia rosea), Snakewood (Cecropia spp), West Indian Elm (Guazuma ulmifolia), Velvet Tree (Miconia argentea)*”

Under the section on results and conclusions, page 3, paragraph 2, states:

“If there were a wetland on this property it would be characterized by a permanent water mirror or not and with plants that have adapted to aquatic environments and habitats that can include emergent plants, amphibian plants, rooted floating plants, submerged plants or freely floating plants, woody plants or herbaceous plants that can be terrestrial and survive under wet conditions where their morphological structures are adapted to these environments, hydromorphic lands and water conditions, which could not be corroborated on the property.”

It continues stating: “*During the field inspection to the Las Olas Residential Horizontal Condominium project property, because of the topographical, ecological characteristics and vegetative profile found, in addition to the soil and previously referenced reports that do not mention that the property has parts that comprise wetlands, this property does not have wetland areas.*”

Non-hydrophyte species were reported in the above paragraph, such as: “*trumpet tree (Tabebuia rosea), Snakewood (Cecropia sp), West Indian Elm (Guazuma ulmifolia), Velvet Tree (Miconia argentea)*”, because these species are common in many types of habitats (Zamora et al, 2000).

In addition to this, they did not specifically report hydrophyte species and this weakens the contention that there are ecological characteristics on the site that according to Decree 35803-MINAET of 2010, must be present on land to be considered a wetland. It is therefore clear that it does not meet the first ecological characteristic of a palustrine wetland to be considered as such.

- b) Second and third requirements to determine the existence of a palustrine wetland: the presence of Hydric Soils and Water Conditions:

With respect to Hydric Soils, the March 18, 2011 SINAC- GASP-093-11 report does not indicate nor do they submit the the results nor soil sampling data. This must be done to determine or discard that the land has hydric soil, nor do they submit a determination of characteristics for Water Conditions required under Decree No. 35803-MINAET, Article 6.

In fact, the March 18, 2011 SINAC- GASP-093-11 report (based on the field inspection conducted on 03/16/2011) reports the following: *“In the Western sector, at the inspection site, we detected the presence of a non-tidal palustrine wetland with a superficial water table, and predominance of grasses, palms and some shrubs. The wetland is located in a flatland area at the foot of the surrounding hills, whose hollow topography determines its existence, at the time of the inspection we did not find any source of surface water. As part of the soil sampling conducted by INTA officials, we detected the presence of hydromorphic soils characteristic of these ecosystems.”*

In my professional opinion, the above paragraph, is a serious contradiction in itself, because it first indicates *“the presence of a non-tidal palustrine wetland with a superficial water table”* and then indicates that *“at the time of the inspection there was no source of surface water detected.”* In other words, on the one hand they indicate that there is a superficial water table and on the other they indicate that they did not detect any source of surface water, which is not possible with a superficial water table.

This contradiction, is even reaffirmed with the review of the opinion of the National Institute on the Innovation and Transfer of Agricultural Technology (INTA Spanish acronym), the specialized institute for certification of soils in Costa Rica. In relation to the "Las Olas" project property it indicates that: *“at the request of the Central Pacific Conservation Area (ACOPAC Spanish acronym), the May 5, 2011 DE-INTA-255-2011 report, provides the following technical opinion on soils and land use capacity of the Las Olas Residential Horizontal Condominium Project”*.

“Conclusions:”

“Based on the fact that an opinion is specifically requested because of the environmental irregularities that affect a zone considered to be a wetland type ecosystem (Management Unit No. 1), the following are our conclusions:

- 1. “The area in question, is flat concave land physiographically, with surface runoff from the surrounding hills draining into it, as well as waters from artificial drainage from the highway bordering it to the West.”*

2. *“Because of the water drainage difficulty in these areas, anaerobic processes are evident and that is why reduction processes increase with depth and approximately at 80 centimeters these processes are radical due to the presence of glazed soils.”¹³*
3. *“As of the date of the inspection (conducted on 03/16/2011) there was no evidence of the water table above 120 cm.”*
4. *The study on land use capacity was made at the level of the Management Unit, defining a single unit for this area: Vs124d1C12 where the mainly climatic and drainage limitations evidence difficulties and risk for agricultural use. In fact lands of this type have severe limitations for the development of annual, semi-permanent, permanent crops or forests, and therefore they are mainly used for grazing or management of natural forests.*
5. *“The anthropic interference that has occurred for several decades in this sector (Road infrastructure, deforestation, stock raising) and the definition of the Management Unit in Point 4, do not lead to categorizing these soils as typical of wetland ecosystems.”*

In other words, there is a clear contradiction between what is reported in the March 18, 2011 SINAC- GASP-093-11 report, stating *“As part of soil sampling, INTA officials detected the presence of hydromorphic soils characteristic of these ecosystems.”*, while the INTA opinion is that: *“The anthropic interference that has occurred for several decades in this sector (Road infrastructure, deforestation, stock raising) and the definition of the Management Unit in Point 4, do not lead to categorizing these soils as typical of wetland ecosystems.”*

Based on the SINAC- GASP-093-11 May 18, 2011 report, reporting hydromorphic soils and the INTA technical opinion (DE-INTA-255-2011 Report) of May 5, 2011, reporting that soils on this land are not typical of wetland ecosystems, the conclusion is that in that area the soil is not hydromorphic.

¹³**Glazed Soils:** Those soils that have become conditioned to the existence of layers of water that are more or less permanently saturated causing extensive permanent hydromorphism (glazing). As the water is slowly displaced through the soil, it becomes oxygen poor and more acidic as result of the organic matter. consequently, there are discolored and green and grey areas with a smell of rotting material because of the anaerobic conditions.

According to the referenced INTA report, in its conclusions it found glazed soils in the 80 centimeter soil horizon and a 120 centimeter water table. Therefore it did not find hydromorphic soil and that leads to the conclusion from a technical and professional viewpoint that there is no ecological characteristic in the area designated as a wetland in the SINAC-GASP-093-11, March 18, 2011 report.

With regard to aquatic faunal species, the ACOPAC-CP-003-11, January 03, 2011 report mentions “*we observed jacana and grey egret. At about 18:00 hours at the site we heard a large number of amphibians croaking, such as frogs and toads.*” It is of interest here to point out that the bird species indicated are very dynamic and opportunistic in looking for food. Therefore, they can be found in many different habitats, including non-wetland sites (Stiles, G. 2007) and frogs and toads are species that can be found in a variety of environments where they can find water and food. Some of these amphibians can be found even in backyards and houses located in tropical ecosystems. Therefore, these are not objective criteria for establishing the existence of wetlands.

2. In your experience, were the criteria required to determine the existence of a wetland met?

Based on the March 18, 2011, SINAC- GASP-093-11 report and the May 5, 2011, DE-INTA-255-2011 report that I reviewed and evaluated, I can conclude that the criteria required to determine the existence of a wetland in the area of the “Las Olas” Condominium Project were unsatisfactory and insufficient, in accordance with Decree No. 35803- MINAET.

This is because the wetland area was determined (SINAC-GASP-143-11, March 18, 2011 report) and then its 1.35 hectare extension was delimited (SINAC-GASP-143-11, March 18, 2011 report), but they neither identified nor described the essential precise and technical characteristics that an area must have to be considered a palustrine wetland: specifically, Hydrophyte Vegetation, Hydric Soil and Water Conditions.

In the case of hydric vegetation, the official reports do not show that the hydrophyte species were logged and identified. To the contrary, the opinion of the INTA official indicates that it is currently used as natural pastureland.

Evidently in the documentation referenced in this report, the SINAC officials were not able to substantiate the existence of hydrophyte vegetation, hydric soil, or water conditions. Therefore, the opinion is insufficient to declare the existence of a palustrine wetland in the Las Olas Horizontal Condominium area in West Esterillos, Parrita, Puntarenas.

3. In those reports that reach conclusions on the existence or not of wetlands, do

you consider the conclusions reached were accurate in consideration of the samples taken and the data analyzed?

The conclusions are not accurate. The majority of the reports are qualitative, without sampling of hydrophyte vegetation or soils. In fact, there are reports that indicated that there are no wetland conditions on this land. Therefore, there are inaccurate and even contradictory opinions.

The declaration of a wetland by SINAC in the March 18, 2011, SINAC GASP-093-11 report is inaccurate because there were no consistent findings or reports of the ecological characteristics required for the existence of a palustrine wetland and the conclusion reached on the existence of a wetland was forced.

4. In your opinion as an expert, are there other anomalies that stand out with regard to the methodology or reasoning used in these reports?

Yes. On the one hand, in accordance with reports (SINAC-GASP-143-11, of 03/18/2011; SINAC-GASP-154-11, of 05/23/2011 and SINAC-GASP-216-2011, of 06/29/2011) that refer to and even certify the Geographic Coordinates of the map delineating the wetland area at the Las Olas Residential Condominium project, when overlaying its resulting area or polygon with their coordinates is on plat P-1244761-2007 and the Google Earth 2005 and 2013 images, with the CRTM05 coordinate system, **the resulting wetlands are located outside the property.** That is a strong technical inconsistency that generates doubt with respect to the soundness of the arguments in those reports, because the delimitation of the supposed wetland was made on land that does not correspond to the land on which the “Las Olas” project will be developed, but rather corresponds to neighboring land separated by a public road.

In addition, the SINAC-GASP-143-11, March 18, 2011 report indicates that: *“Based on prior inspections (December 06 and 12, 2010) and the SINAC-GASP-093-11 report, an approximate delimitation was made of the described wetland ecosystem, using GPS GARMIN GPS Image 60CSx.”*

Based on the fact that the supposed wetland had been filled in, they should have at least done photo interpretation of the specific land and a series of transverse sections to discard hydromorphic soils and thereby obtain an objective delimitation. Therefore, the delimitation procedure was inaccurate and incorrect.

We should refer to the fact that the supposed fill may be due to land transformation or deposits, in conformity with the environmental viability and consistent with the environmental management plan for the project.

With respect to whether these wetlands were filled in and in conformity with the environmental viability previously approved by SETENA and the execution of the environmental, natural and human protection protocol for the project, specifically the water and soil protection protocols, the following were included under proposed actions:

- In protocol I (Protection of waters) the following action was proposed: “a) *Drainage, maintaining natural drainage as possible and directing those changed. When deemed necessary gradient breaks or traps will be used*¹⁴”
- In protocol II (Protection of soils) the following action was proposed: “a) *rainwater drainage in the project area to minimize runoff and soil displacement. When deemed necessary, gradient breaks and/or traps will be used*”; “c) *Slopes will have moderate inclination and those higher than 1 meter will be protected and road cuts will be protected using permanent works to prevent landslides.*” “f) *Soil removed will be placed in appropriate locations within the area or at a site authorized by the owner and deposited; meanwhile, they will be protected.*”

We can clearly deduce from the above that to be able to develop the infrastructure for the project and in conformity with the management plan, the land would have to be transformed and deposited, as well as the orientation of runoff waters. Therefore, it is probable that these land deposits and run off water works were erroneously considered by SINAC-ACOPAC authorities as land fill. However, field verification and a soil study would be required to evaluate and discard this issue, which was not done.

G. Conclusions:

Based on the foregoing, my opinion as an expert on wetlands is:

1. Costa Rica has a pertinent legal framework to protect, identify, classify and conserve wetlands and to do this it established Executive Decree N°35803-MINAET, which provides the technical criteria and procedures that must be followed to determine and delimit a specific area as a wetland.
2. The National Conservation Area System (SINAC) authorities were not rigorous in applying the legal framework to evaluate the "Las Olas" project land, since they did not describe the ecological characteristics that must be met to determine if an area is a palustrine wetland, because: (i) They neither sampled or identified the hydrophyte vegetation; (ii) They did not substantiate the existence of hydric soil and water

¹⁴**Gradient Break:** Structure built to slow down water velocity and pressure on inclines or slopes to help decrease erosion. (Adapted from OPS/CEPIS, 2004).

conditions and (iii) The official agency that certifies to soil use in Costa Rica, INTA, certifies that the soils on this specific land were not typical of wetland ecosystems, since they were not hydromorphic and SINAC did not submit an argument or evidence to refute INTA's findings. Consequently, the conclusions of the SINAC authorities do not have the required basis for establishing that the project area is a wetland.

3. The resulting supposed palustrine wetland area and its coordinates, duly certified by the SINAC, competent authority, when overlaid on project plat No. 1244761-2007 and Google Earth 2005 and 2013 maps of the area using the CRTM05 coordinate system, was located outside the "Las Olas" project area.
4. At the time the project began to develop the infrastructure, in conformity with the environmental viability approved by SETENA and the respective management plan, it included the transformation and deposit of dirt, as well as runoff waters. Therefore it is possible that this work may have been erroneously considered by SINAC authorities as land fill and drainage of the supposed wetland area. However, to verify this issue, a soil study on the site is required to evaluate and discard these facts.
5. In my expert opinion there is no palustrine wetland on the site indicated within the "Las Olas" project area. For the same reason, the SINAC authorities did not technically substantiate the type of ecosystem in the study area.

GERARDO BARBOZA JIMENÉZ

San Jose, November 23, 2015.

H. Bibliography

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I. Appendices and List of Legislation and Documentation Reviewed and Analyzed

Appendix 1. Gerardo Barboza Curriculum vitae

Appendix 2. Overlaying the plan and resulting polygonal area with its coordinates on property plat P-1244671-2007 and the 2005 and 2013 Google Earth Aerial Images.

Document One: Decree No. 35803-MINAET. Technical Criteria for the Identification, Classification and Conservation of Wetlands. 26/04/2010.

Document Two: Law No. 7554. Constitutional Environmental Law. Costa Rica. 10/04/95. Ruling of the Constitutional Court of Costa Rica. No. 16938, 12/08/2011. Jurisprudence on wetlands.

Document Three: Law No. 7788. 04/23/98. Biodiversity Law. Costa Rica 04/23/98

Document Four: Law No. 23214- MAG-MIRENEM. Soil Use Capacity of Costa Rica.

Document Five: ACOPAC-CP-003-11 Report 01/03/11

Document Six: Plat P- 1244761-2007

Document Seven: SINAC-ACOPAC-GASP-093 Report. 03/18/11

Document Eight: ACOPAC- OSRAP-371-2010 Report. 07/16/10

Document Nine: DE- INTA-255-2011 Report. 05/05/11

Document Ten: SINAC-GASP-143-11 Report 03/18/11

Document Eleven: SINAC-GASP-154-11 Report 23/05/11

Document Twelve: SINAC- GASP 216-2011 Report 06/29/11

Document Thirteen: SINAC- GASP 216-2011 Report 06/29/11

Document Fourteen: Document D1: “Las Olas” Project Environmental Viability.

Document Fifteen: Protocol II, Part of Document D.: “Las Olas” Project Environmental Viability.

Document Sixteen: Environmental Management Plan, “Las Olas” Condominium Project.

Document Seventeen: Resolution No. 1597-2008-SETENA (File D1-1362-2007-SETENA). Grants Environmental Viability to the “Las Olas” Project.

Document Eighteen: Law No. 7224. Law that Ratifies the Convention Relating to Wetlands of International Importance, Especially as a Habitat for Aquatic Birds. 04/02/91.

Document Nineteen: Law No. 7575. Forestry Law. Costa Rica. 10/04/95.

Document Twenty: Location maps with overlay of Plat P-1244761-2007 (Las Olas Condominium Project Property) pm 2005 and 2013 Google Earth Images, with location of supposed palustrine wetland area, with the CRTM05 coordinate system.