

**Fraccionamiento Akumal Norte**  
**Proposal to create a Partial Plan of Urban**  
**Development , aligned with the**  
**PDU-Akumal 2007**

**Content:**

1. Legal conditions of the Fraccionamiento.
2. Technical notes regarding geo-referencing, topography and photogrammetry
3. Results:
  - Photogrammetry. Reference points.
  - Embedding the polygons of the study area (PDU-Akumal, State Catastro's map, road and additional area)
  - Discussion of the available resources.
4. The need to defining an "official" polygon of the study area.
5. Evolution on the land-use 2007-2022.
6. Conclusion



20 de Enero de 1975.

PERIODICO OFICIAL

5

**Gobierno del Estado de Quintana Roo**  
**Chetumal, Q. Roo**

**P E R M I S O**

Se concede a PROMOTORA AKUMAL CARIBE, S.A., autorización para fraccionar los terrenos de su propiedad conocidos como Akumal Norte y Akumal Sur

**Relevant aspects of the permit (January 20, 1975)**

**Fraccionamiento** (Aprox. 54.36 has.)

**Residential, Tourism and Accommodation**

Akumal, **Akumal norte** and Akumal sur (They were all part of the same fraccionamiento)

**Development in 9 stages** in accordance of the project of each of the stage

**Approved land-use** "Residential, Tourism, Accommodation and Sports"

The developer **will hand-out the public service infrastructure** to the state government.

**Development of infrastructure in 10 years starting when electricity and water supply are provided.** (2 years for stage 1 and one additional year for each of the following stages)

**The requirement of donating land for facilities was fulfilled.** (117,513.08 m<sup>2</sup> of land were donated for roads, accesses, plazas, markets, schools, daycares and government buildings)



## Evolution of the Development (47 years)

**The terms of the original permit were not fulfilled.** The developer is not involved in the issues of the development.

The urban infrastructure is not complete yet.

The municipality **has not “Municipalized”** the development but they support service provision out of “good will”

**Catastro has not updated its information** and there is not detail work to regularize municipal services.

**From 2008, the Fraccionamiento is regulated by the PDU-Akumal 2007** (Since the terms of the original permit of 1975 were not fulfilled, this instrument is the one that is currently valid)

The valid regulatory instruments for the region are the PDU-Akumal 2007 (Akumal’s Urban Development plan), el POET Corredor Cancún Tulum 2001 (Ecological Land-use Plan for the Corridor Cancun-Tulum) and the Sub-regional Urban Development Plan updated in 2010.

For the Fraccionamiento Akumal, the most relevant regulatory instrument is the PDU-Akumal 2007 (According to the criteria of SEMARNAT 2013- Chapter.6, number 6,5)

The evolution resulting from real state transactions and construction permits are out of the scope of this diagnosis but the current scenario needs to be considered and evaluated according to the valid regulatory framework.



**SEMARNAT's technical criteria to apply the Ecological Equilibrium and Environmental Protection General Act and its regulations in terms of Environmental Impact,** published on August 8, 2013, in its chapter 6, number 6.5 establishes the following...

***"When a human settlement regulated by a PDU exists and a POEL and/or POET exist, in every case, the dispositions of the PDU must prevail and viceversa, when area outside a human settlement regulated by a POEL/POET exists and a PDU exists, in every case, the dispositions of the POEL/POET must prevail. However, the existence of the PDU or POEL/POET and their environmental criteria should not be ignored. In the case of contradictory criteria, the POEL/POET or PDU prevails depending on the specific case, with the need of providing justification of the circumstances.***

### Sub-regional North Zone Updated 2010

Accommodation Unit	Equivalency	POET 2001
1. Basic House Unit	2.5 hotel rooms	
2. Tourism residence	4 hotel rooms	
3. Master Suite	1 hotel room	
4. Villa	3.5 hotel room	2.5
5. Motel room	1 hotel room	1
6. Junior Suit	1 hotel room	1.5
7. Standard Suit	2 hotel room	2
8. Appartamnet or Loft	2.5 hotel room	2
9. Room in a Hospital-hotel	2 hotel room	2
10. Single camper and motel room	2 hotel room	2



UGTS 1- Corredor Yalkú - Akumal

Land-Use Plan objected by SEMARNAT.

ESTRATEGIAS QUE APLICAN A LA UNIDAD DE GESTIÓN TERRITORIAL SUSTENTABLE
1.- Dar un uso óptimo a los recursos medioambientales que son un elemento vital de su desarrollo, manteniendo los procesos ecológicos esenciales y ayudando a conservar los recursos naturales y la diversidad biológica.
2.- Asignar actividades económicas viables a largo plazo que reporten, a todos los agentes, beneficios socioeconómicos bien distribuidos, entre los que se cuentan: oportunidades de empleo estable, de obtención de ingresos, servicios sociales y que contribuyan a la reducción de la pobreza.
3.- Impulsar la construcción de edificaciones verticales y de uso mixto que permita la re-densificación y mejor aprovechamiento del suelo, así como la ocupación de predios vacíos que permitan consolidar y compactar nuestra ciudad evitando el desmedido crecimiento horizontal.
4.- Promover el pago por servicios ambientales mediante un fondo comunitario local, así como un mercado de bonos de carbono local.

STRATEGIES THAT APPLY TO THE SUSTAINABLE LAND MANAGEMENT UNIT

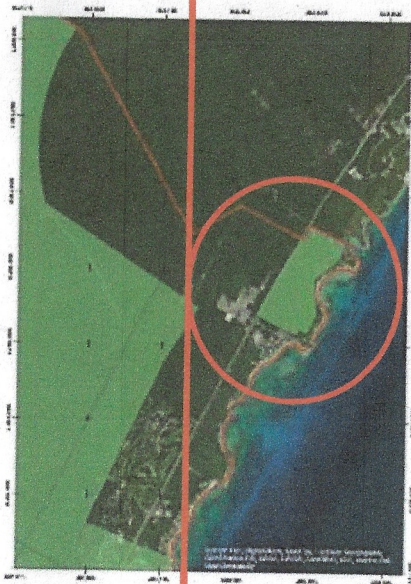
3. Boosting the construction of vertical buildings with a mixed use that allows the re-densification and better use of the land; and the occupancy of empty lots that allows consolidating and compacting our city, avoiding horizontal grow.

UGTS 2 - PDU Akumal

URBAN USE 1,518.13 HAS.

The land-use is defined by the Urban Development Program of Akumal. In lots where mangrove exists, what is established in the Wildlife General Act and Mexican Official Norms should be applied.

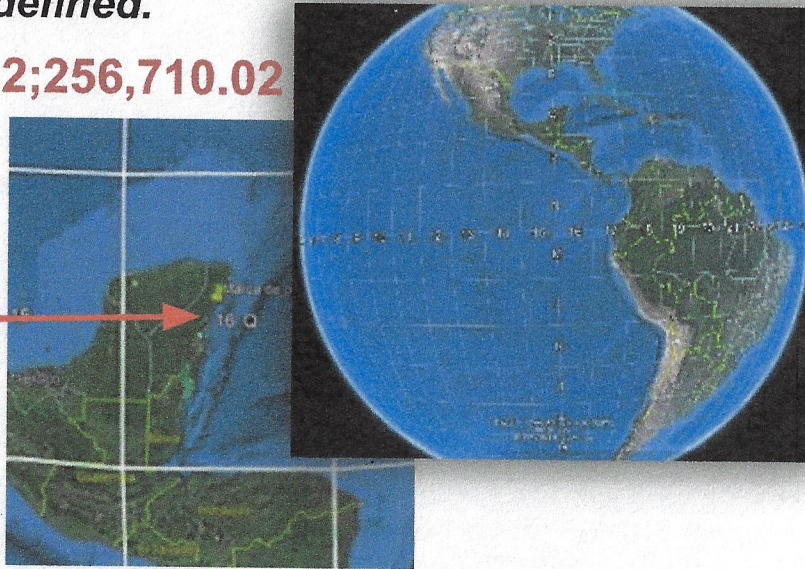
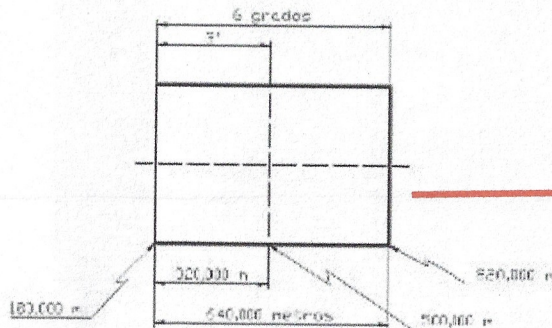
Note: In a second step, they would modify the PDU-Akumal 2007 establishing new land-use and density criteria.





**UTM Coordinates:** The globe is divided in 60 “wedges” numbered from 1 to 60 and 20 stripes, named with the letters C to X (without using i,o) ... with this information, a square called UTM Zone is defined.

**16Q 468,238.23 2;256,710.02**



**The measurement unit is meters. From the equator to the north from 0 to 10 thousand Km continuous. In the east-west orientation, the measurement goes from the center of the square with a value of 500 thousands meters.**

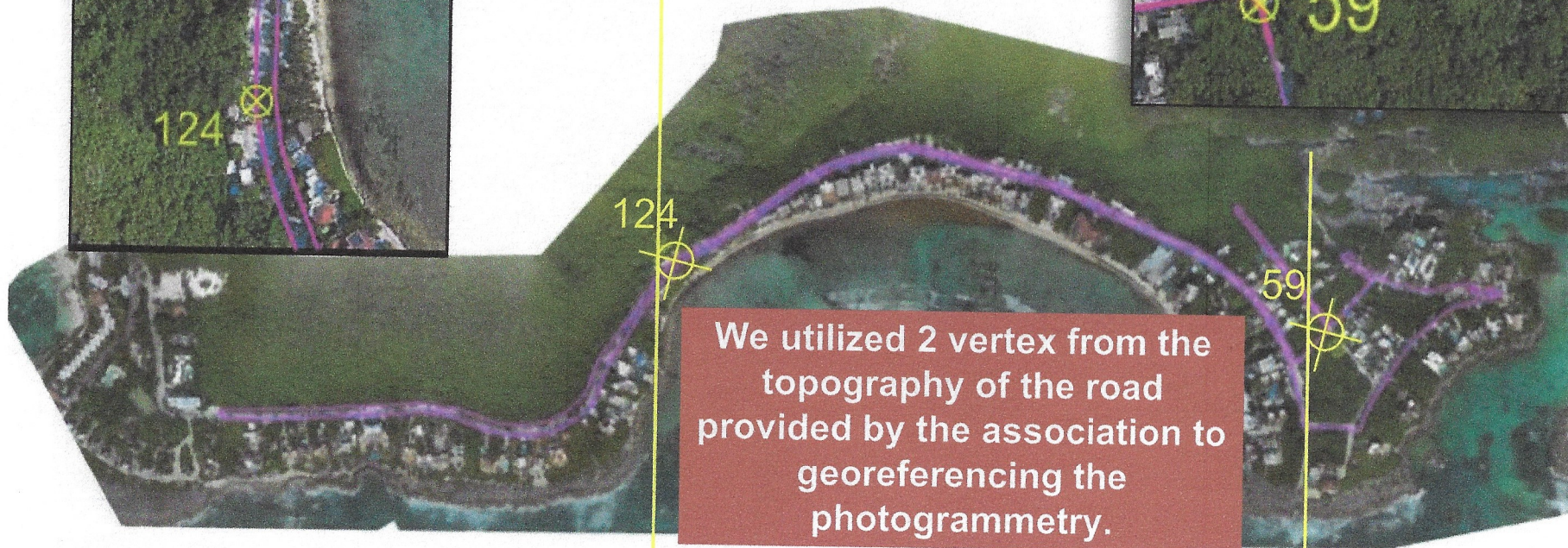
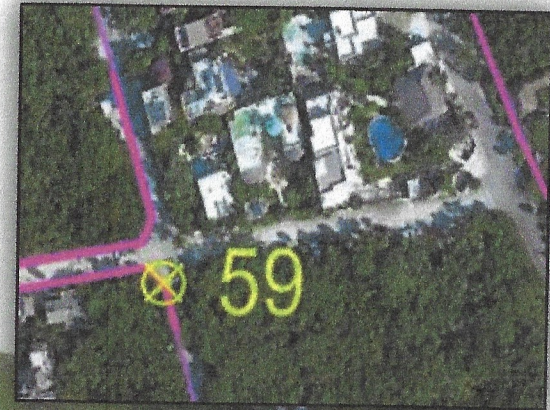
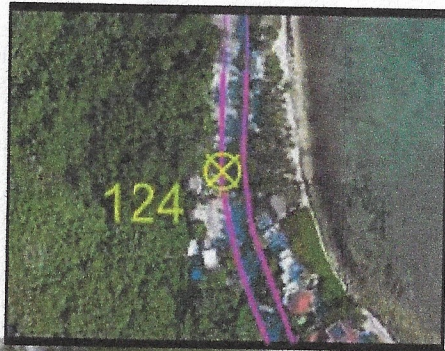
The location of a point with high precision does not mean that this point is part of a given property... except if the legal support (property title) exists.

**The topography using a satellite receptor determines a point in the surface of the Earth... The accuracy of the work depends on the precision of the equipment used. The high resolution equipment can have an accuracy of centimeters... low quality equipment can have an accuracy in meters.**



***The photogrammetry is a HIGH QUALITY PHOTOGRAPHY, but it requires reliable points from the topography to establish a scale factor.***

***The main advantage of this tool is that with the photogrammetry it is possible to establish a local coordinate system to locate other points in the map.***



We utilized 2 vertex from the topography of the road provided by the association to georeferencing the photogrammetry.



### 3.1 Photogrammetry. Reference points

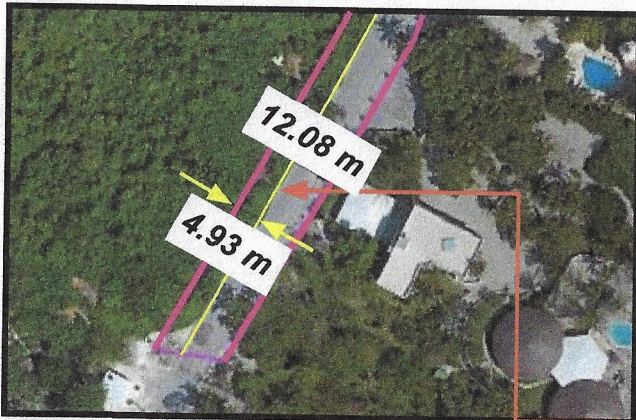


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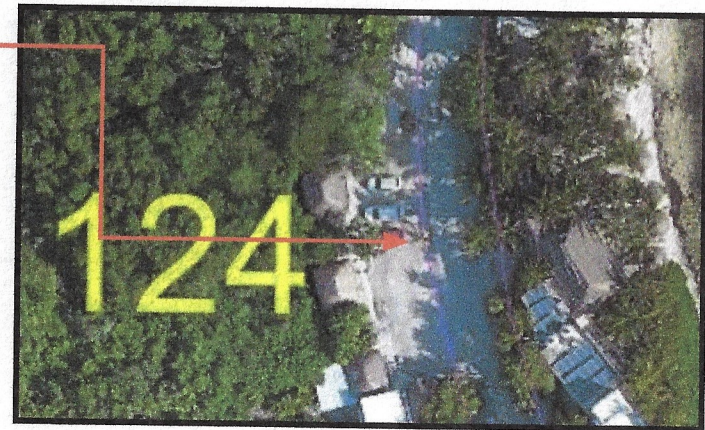
Topography shows a road that does not appear in the photogrammetry



Photogrammetry Vs.  
Topography. Large discrepancy.  
(In this example, 40%)



We utilized 2 vertex from the topography of the road to georeferencing the photogrammetry, marked by mats used for the dron's launching and landing.





## 3.1 Photogrammetry. Reference points



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The topography shows different sections of the road, going from 11 to 16 meters in width. In some areas the road overlaps with green areas





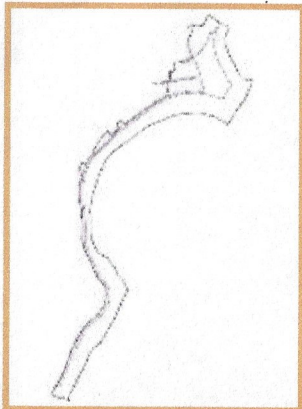
### 3.2 Embedding of polygons. (PDU-Akumal, state catastro's map, road and additional area. Discrepancies.

Contrato: P-DU-Akumal Norte D01/2022

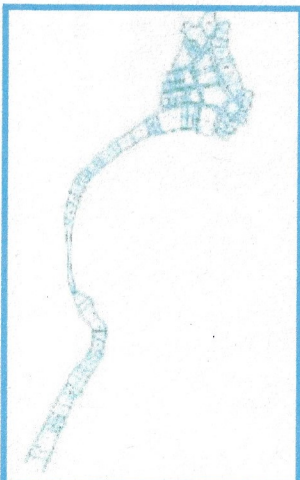


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Polygons provided by the association.

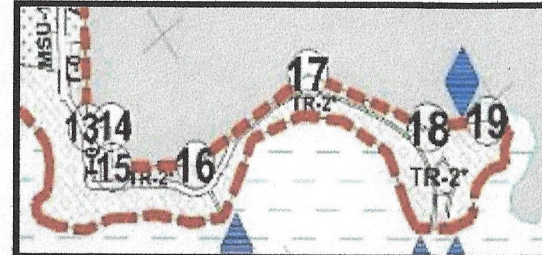


Catastro's map with lots

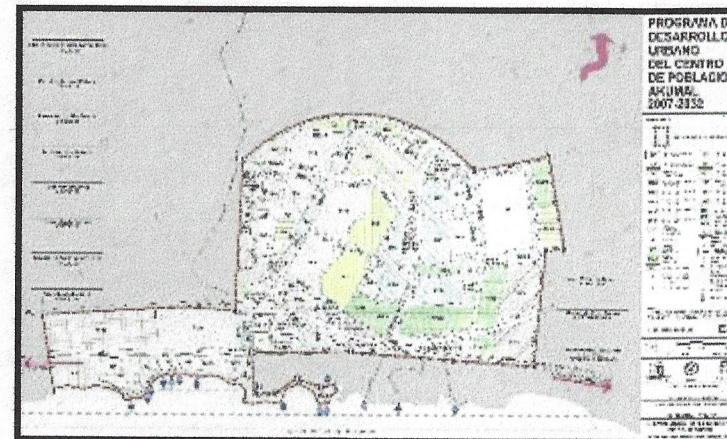
FOTOGRAMETRIA  
AKUMAL NORTE



- POLIGONO PROPORCIONADO POR LA ASOCIACION
- LEVANTAMIENTO TOPOGRAFICO CALLE, PROPORCIONADO POR LA ASOCIACION
- PLANO CATASTRAL, LOTIFICACION
- POLIGONO DENTRO DE PROGRAMA DE DESARROLLO URBANO.



Uso de suelo TR2: Turístico  
Residencial 30 Ctos./ha.



PDU Akumal 2007



**3.2 Embedding of polygons. (PDU-Akumal, state catastro's map, road and additional area. Discrepancies.**



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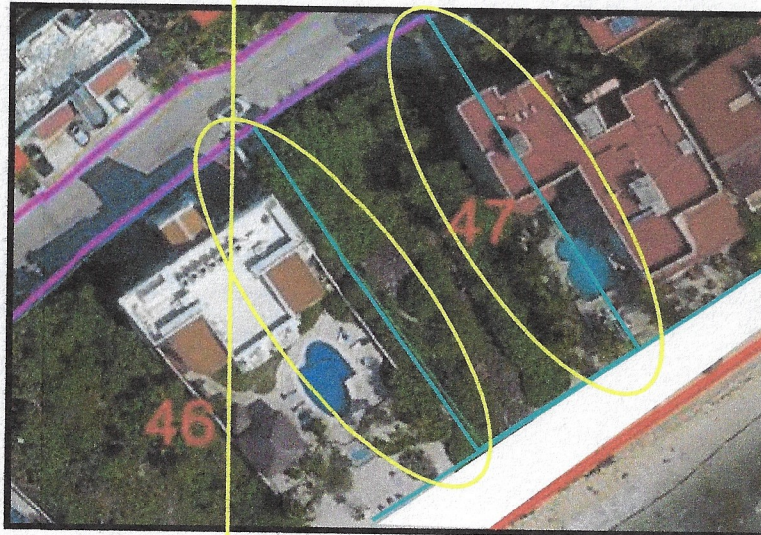
[ivanhernandezpacheco@yahoo.com.mx](mailto:ivanhernandezpacheco@yahoo.com.mx)



The limits of the association's polygon (red) does not match with catastro's map (blue)



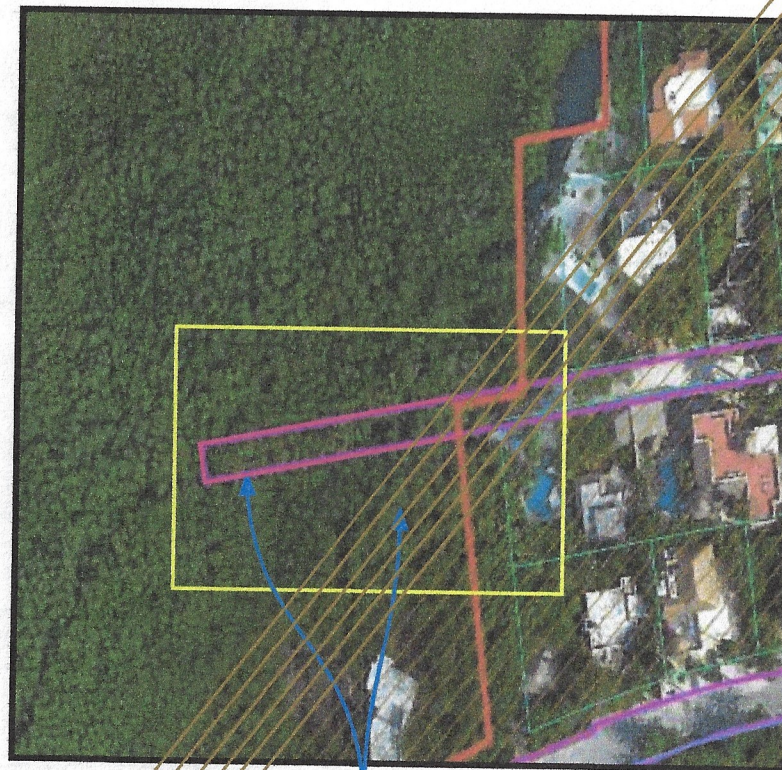
There are buildings outside the association's polygon (red)







**Catastro's map (blue) goes beyond the association's polygon (red).**



**The topography of the road (magenta) goes beyond the association's polygon (red) and the PDU. (Brown lines)**



Discussion.

- 1. The topography of the road is a physical registry of the land.**
- 2. It does not consider road rules or data from the project**
- 3. Based on the photogrammetry discrepancies in meters are shown.  
(This is too much for a such a Small available space)**
- 4. The limits of the fraccionamiento on the beach side are evident,  
however, this is not the case in the side of the mangrove... we have to  
make decisions based on the following mechanisms:**
  - a) Use the road as a base and "self-assign" a stripe in the mangrove  
side that seems reasonable according to what the PDU shows.**
  - b) Get the registered land surveys of the lots in the mangrove side  
and use them to build the limits of the polygon.**
  - c) Follow what the PDU Akumal 2007 establishes.**



## First Section





***First section (Photogrammetry 03-12-2022)***





## 5. Land-use evolution 2007-2022.

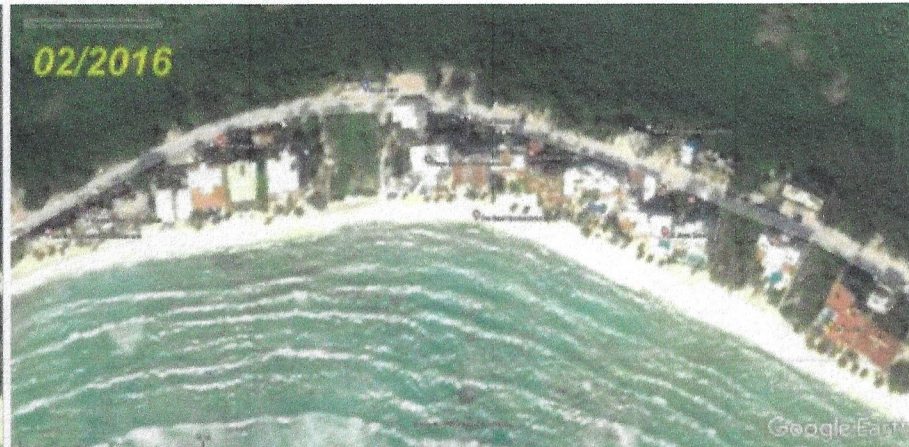
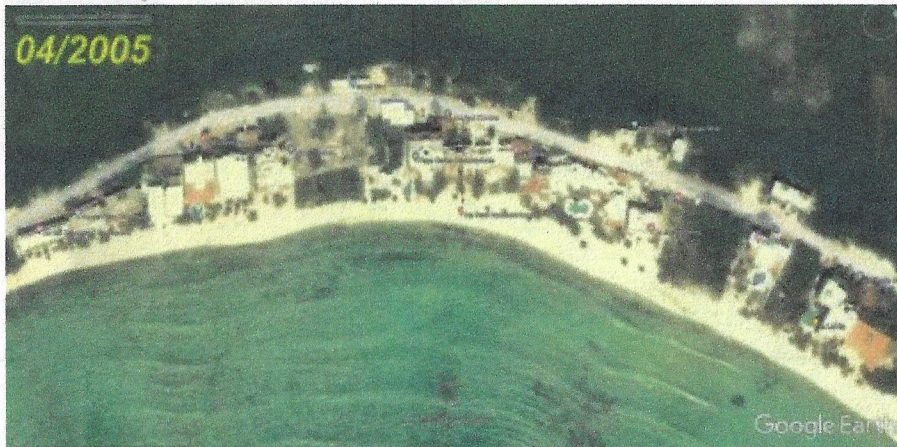
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### Section 2





5. *Land-use evolution 2007-2022.*

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**Section 2 (Photogrammetry 03-12-2022)**





## 5. Land-use evolution 2007-2022.

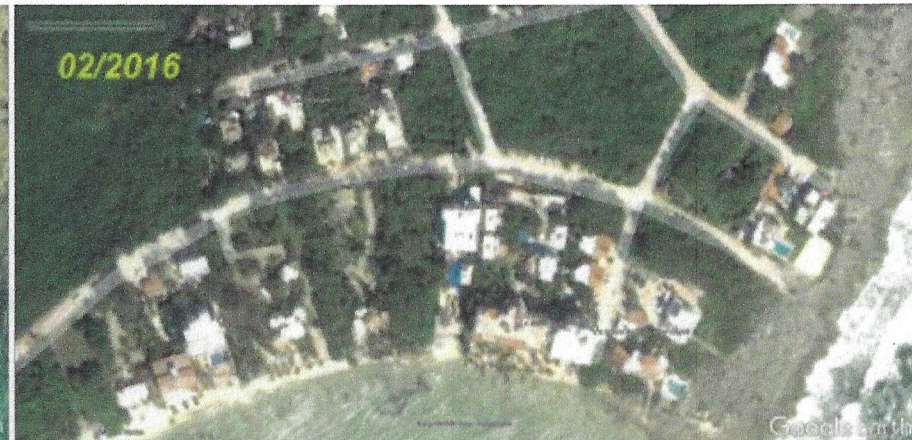
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### Section 3





5. Land-use evolution 2007-2022.

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**Section 3 (Photogrammetry 03-12-2022)**





## 5. Land-use evolution 2007-2022.

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### Section 1





5. Land-use evolution 2007-2022.

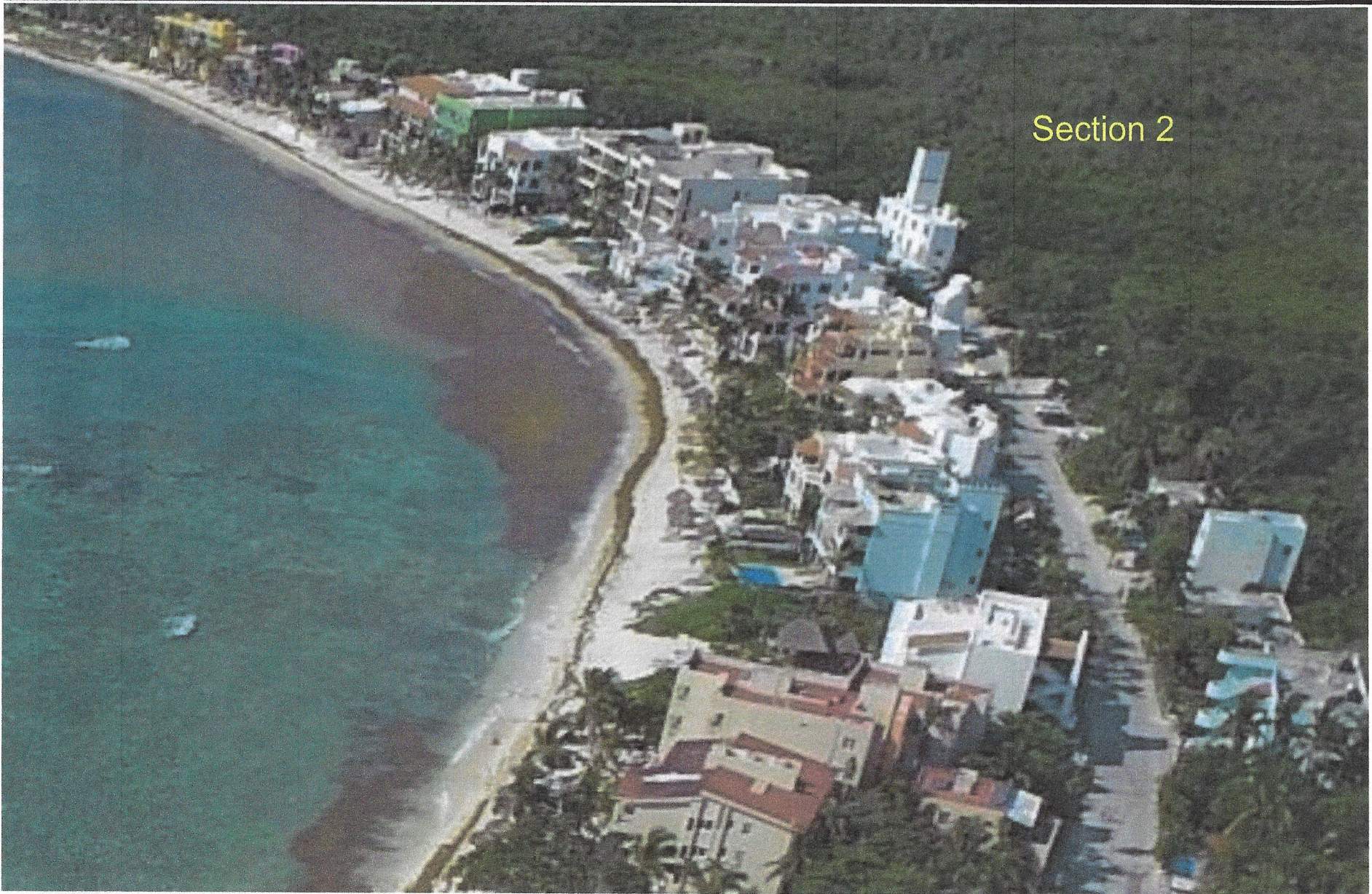
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Section 2





## 5. Land-use evolution 2007-2022.

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### Section 3





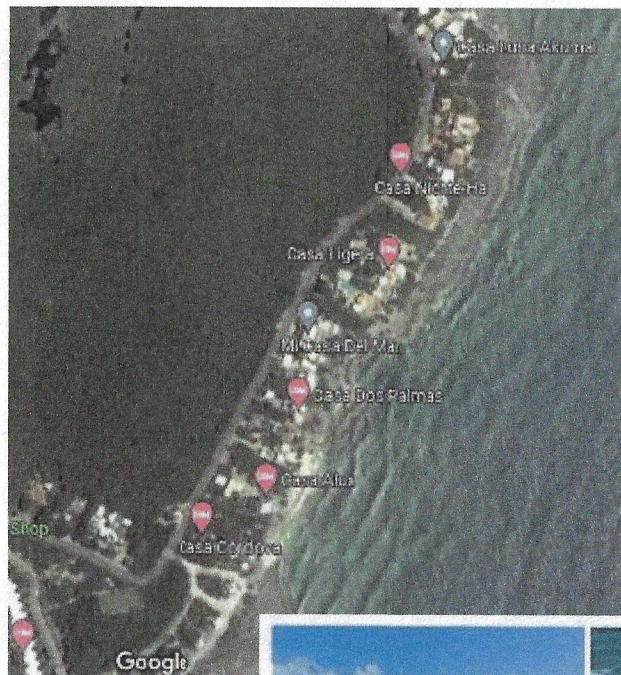
## 5. Land-use evolution 2007-2022.

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### Vacation Rentals

Name	Description
Casa Cordova	1 room apartment
Casa Alux	2 buildings connected by a terrace. 3 rooms + tv room
Casa Cascadas	4 room villa. Pool
Villa Sea gate	4 room house. Pool
Casa Dos Palmas	4 room house + entertainment room. Pool
Mi casa del mar	2 room condos. Pool
Casa Magna	2 buildings. 7 rooms. Pool
Solymar	Main house + guest house. 7 rooms. Pool.
Casa ligera	Main house + guest house. 6 rooms. Pool.
Casa Iguana	2 buildings. 4 rooms. Pool
Casa del Mar	3 room villa. Pool
Casa Nichte Ha	3 room house. Pool
Casa zama	6 room house. Solar energy. Pool
Casa Luna	4 room house. Pool



Obtained from: Google maps, Arbnb, Akumal Direct, other websites.



## 5. Land-use evolution 2007-2022.

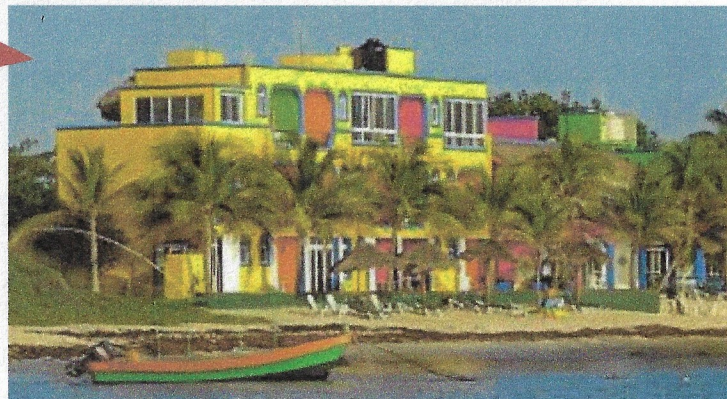
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### Vacation Rentals



Name	Description
Del Sol Condos & Hotel	Condos 1, 2 and 3 rooms. Hotel rooms 1 and 2 beds.
Half moon bay	3 room Condos
Lol Ka'naab	2 room Condos
Playa Blanca	2 and 3 room Condos
Nikte ha y Nikte	3 room Condos
Playa Caribe	12 condos with 2 rooms, 3 studios (room w/bathroom and kitchenette)
Luna Azul	2 room Condos. 3 studio/casitas
The Reef	2 and 3 rooms Condos, 1 penthouse with 4 rooms
La Bahia	2 rooms Condos
Villas Flamingo	4 villas with 1, 2 and 3 rooms
La Joya Condos	1 and 2 rooms Condos
Condos Tan-Ik	2 room Condos
Hacienda la tortuga & Mirage	2 buildings with 1 and 2 room condos sharing a pool and restaurant La lunita.
Yool-Caanal	2 room Condos
Nahil condos	2 and 3 room Condos. Studios with 1 bed and bathroom. (12 units)
Villa Bellamar	House with 13 suits. Pool
La Sirena	5 condos with 2 rooms and 2 villas with 3 rooms
La Iguana	Condos with 1, 2 and 3 rooms. Villas with 2 rooms

Obtained from: Google maps, Arbnb, Akumal Direct, other websites.



## 5. Land-use evolution 2007-2022.

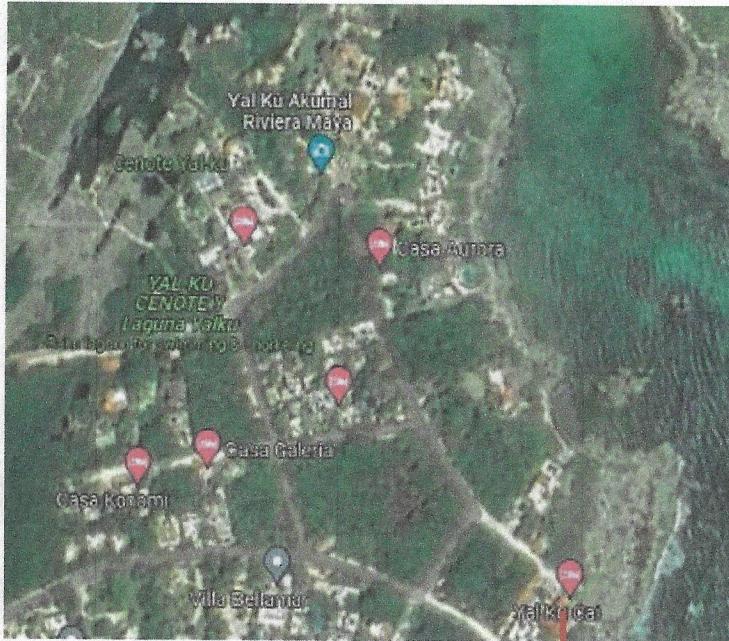
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### Oferta



Name	Description
Villa Nah-Ha	4 room house. Pool
Casa Jaguar	4 room house. Pool
Yal Ku Cai	2 studios and 4 condos with 2 rooms. Pool
Amanecer	Condos with 2 rooms and 1 studio
Casa Konomi	3 room house. Pool
Casa Galería	Main house: 2 rooms. 2 Studios/suites. Pool
Tranquilidad Properties	2 houses with 2 rooms. 3 apartments 1 and 2 rooms. Pool
Casa Gatos Aparthotel	Suites with 1 king size bed and apartments con 2 and 3 rooms.
Villa Josefina	Main house + guest house. 4 room house. Pool
Casa Aurora	4 room house. Pool
Casa Romero	3 room house. Pool. Access to the lagoon
Casa Azul Riviera	4 room house. Pool. Access to the lagoon
Villa Gauguin	5 room house. Pool. Access to the lagoon
Villa Milagro	Main house + guest house. 4 room house. Pool
Casa Delfin	5 room house. Pool. Access to the lagoon
Casa del Sol	Main house + casita + room in the tower. 5 rooms. Pool. Access to the lagoon
Casa Christensen	4 room house. Pool

Obtained from: Google maps, Arbnb, Akumal Direct, other websites.