EXECUTIVE SUMMARY

BAGÉ AIRPORT
COMANDANTE GUSTAVO KRAEMER
SBBG/BGX

July/2020

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INTRODUCTION

The Infrastructure Ministry published, in the Union Official Journal, in the Edition Number 52, on March 18th, 2019, the Public Call Notice 2/2019, with the main goal to select projects, surveys, investigation and technical studies to subsidize the modelling of the concessions for the expansion, exploitation, and maintenance of the following airports:

South Cluster

Curitiba/PR – Afonso Pena;
Foz do Iguaçu/PR – Cataratas;
Navegantes/SC – Ministro Victor Konder;
Londrina/PR – Governador José Richa;
Joinville/SC – Lauro Carneiro de Loyola;
Bacacheri/PR;
Pelotas/RS;
Uruguaiana/RS – Rubem Berta;
Bagé/RS Comandante Gustavo Kraemer.

North Cluster

Manaus/AM – Eduardo Gomes;
Porto Velho/RO – Governador Jorge Teixeira de Oliveira;
Rio Branco/AC – Plácido de Castro;
Cruzeiro do Sul/AC;
Tabatinga/AM;
Tefé/AM;
Boa Vista/RR – Atlas Brasil Cantanhede.

Central Cluster

Goiânia/GO – Santa Genoveva;
São Luís/MA – Marechal Cunha Machado;
Teresina/PI – Senador Petrônio Portella;
Palmas/TO – Brigadeiro Lysias Rodrigues;
Petrolina/PE – Senador Nilo Coelho;
Imperatriz/MA – Prefeito Renato Moreira.

According to the Public Call Notice 2/2019, the Grupo de Consultores em Aeroportos (GCA) presented the following reports for each airport: **Market Reports, Engineering Studies, Environmental Studies and Economic and Financial Evaluation**. Furthermore, it presented a complementary Economic Financial and Evaluation Report, for each Cluster, which aimed the economic financial feasibility assessment of the airports that form the Cluster.

The purpose of the Executive Summary is to present the main arguments, information and conclusions of each one of the Bagé Airport/RS Comandante Gustavo Kraemer – SBBG/BGX report. For a better understanding of the studies, it is recommended the reading of the reports.

1 MARKET REPORT

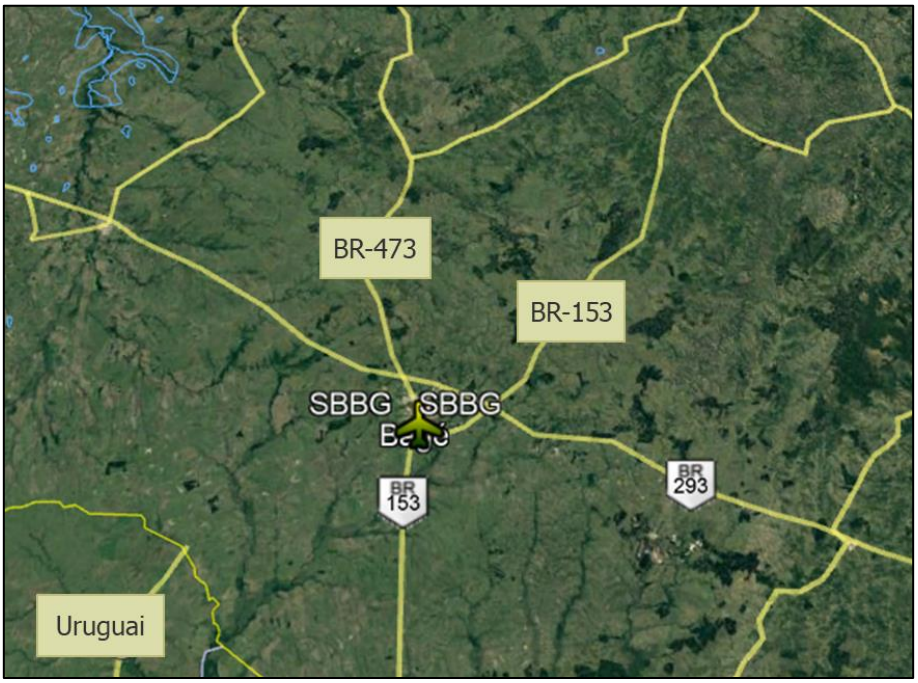
This section presents a Summary of the Market Report for the **Bagé Airport/RS Comandante Gustavo Kraemer** (IATA BGX or ICAO SBBG), which processed 1 thousand passengers in 338 operations in 2018.

1.1 Overview

The airport lies in Bagé, a municipality of the State of do Rio Grande do Sul distant 62 km from the Brazil-Uruguay border. The city's economic highlights include farming, and cattle and horse raising. It is also a regional benchmark for assorted services and manufacturing.

The Airport lies 13 km distant from Zona Industrial I, which concentrates the municipality's manufacturing companies.

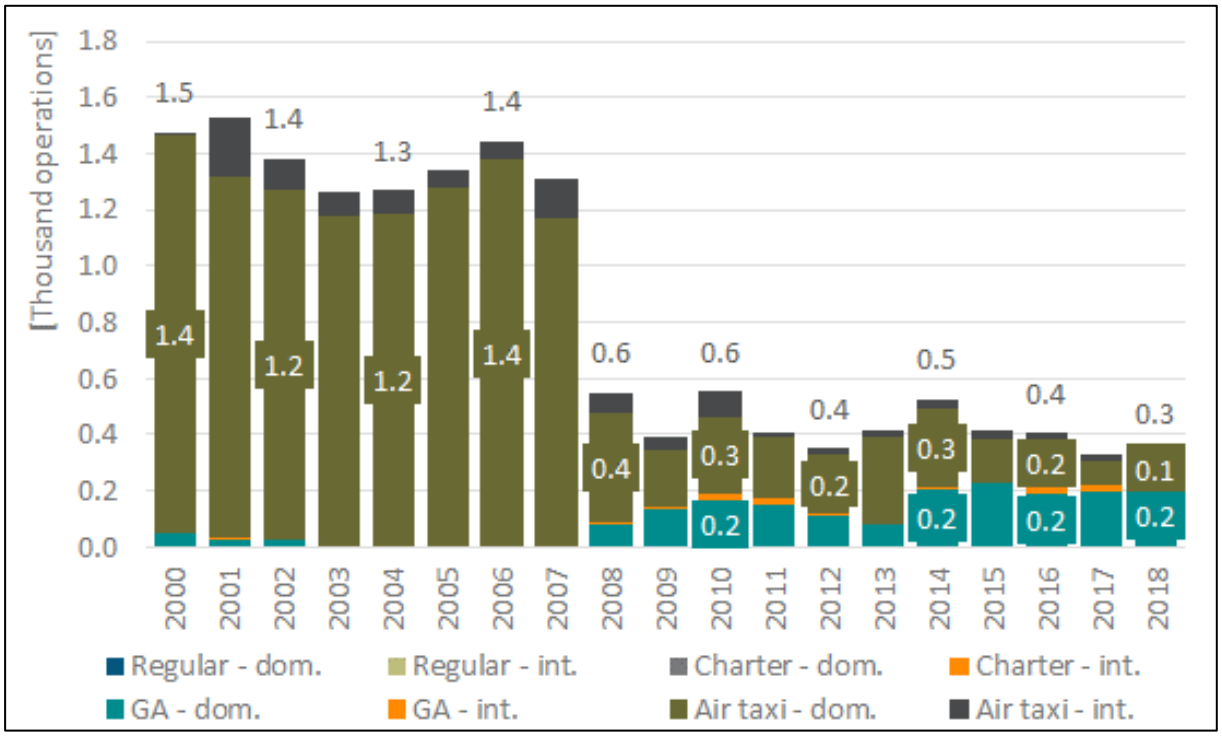
Figure 1-1: Bagé and its surroundings



Source: Google Earth

In 2018, the Airport logged 1 thousand passengers and 338 operations, of which 68% were domestic general aviation, 23% were domestic air taxi, 6% were international air taxi, and 3% were international general aviation flights (Figure 1-2). No regular commercial aviation passengers or operations were reported that year.

Figure 1-2: Annual operations history (landings and take-offs) at the Airport



Source: Infraero.

The Airport only served general aviation and air taxi operations until September 2019, when a regular domestic route[1] was established with the Porto Alegre Airport (SBPA).

[1] Only considers routes with twice weekly or greater frequency according to ANAC..

Figure 1-3: Map of the Airport's domestic routes in 2018

Source: OAG and ANAC

Regarding the pandemic impacts, it stands out that the airport continued to receive flights from the essential airline network in March. The demand in March 2020 was 68% of the previous month. However, in April, the airport had its operations completely interrupted.

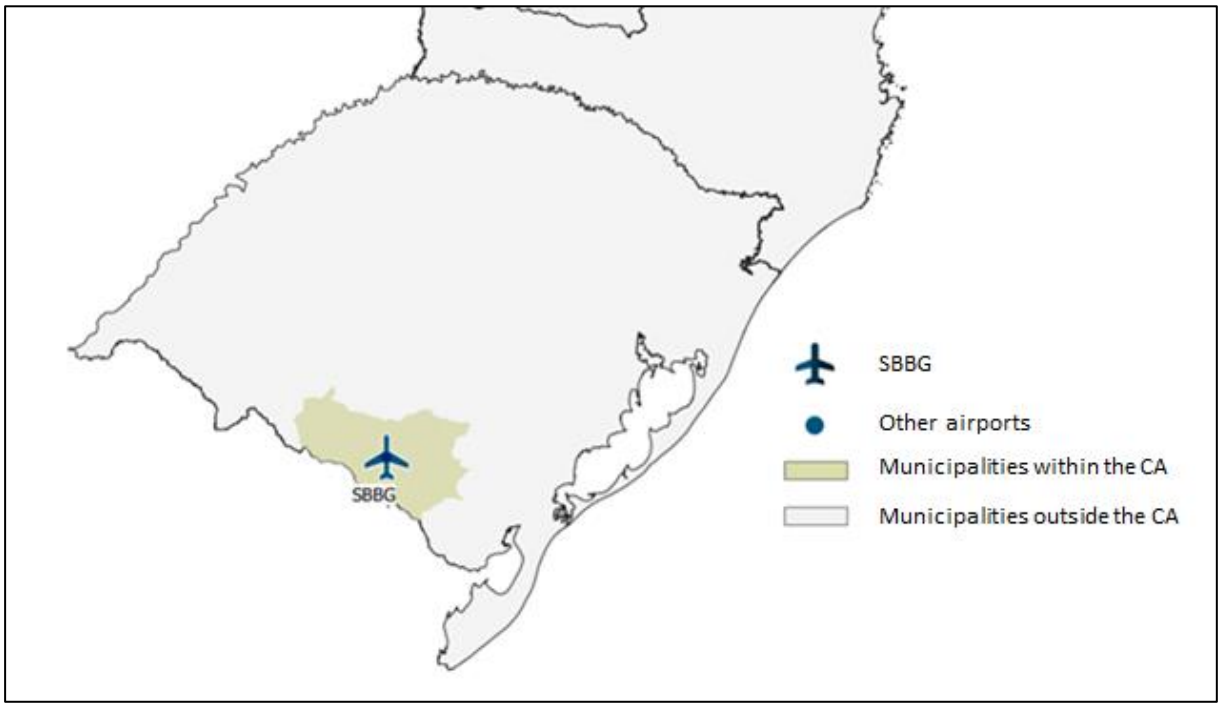
Current and forecast cargo operations at the Airport are practically non-existent.

Catchment Area

SBBG's Catchment Area (CA) is defined based on the "City Catchment Areas" ("Regiões de Influência das Cidades" – REGIC)[2] study, by the Brazilian Geography and Statistics Institute (IBGE), which covers a range of economic and socio-cultural aspects of the population.

According to the REGIC, Bagé is under the influence of Pelotas, which, is itself under the influence of the Porto Alegre Metropolis. Therefore, the Bagé CA is contained within the Pelotas CA and, more generally, Porto Alegre's. Overall, the Bagé CA, which Figure 1-4 shows, covers 7 municipalities.

Figure 1-4: Airport CA according to the REGIC



Source: REGIC, ANAC and GCA Consortium

To forecast the Airport's volumes and demand profile, the AC was adjusted for compatibility with the effective passenger catchment rea according to the origins and destinations survey published in the study Brasil Que Voa (BQV), which EPL[3] conducted in 2014. In the case at hand, a significant share of passengers from cities in the Rio Grande do Sul interior, such as Bagé, use SBPA – therefore, SBBG was assumed to compete with SBPA for passengers in its CA.

[2] Source: IBGE. *Regiões de Influência das Cidades 2007*, IBGE, Rio de Janeiro, 2008. The IBGE has published other and more current Urban-Territorial Division studies, but they reference the same hierarchical review of municipalities as produced for the 2007 study, that is, their hierarchy is simplified, but consistent with the one in the 2007 study.
[3] EPL is a Federal-government agency focused on country-wide transportation & logistics planning.

1.2 Demand forecasts

The Airport's demand has been forecast based on multivariate regression analyses whose parameters have been selected by means of tests with several potential independent variables for each flow analyzed.

1.2.1 Passengers

Commercial aviation passengers

To forecast domestic passengers with origin or destination in the CA[4], the study ran regressions using Brazil's GDP, World GDP and the CA's average fares, adjusting GDP elasticity in the long term based on the passengers-to-per-capita GDP ratio of large countries to reflect the reduction of the marginal propensity to fly as average income increases.

Once domestic demand had been forecast for the CA, the study distributed it across competing airports based on their historic market shares and other factors. In the particular case of SBBG, which lacked commercial operations in 2018 but had announced airlines interested in commencing operations there, the study assumed a market share corresponding to the entry of a typical airline operation into an airport (see item 6.2.2.2 for additional details). Finally, compatibility adjustments were made between forecast demand and 2019 volumes and adjustments regarding the COVID-19 pandemic. No international passenger flows have been forecast for SBBG.

General aviation passengers

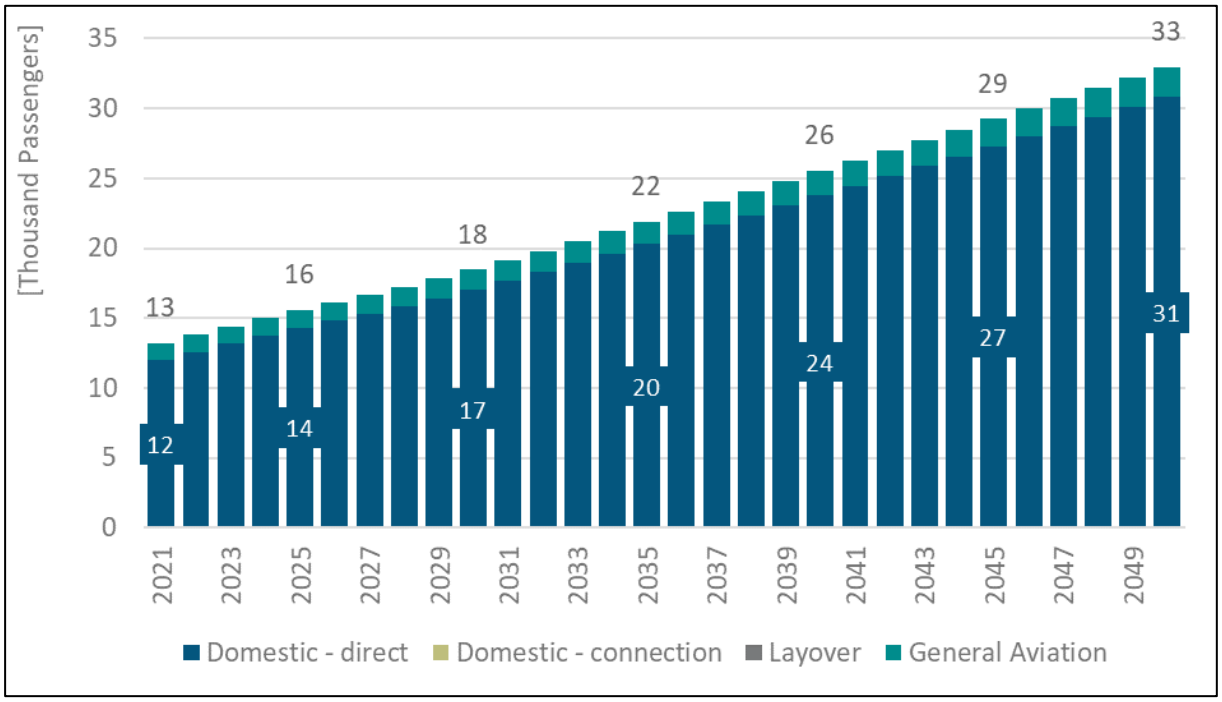
For general aviation passengers, the report first forecasts total aircraft operations based on several independent variables, such as Industrial GDP and Brazilian fleet (taking into account the effects of the pandemic). Then total passengers are estimated based on usual pax/operation parameters.

Total passengers

Figure 1-5 shows the consolidated results of the above forecasts. Total passengers at SBBG will grow 3.2% p.a. from 2021, the first, and 2050, the final full year of the concession, at which time 33 thousand passengers are expected.

[4] Includes the Porto Alegre, Uruguaiana, Pelotas, Passo Fundo, Santa Maria, Caxias do Sul and Santo Ângelo.airports.

Figure 1-5: Total passengers forecast at the Airport by flow type



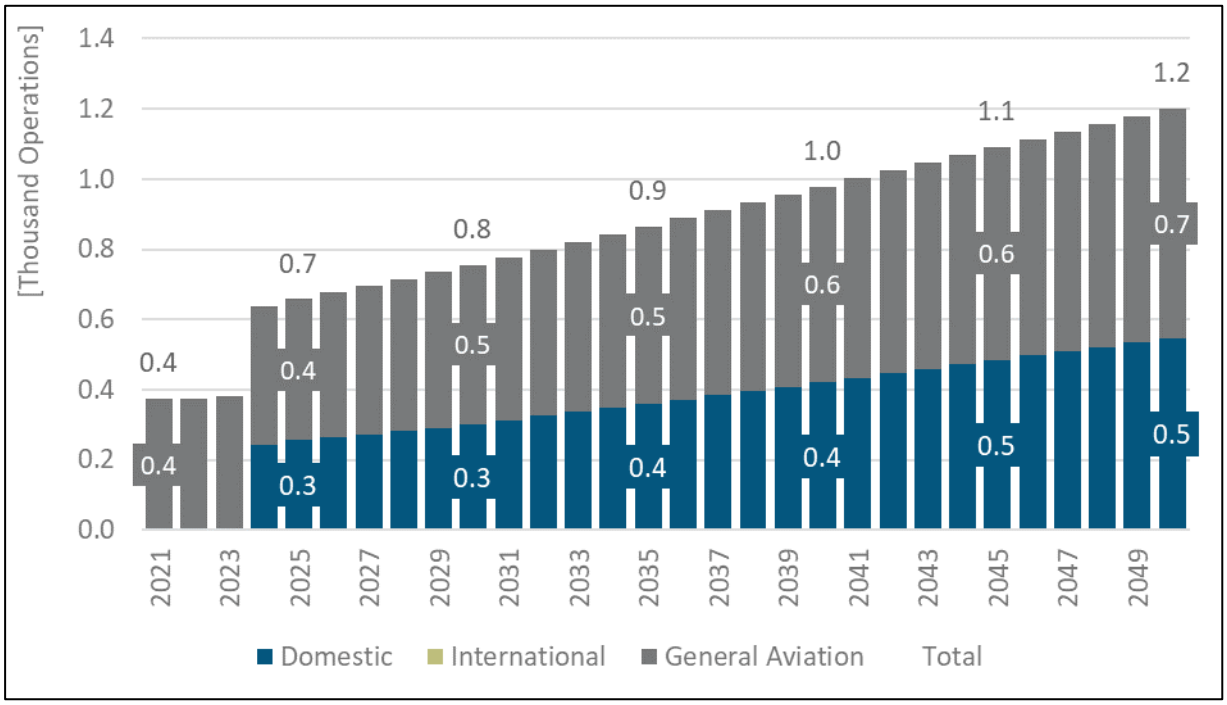
Source: GCA Consortium.

1.2.2 Aircraft operations and airlines network

Domestic and international aircraft operations

Commercial aircraft operations were forecast based on passenger flows by origin-destination (OD) pairs, load factor, and aircraft mix. In 2050, the final full year of the concession period, the Airport is forecast to log 547 domestic commercial and 653 general aviation operations, with average annual growth rates of 3.1% and 1.9%, respectively.

Figure 1-6: Total annual Airport operations forecast



Source: GCA Consortium.

No new routes have been forecast for the Airport over the concession period.

1.2.3 Peak demand and restrictions

The Airport's main systems have been sized to meet demands at more intense flow times, so that users will receive appropriate service levels according to previously established criteria and, no severe operational and economic impacts will take place.

For Passenger Terminal (PT) areas and processors at airports flying under one million passengers per year, like SBBG, the applicable service level criterion in the initial investment phase is based on 1.3 times the number of seats in the critical aircraft[5] (or, in the case of simultaneous operations in 45 minutes, 1.3 times the number of seats available). In later phases of the project, the benchmark becomes the 30th busiest hour of the year.

The results for both criteria have been calculated as of 2018 based on Infraero records, and forecast according to domestic peak-factor benchmarks (peak demand/annual demand). Because SBBG had no regular commercial operations in 2018, the study assumes as a reference for the year's dimensioning the average records of the Uruguaiana (SBUG) and Pelotas (SBPK) Airports, which show similar characteristics.

- Using the criterion of 1.3 times the number of seats on simultaneous operations in 45 minutes or on the critical aircraft, the study finds 0 passengers for departures and arrivals, and 0 simultaneous passengers at concession start, in 2021;

[5] The aircraft with the largest number of seats available at the airport in the reference period. For this Airport, this is the ATR72 (70 seats).

- Using the 30th busiest hour produces the following numbers:
    - 2021 (concession start): 0 departing passengers, 0 arriving passengers, and 0 simultaneous passengers;
    - 2050 (final full year of the concession): 96 departing passengers, 99 arriving passengers and 171 simultaneous passengers;

The Engineering Report discusses the use of this data for PT dimensioning.

For the runway system, the report considers maximum commercial aircraft operations per hour over a period of one year. As with passengers, the forecast embraces peak-factor benchmarks. It has been forecast that the Airport will have a peak of 3 commercial aircraft runway operations per hour in 2050.

Dimensioning also forecasts peak usage of commercial aircraft aprons. Because there are no usage records for 2018[6], apron requirements are defined based on the applicable peak-factor benchmarks (see item 9.4.4). The study finds that the requirement is minimal, at 1 position.

Given the various systems' capacities (see Engineering Report), the study assesses potential restrictions on forecast demand. Considering the Airport's expected improvement and expansion works, no restrictions on traffic growth have been forecast for any of the Airport's systems.

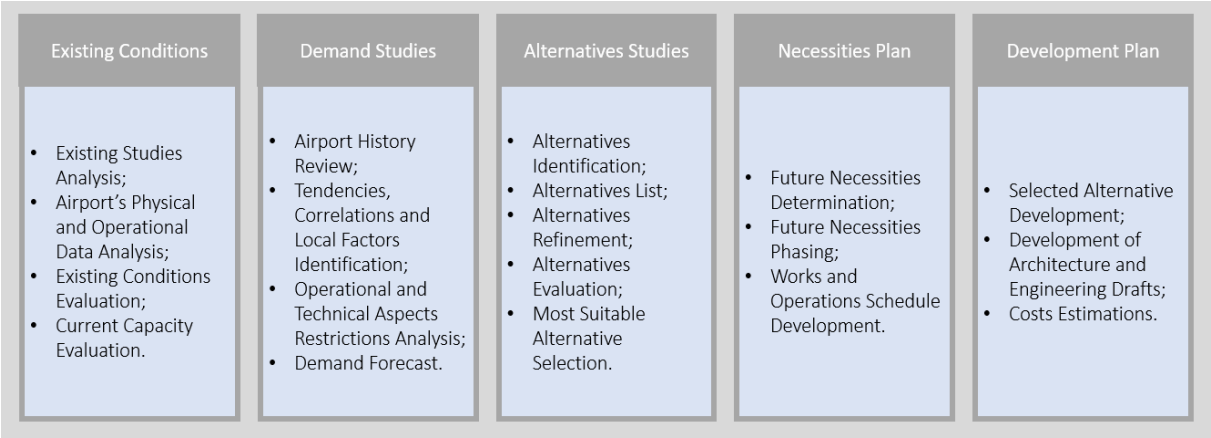
[6] Based on ANAC data.

2 ENGINEERING STUDIES

This section presents the Executive Summary of the Engineering Studies for the concession of the Bagé Airport/Comandante Gustavo Kraemer – SBBG/BGX.

The Engineering Studies Report has been developed according to the methodology presented in Figure 2-1.

Figure 2-1: Study Methodology



Source: GCA Consortium.

Below, in brief explanations, the results and premises of each phase of the studies are presented. For further details, please check the complete studies report.

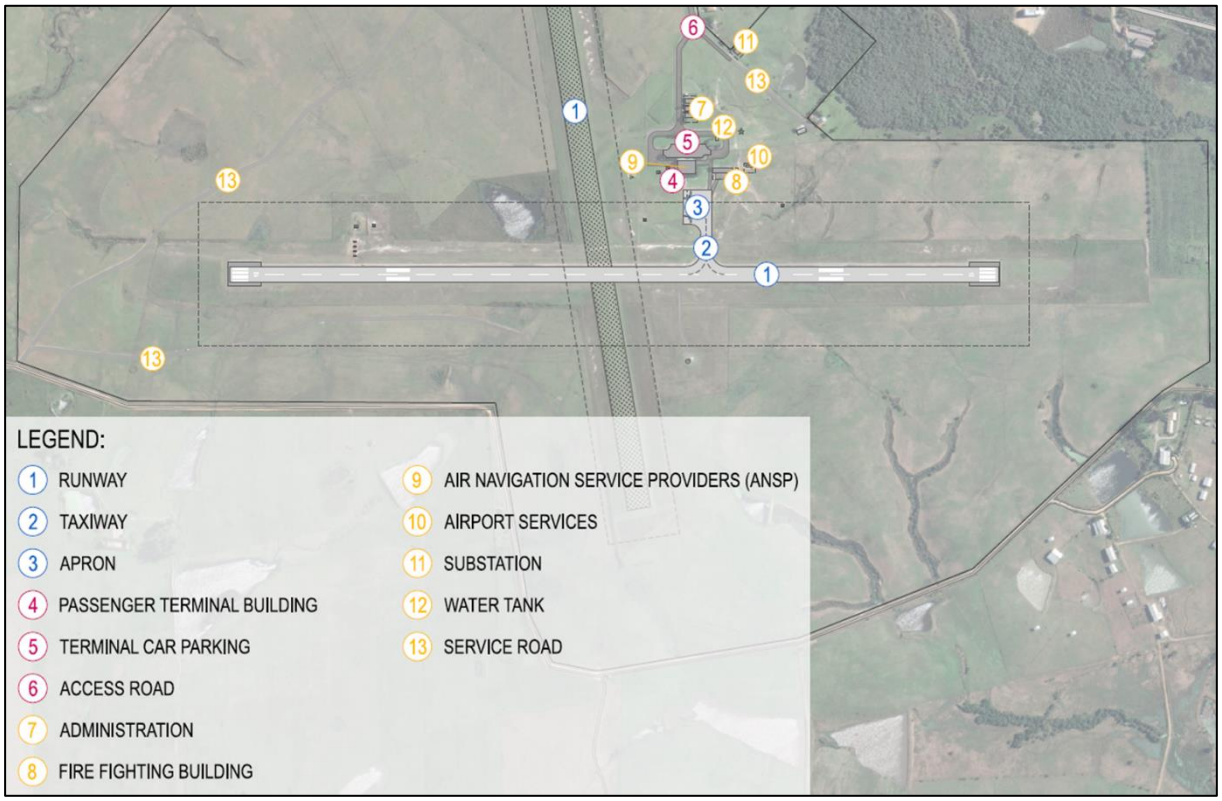
2.1 Existing Conditions

2.1.1 Current Situation

The current situation characterization is extremely important for an appropriate development of the Airport Site. Through it, it's possible to have an accurate understanding of the existing restrictions and opportunities for the expansion of the Airport complex. Among other aspects, the comprehension of the current situation involves operational, security, legal and social-environmental matters.

In order to characterize the present situation, it has also been evaluated the current operation and it has been done the identification of the existing infrastructures, by on-site visits, and of the main development plans and available studies. The Figure 2-2 illustrates the identification of the main existing facilities.

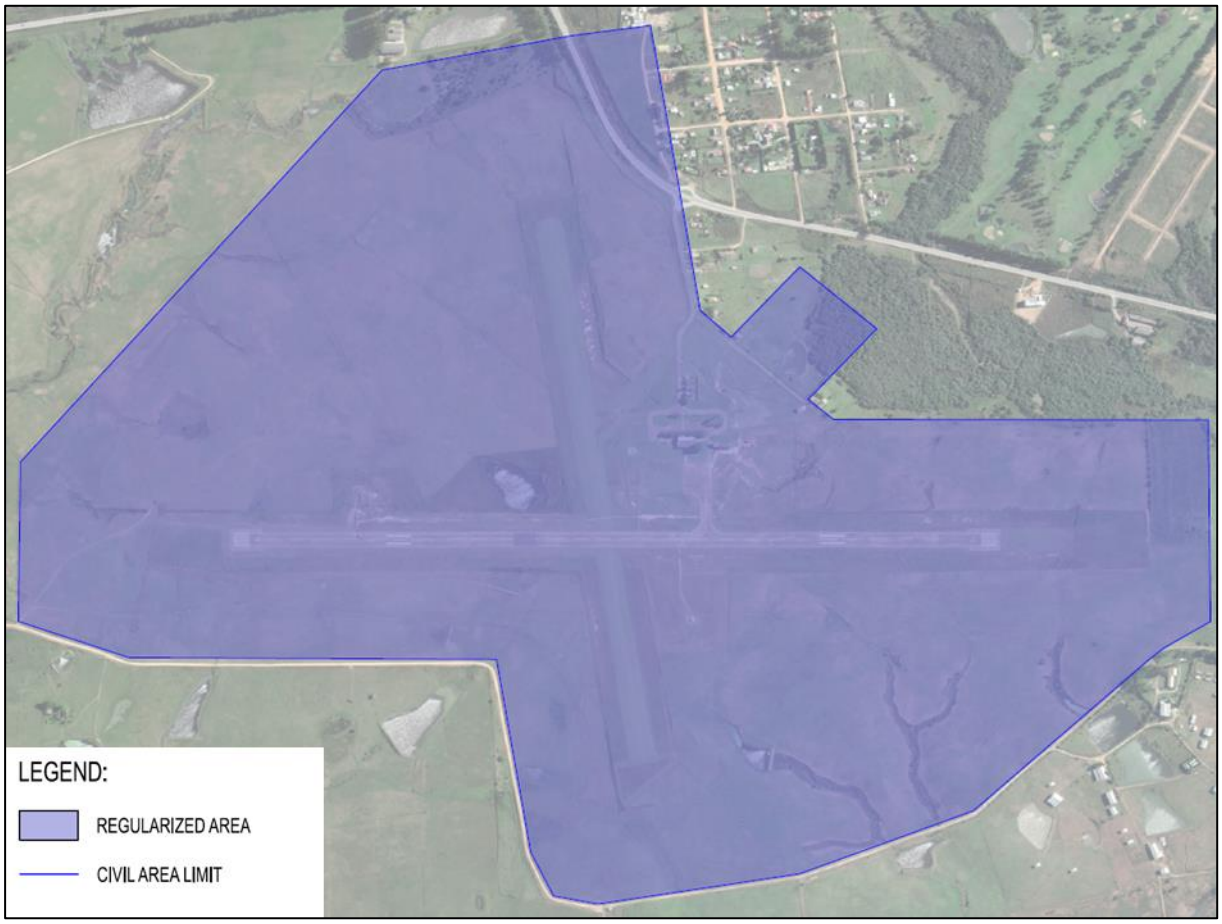
Figure 2-2: Current Facilities Situation



Source: GCA Consortium.

Furthermore, regarding the present patrimonial situation, it should be noted that the airport under study is in a regularized patrimonial area. The regularized estates belong to the Federal Union and INFRAERO. The Figure 2-3 presents the patrimonial situation of the Airport.

Figure 2-3: Patrimonial Limits of the Airport Site



Source: Google Earth, GCA Consortium.

According to the SAC/MI guidance, until the start of the concession period, the ongoing works must proceed. From this date on, the remaining services must be completed by the concessionaire and the remaining costs considered in the financial modeling of this study. Since there are no works in the Airport expected to be completed until this date, there won't be residual costs related to these works to be considered by CAPEX.

2.1.2 Installed Capacity Evaluation

The analysis of the installed capacity is one of the phases in the existing conditions evaluation process. In this stage are evaluated the capacity conditions according to the appropriate levels of service. Thus, it has been developed the capacity assessment for all airport systems. The installed capacities of the main systems are presented below.

2.1.2.1 Runway, Taxiway and Apron System

Table 2-1 and Table 2-2 summarize the results obtained from the installed capacity analysis and the existing demand for the runaways, taxiways and aprons systems. The taxiways were assessed based on geometric width and code of the aircraft design restrictions.

Table 2-1: Runway Capacity

Component	Current Capacity	Demand	Situation
Runway (mov/h)	19,3	4	Suitable

Source: GCA Consortium.

Table 2-2: Taxiways Capacity

Taxiway	Width (m)	Width Without Shoulders (m)	RBAC154 Code	Critical Aircraft	Situation
Taxiway A	21	21	B	C208	Suitable

Source: AIP, GCA Consortium.

In order to measure the current capacity of the main aircraft aprons, the static and dynamic capacities were analyzed for five different scenarios. Each scenario prioritizes the maximum use of the most restrictive aircrafts, or rather, the occupying positions F, E, D and C in descending order of priority. The Table 2-3 shows the static capacity for the five scenarios evaluated.

- Scenario 1: Aircrafts code F, E, D, and C operating simultaneously, in descending order of priority;
- Scenario 2: Aircrafts code E, D and C operating simultaneously, in descending order of priority;
- Scenario 3: Aircrafts codes E and C operating simultaneously, in descending order of priority;
- Scenario 4: Aircrafts Codes D and C operating simultaneously, in descending order of priority;
- Scenario 5: Only aircrafts code C operating.

Table 2-3: Aprons Static Capacity

Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Boarding Bridge Positions	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	0
C	-	-	-	-	0
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0

Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Remote Stands	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	0
C	-	-	-	-	2
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0
Positions (Remotes + Boarding Bridges)	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	0
C	-	-	-	-	2
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0
Total Boarding Bridges	-	-	-	-	0
Total Remote Stands	-	-	-	-	2
Total Number of Stands	-	-	-	-	2

Source: PDC Chart, GCA Consortium.

In order to evaluating the hourly dynamic capacity of the main apron, the static capacity obtained by the average occupation time of each aircraft code for the same scenarios was considered, obtaining the total dynamic capacity, as shown in Table 2-4.

Table 2-4: Aprons Dynamic Capacity

Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Average turning time (min)	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	15
B	-	-	-	-	25
C	-	-	-	-	45
D	-	-	-	-	75
E	-	-	-	-	85
F	-	-	-	-	130

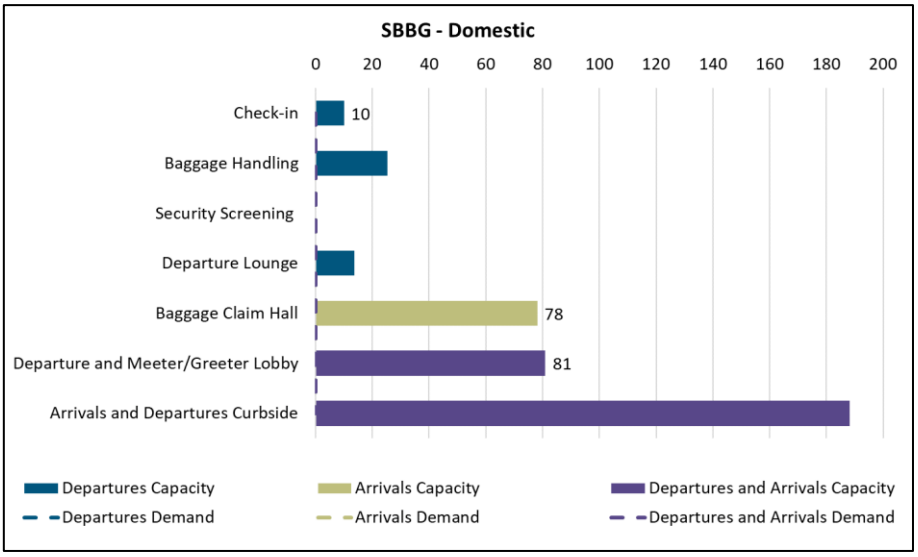
Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Capacity	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	0
C	-	-	-	-	3
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0
Total	-	-	-	-	3

Source: GCA Consortium.

2.1.2.2 Passenger Terminal System

Figure 2-4 summarizes the results obtained from the installed capacity and the existing demands of the departures and arrivals flows.

Figure 2-4: Terminal's Components Capacity



Source: GCA Consortium.

2.1.2.3 Other Facilities

Regarding the current condition of other systems, the following observations can be noticed, about the present situation described on Table 2-5.

Table 2-5: Other Components Capacity Summary

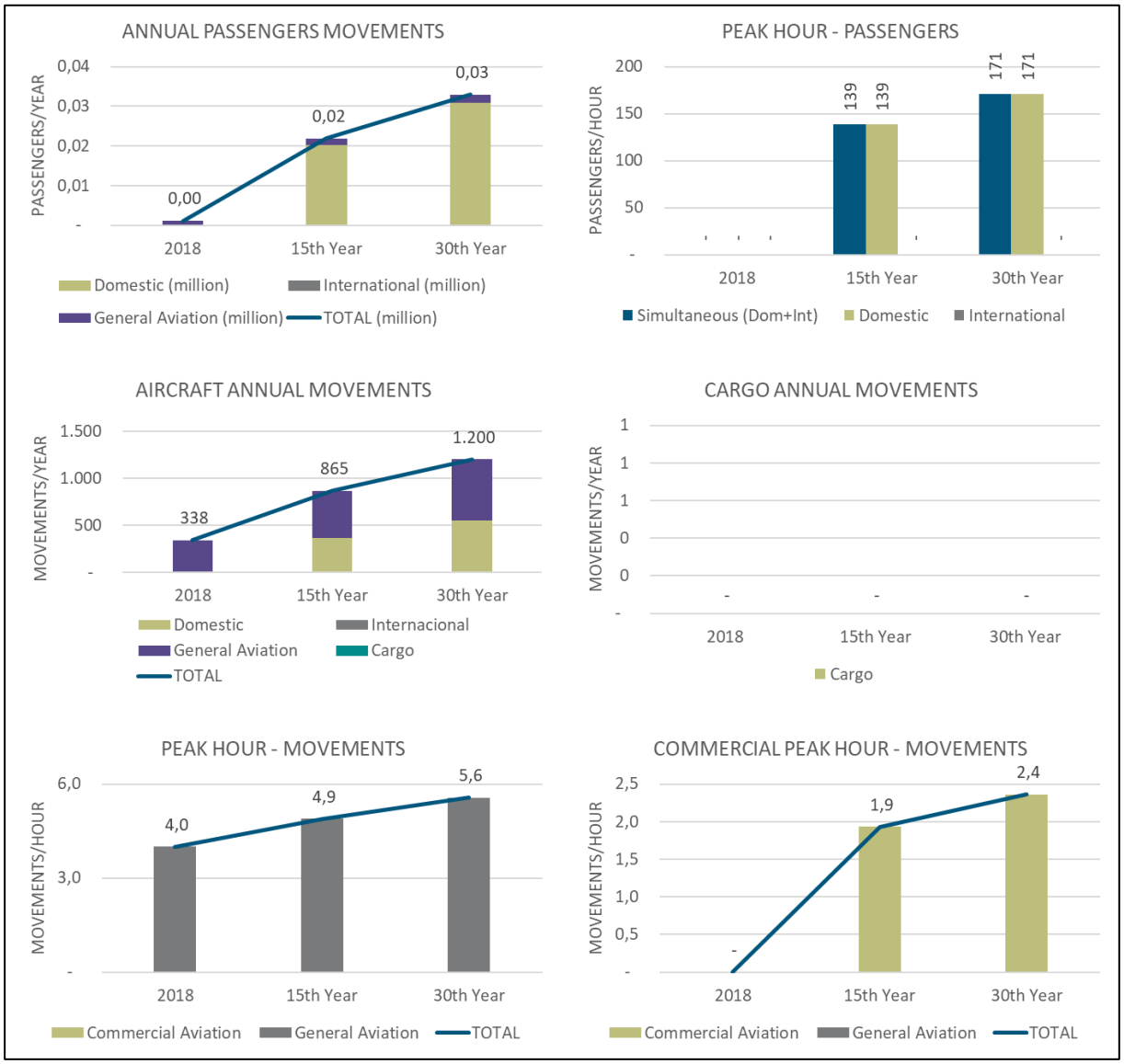
Component	Facilities Description
Aeronautical Infrastructure	• **Operation:** presents technical capability for day/night non-precision VFR/IFR operation for thresholds 06 and 24 and non-precision VFR for day operations at thresholds 14 and 32. With PAPI system at threshold 06, the Runway is capable of landing jet aircraft by this threshold. There is no PAPI systems at threshold 24.
Cargo Terminal System	• **Cargo Terminal Building:** suitable to current demand. • **Airside Aprons:** suitable to current demand. • **Landside Aprons:** suitable to current demand. • **Cargo Terminal Parking:** suitable to current demand.
General Aviation System	• **General Aviation Terminal:** there is no General Aviation Terminal currently and as the demand is less than 25,000, the sector is suitable to current needs. • **General Aviation Aprons:** suitable to current demand. • **General Aviation Hangars:** not suitable to current demand. • **General Aviation Terminal Parking:** suitable to current demand.
Administration and Maintenance System	• **Administration:** suitable to current demand. • **Maintenance:** not suitable to current demand.
Operation Support System	• **Fuel Farm:** not suitable to current demand. • **Fire Fighting Installations:** suitable to current demand.
Airlines Support System	• **Cargo Processing:** suitable to current demand. • **Airlines Support Maintenance:** suitable to current demand. • **Maintenance and Hangars:** suitable to current demand.
Industrial Support System	• **Mail:** suitable to current demand. • **Catering:** suitable to current demand. • **Airport Services:** suitable to current demand.
Basic Infrastructure System	• **Electric Power:** suitable to current demand. • **Water Consumption:** suitable to current demand. • **Sewage Treatment:** not suitable to current demand. • **Solid Waste:** not suitable to current demand.

Source: GCA Consortium.

2.2 Demand Studies

In order to evaluate the current capacity to accommodate the forecast demand and the investments needs over the concession period, market reports and forecasts of passenger demands, aircrafts operations and freight have been developed. The Figure 2-5 shows the results of the studies of demand.

Figure 2-5: Demand Forecast Summary



Source: Market Reports.

2.3 Necessities Plan

Given the demand projections and the installed capacity, the infrastructures required to meet the expected demand were evaluated for all airport systems. The following Figure 2-6, shows a summary of infrastructure needs for the airport throughout the development stages considered for the period of analysis. The requirements of each stage are based on the existing infrastructure in face of the projected demand. Thus, the installed infrastructures have been kept, reallocated or expanded according to the anticipated needs.

Figure 2-6: Necessities Plan

SBBG	Phase 1	Phase 2	Phase 3
Airside System			
Runway	Intervention	Suitable	0
Taxiways	Intervention	Suitable	0
Aprons	Intervention	Suitable	0
Ground Handling Equipments	Intervention	Suitable	0
Passenger Terminal System			
Passenger Terminal Building	Intervention	Suitable	0
Car Parking	Intervention	Suitable	0
Access Roads	Intervention	Suitable	0
Aeronautical Infrastructure			
Navigation Aids	Intervention	Suitable	0
Air Cargo Terminal System			
Air Cargo Terminal Building	Suitable	Suitable	0
Car Parking	Suitable	Suitable	0
Access Roads	Suitable	Suitable	0
General Aviation System			
General Aviation Terminal Building	Suitable	Suitable	0
Aprons and Taxiways	Intervention	Suitable	0
Car Parking	Suitable	Suitable	0
Access Roads	Suitable	Suitable	0
Administration and Maintenance System			
Administration	Suitable	Suitable	0
Maintenance	Intervention	Suitable	0
Operations Support System			
Fuel Farm	Intervention	Intervention	0
Firefighting Building	Suitable	Suitable	0
Airlines Support System			
Air Cargo and Maintenance Facilities	Intervention	Intervention	0
Maintenance and Hangars	Suitable	Suitable	0
Industrial Support System			
Mail	Suitable	Suitable	0
Catering	Intervention	Suitable	0
Airport Services	Suitable	Suitable	0
Basic Infrastructure System			
Eletric Power	Intervention	Suitable	0
Water Consumption	Suitable	Intervention	0
Sewage Treatment	Intervention	Intervention	0
Solid Waste	Intervention	Suitable	0

Source: GCA Consortium.

Furthermore, an infrastructure needs summary for the airport with its main information and components over the 30 years considered for the analysis period is presented in Table 2-6.

Table 2-6: Main Components Necessity Summary

SBBG	Current	Phase 01	Phase 02
DEMAND	**2018**	**15 Years**	**30 Years**
Annual Passengers Movements			
Regular Aviation	-	20,280	30,827
General Aviation	1,106	1,624	2,109
Total	1,106	21,904	32,936

SBBG	Current	Phase 01	Phase 02
Cargo (tons)			
Total	-	-	-
Aircraft Movements			
Passengers	-	360	547
Air Cargo	-	-	-
General Aviation	338	505	653
Total	338	865	1,200
RUNWAY SYSTEM			
Design Aircraft Code	C	C	C
Number of Runways	2	1	1
Runway Length (m) (1)	PPD 1: 1,500 PPD 2: 1,149	PPD 1: 1,500	PPD 1: 1,500
Operation Type	NPA	NPA	NPA
APRON SYSTEM			
Passengers Apron (2)			
Contact Stands	-	-	-
Remote Stands	2C	2C	2C
Total Number of Stands	2C	2C	2C
Cargo Apron (2)			
Total Number of Stands			
PASSENGERS TERMINAL SYSTEM			
Departure Peak Hour Capacity	-	104	104
Arrival Peak Hour Capacity	78	101	101
Terminal Building			
Total Area (m^2)	450	3,000	3,000

SBBG	Current	Phase 01	Phase 02
Baggage Handling System			
Processing Capacity (bhp)	-	49	61
Car Parking			
Total Area (m²)	2,150	1,250	1,250
Number of lots	80	46	46
Curbside			
Departure Curbside Length (m)	18	15	19
Arrival Curbside Length (m)	18	15	18
Total Length (m)	36	30[(3)]	37
Ground Handling Equipment			
Total Area (m²)	-	700	700
CARGO TERMINAL SYSTEM			
Cargo Terminal Building Area (m²) [(4)]	-	-	-
GENERAL AVIATION SYSTEM			
General Aviation Terminal (m²)	-	-	-
Total Number of Stands	-	2	2
General Aviation Terminal Car Parking	-	-	-
Hangars and Aprons Area (m²)	-	2,000	2,000
ADMINISTRATION AND MAINTENANCE SYSTEM			
Administration [(4)]			
Total Area (m²)	50	276	276
Maintenance			
Total Area (m²)	-	50	50
OPERATION SUPPORT SYSTEM			
Fuel Farm			
Total Area (m²)	-	900	1,650
5-day storage (m³)	28	44	68
Fire fighting Building			
Category	Exempt	Exempt	Exempt
Total Area (m²)	1,100	1,100	1,100

SBBG	Current	Phase 01	Phase 02
AIRLINES SUPPORT SYSTEM			
Maintenance Area (m²)	-	50	100
Cargo Processing Area (m²) (5)	-	-	-
Aircraft Maintenance Area (m²)	-	-	-
INDUSTRIAL SUPPORT SYSTEM			
Mail Area(m²)	-	-	-
Catering Area (m²)	-	50	50
Airport Services Area (m²)	390	390	390
BASIC INFRASTRUCTURE SYSTEM			
Water Tank (m³)	26	26	36
Solid Waste Area (m²)	-	10	10
Electric Power Area (m²)	-	200	200
Sewage Treatment Units (6)	- (7)	1	2

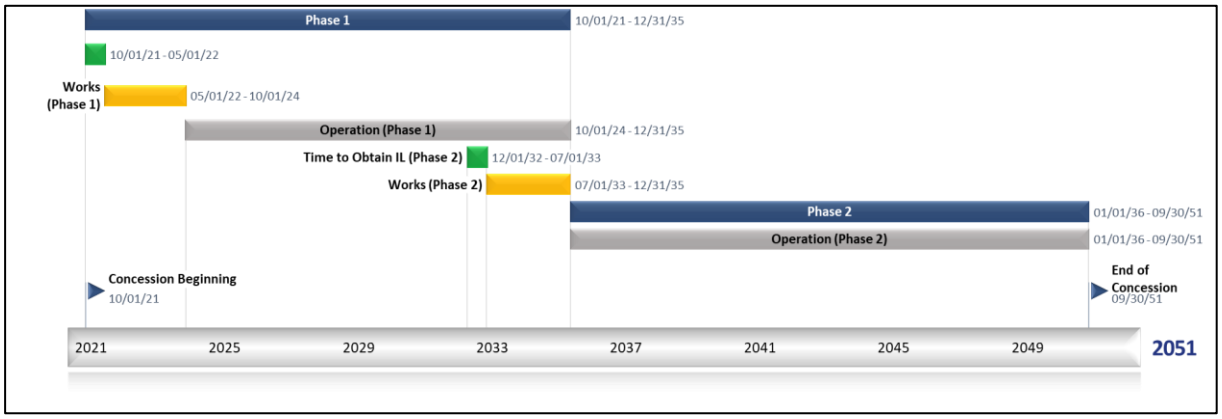
(1) It's been considered the Landing Distance Available (LDA).
(2) The cargo apron can be reversible, that means, shared with the commercial aviation.
(3) It is proposed the construction of a new PTB, being the current one disabled.
(4) The area can be considered inside the PTB.
(5) Area can be considered inside the PTB or Cargo Terminal Building.
(6) Compact Sewage Treatment Unit, D70 model.
(7) Currently the airport doesn't have an area designated to Sewage Treatment Units.

Source: GCA Consortium.

After scheduling needs, based on the capacity of the airport systems, it was possible to define for each component when the interventions should be initiated, so that the service level can be maintained throughout the period.

Considering the concession starts in 2021, it's estimated a 7-month period to get the installation licenses (IL) necessary to start the works. After obtaining those licenses, the work can be started. Thus, as a result of the interaction of several planning elements, the work and operation phases were set, as shown in Figure 2-7.

Figure 2-7: Phasing and Works Estimated Schedule



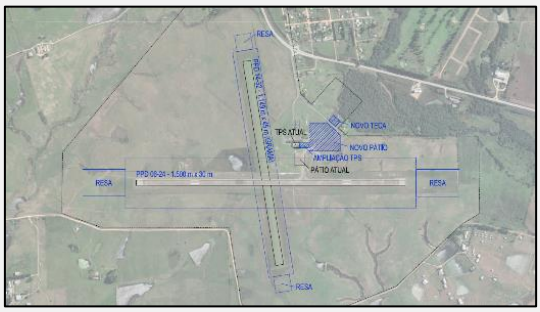
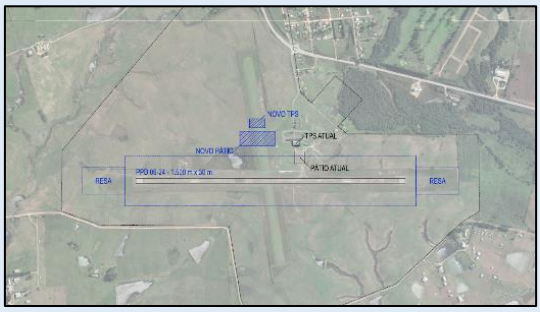
Source: GCA Consortium.

2.4 Alternatives Study

In order to choose the best alternative for the development of the airport site, it was considered the best solution for all infrastructure non-conformities, allowing the future development of the airport site in an optimized way, assuring a high level of service for all installations, minimizing the interference in the existing facilities and presenting compatible costs with the airport revenues during the concession period.

The proposed alternatives and their main characteristics are presented in Figure 2-8.

Figure 2-8: Proposed Alternatives

Alternative 01		• Passenger terminal building extension from 450 m² to 3,150 m² (Costs > R$ 17 MM); • New cargo terminal building implementation with 1,000 m² (Costs > R$ 5 MM); and • New apron implementation with 16,000 m² (Costs > R$ 3,4 MM).
Alternative 02		• New Passenger terminal building implementation with 3,150 m² (Costs > R$ 20 MM); and • New apron implementation with 16,000 m² (Costs > R$ 3,4 MM).

Source: GCA Consortium.

The presented costs were obtained from reference figures by square meter (m^2) and have the purpose to compare in a macro way the different alternatives. The detailed cost analysis was made only for the chosen alternative and it is presented in the CAPEX report.

The two alternatives analyzed have similar costs. Considering that alternative 02 has a better geometrical arrangement, good conditions for future expansion and that the deactivation of Runway 14/32 will not cause major losses to the operation or development of the airport, this alternative has been chosen for the development of the airport site.

2.5 Development Plan

After the selection of the most appropriate alternative and the Requirement Plans, it was designed the airport's development plan for the concession period. Furthermore, it was developed an architecture and engineering preliminary design. Thus, the costs of the project and operation along the implementation phases were estimated in order to enable the airport economic-financial modeling.

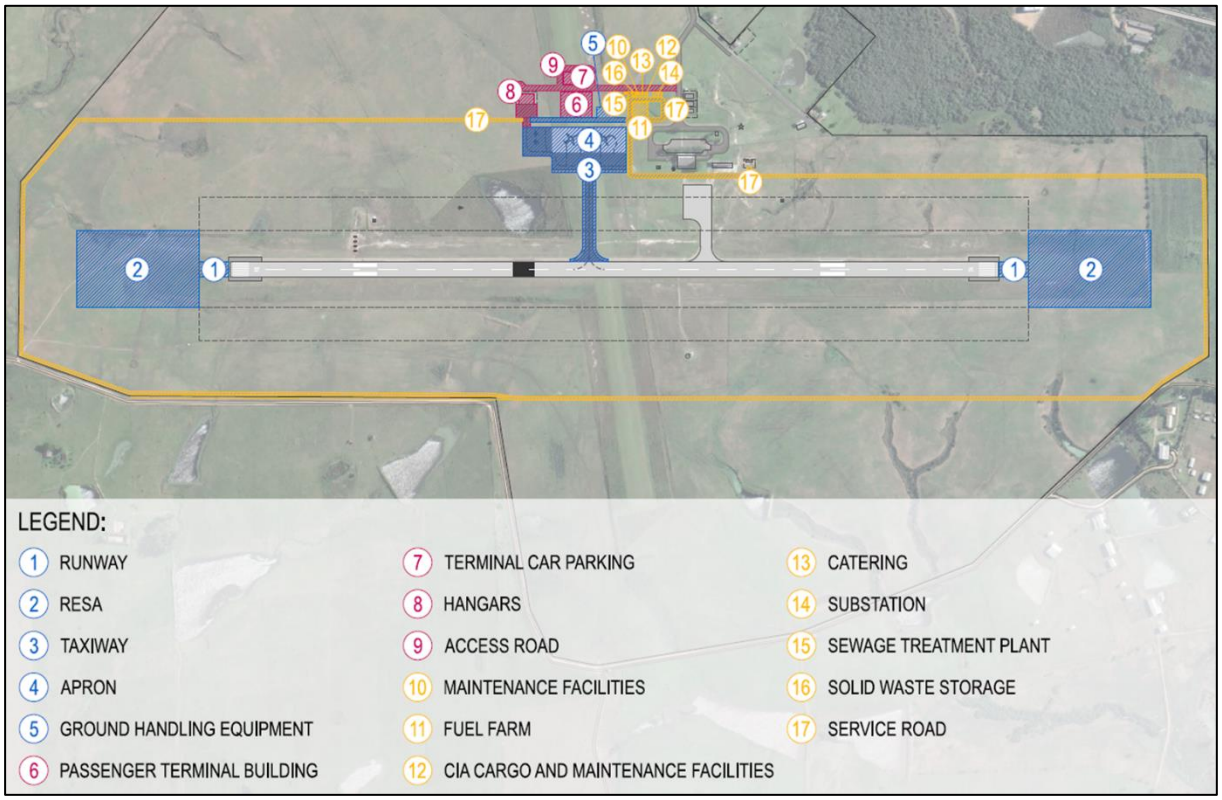
Below, the main investments for each phase of the planning are presented, as well as the implementation plants identifying the interventions at the airport and their subsequent level of details.

2.5.1 Phase 1

The first phase of the concession is expected to occur between the years 2024 and 2035, since the period between 2021 and 2024 will be used to get both the environmental licenses and carry out the constructions, so that all proposed works meet the demand of the year 2035.

In the Figure 2-9, it is presented the implementation proposed to Bagé Airport, considering Phase 01.

Figure 2-9: Development Plan – Phase 01 Implementations



Source: GCA Consortium.

The main interventions proposed in this phase are:

- RESA implementation on thresholds 06 and 24;
- Blast pad Implementation in both thresholds;
- Runway 06/24 strip leveling;
- Runway 06/24 drainage system adequation;
- New passenger terminal building implementation nearby the central part of the runway;
- New apron implementation nearby the new passenger terminal building;
- Access taxiway A and taxilane B implementation from the new apron.

2.5.2 Phase 2

The second phase of the operation is expected to be between the years 2036 and 2051, since the period for obtaining the environmental licenses and carrying out the constructions happen in the previous phase, in order to all proposed works meet the demands of the year 2050.

In Figure 2-10, it is presented the proposed implementation for the Bagé Airport, considering the Phase 02.

Figure 2-10: Development Plan – Phase 02 Implementations

Source: GCA Consortium.

The main intervention proposed for this phase is the terminal car parking extension

2.6 CAPEX

To elaborate the budget for the planned investments, prices were considered in accordance with the reference tables of SINCRO and SINAPI, in order to get referential unit cost per airport component. It was also considered the BDI rate, according to the TCU guidance and SICRO methodology. So, from the planned investments, unit costs and BDI rate, it was obtained the budget for the investments to the airport development. The Table 2-7 summarize the investments by implementation phase.

Table 2-7: CAPEX – Summary per Phase

DESCRIPTION	VALUES [R$]
Phase 1 Airport Expansion	46,415,157.71
Phase 2 Airport Expansion	8,456,179.55
Airport Expansion Subtotal	**54,871,337.26**
Phase 1 Airport Expropriations	-
Phase 2 Airport Expropriations	-
Airport Expropriations Subtotal	**-**
CAPEX Total	**54,871,337.26**

Source: GCA Consortium.

The Table 2-8 compiles the investment, maintenance and expropriation expenses values for each phase, considering the investments used for the resurfaces in the runaway system (which is included in “Maintenance” in Table 2-8).

Table 2-8: Components Summary

DESCRIPTION	DEVELOPMENT (R$)	MAINTENANCE (R$)	EXPROPRIATION (R$)	VALUES (R$)
Phase 1 Airport Expansion	45,156,480.69	1,258,677.02	-	46,415,157.71
Phase 2 Airport Expansion	4,960,919.30	3,495,260.25	-	8,456,179.55
Airport Expansion Subtotal	**50,117,399.99**	**4,753,937.27**	**-**	**54,871,337.26**
Phase 1 Airport Expropriations	-	-	-	-
Phase 2 Airport Expropriations	-	-	-	-
Airport Expropriations Subtotal	**-**	**-**	**-**	**-**
CAPEX Total	**50,117,399.99**	**4,753,937.27**	**-**	**54,871,337.26**

Source: GCA Consortium.

3 ENVIRONMENTAL STUDIES

The Report 3 – Environmental Studies was elaborated to comply with the *Public Notice (Edital de Chamamento Público) N. 2/2019* regarding projects presentation, surveys, investigations and technical studies required to subsidize the concession modeling for expansion, exploration and maintenance of the Airport of Bagé.

The report presents all the environmental studies performed in the field and in the office, by means of primary and secondary data, including a detailed assessment of every document provided by the Secretariat of Civil Aviation (*Secretaria de Aviação Civil – SAC)*, disclosed in Data Room, and of environmental processes verified at the State Foundation of Environmental Protection (*Fundação Estadual de Proteção Ambiental - FEPAM*) on April 16 and 23, 2019.

These data oriented the technical field visit to the Airport of Bagé, which occurred on May 22, 2019.

Complementarily, on August 8 and 15, a new checking was made at FEPAM, the main objective being to identify updates in environmental processes.

Environmental studies were conducted in order to meet the guidelines presented by the public notice, considering that all of the requirements were properly addressed in the report, according to certain analytical chronology, by means of careful evaluation of the airport's compliance with the respective licensing procedures, expansion studies, master plans and previous environmental studies.

Bagé Airport is located in the state of Rio Grande do Sul, in the municipality of Bagé, about 60 km from the border with Uruguay, the extreme south of Brazil. The history of Bagé Airport began in the 1930s, with the creation of the Municipal Aerodrome in 1932, but its official inauguration took place in 1946. From then on, the site underwent several adjustments and extensions, being transferred to the administration of INFRAERO, only in the 80s.

The airport of Bagé is regular concerning the operating licensing of its current activities and infrastructure. The State Foundation of Environmental Protection (*Fundação Estadual de Proteção Ambiental - FEPAM*), the environmental agency of Rio Grande do Sul state, is responsible for the environmental licensing of the enterprise. Information on the Operating Licenses (OL) is detailed below.

Chart 3-1: Operating License Data

License	Issuing Agency	Process n.	Issue	Expiration	Status
01006/2017	FEPAM	6262-05.67/15.5	February 17, 2017	February 17, 2022	Regular

Source: GCA Consortium.

The report detailed the compliance *status* of Operating Licenses (OL) n. 01006/2017 constraints, as well as the historical and relevant points of the processes.

Analyzing the process at FEPAM, it was possible to identify that the Bagé Airport has an Operating License since 2011, and its renewals have been carried out until the present date.

The report detailed the compliance *status* of Operating Licenses (OL) n. 01006;2017 constraints, as well as the historical and relevant points of the processes.

Despite following the environmental norms, it is worth noting that in the current OL there are 10 specific conditions, described in item 14, for which the environmental agency has defined a period of 120 days for their implementation.

However, this deadline has not been met and, on April 22nd, 2019, FEPAM issued an official letter FEPAM / DISA-OFDFNS No. 00322/2019, defining an additional 120 days for implementation, under penalty of archiving the License. During the technical visit it was identified that most of these conditions have not yet been met.

Despite the improvement works, including a renovation for expansion and modernization of the Passenger Terminal in 2004, no documents related to the expansion works were identified in the data from the Data Room neither in the actual and online files of the environmental agency.

Other authorizations, grants and licenses from the airport administrator and licenses from concessionaire companies were also searched and reported. It should be noted that there is no authorization for the use of water resources to abstract groundwater from the two deep wells installed at the airport. It should be noted that these wells are currently inoperative and that the supply of drinking water has been carried out by DAEB, the municipal public service, since 2018.

In addition, a list of the current contracts was also presented, with activities subject to licensing at the airport.

Regarding the regularity of the enterprise, notifications and non-compliances of the airport were surveyed and exhibited to several agencies, National Agency of Sanitary Vigilance (*Agência Nacional de Vigilância Sanitária -Anvisa*) and National Agency if Civil Aviation (*Agência Nacional de Aviação Civil -ANAC*).

Two notifications issued for Bagé Airport were identified. The first is a notification issued by the environmental agency, official letter FEPAM / DISA-OFDFNS nº 00322/2019 (process 006262-0567 / 15-5-LO of April 22, 2019), which stipulated the period of 120 days for handling irregularities. The second notification was issued by the Fire Department (CBMRS) and refers to the reporting of non-conformities identified in the Inspection Nr. 1263/1 of June 11, 2014.

No occurrences (notifications, infractions, non-conformities and others) applied by Anvisa to the current airport administrator were identified, however, in relation to the compliance to ANAC, pending issues were identified related to the presentations and due records of the IPF and PGRF to the regulatory agency.

The information on past notices and fines do not oblige the next manager, which is not responsible for their payments. However, the current airport manager is responsible for eliminating the facts that originated such notices, as well as for managing ongoing mitigating or recovering actions.

A socio-environmental assessment of the Airport of Bagé was performed and presented by means of the socio-environmental diagnosis in this report, considering the following aspects:

- Soil Use and Coverage including approaches to water resources, permanent preservation areas (APP) and vegetation;
- Irregular superficiaries and occupations in the airport assets area;
- Potential of Cave Occurrence;
- Mining rights;
- Fauna and Fauna Risk;
- Noise;

- Atmospheric Emissions;
- Energy;
- Basic Sanitation including approaches to water supply, effluents, solid waste and drainage system;
- Degraded areas, erosions and silting;
- Environmental Risks/Emergencies;
- Conservation Units, Protected Assets and Communities, including the analysis of heritage, archeological or pre-historical sites and traditional communities;
- Stakeholders engagement;
- Environmental Management System.

In this diagnosis, through the visual analysis of the images, the mapping of the classes of vegetation cover and of land use and occupation in the current patrimonial limit and in the areas foreseen for future use. The predominant land use classification at the airport is formed by Anthropic Field with Isolated Trees, occupying approximately 94.89% of the airport area, 3.22% of the areas are composed of areas with buildings and 0.60% by Seasonal Semideciduous Forest, followed by the other uses with small percentages of occupation.

The airport is located in the Negro River hydrographic basin and in the Uruguay sub-basin. The Negro River Basin is located southwest of the State of Rio Grande do Sul and has a Management Committee created by Decree Nr. 45531 of March 6th, 2008 and amended by the Decree Nr. 54244, of September 28th, 2018. The Basin Plan has not yet been elaborated.

Inside the airport area there are water bodies and Permanent Preservation Areas. It is noteworthy that the airport team reported that in November 2018, for the removal of artificial dams and drainage ditches in the runway strip (identified as non-conformity in the airport master plan), technical documentation was prepared with guidelines for procedures to be followed for the issue of environmental licensing. According to the local team, these dams were the result of excavation, to remove soil in order to level the PPD, during their construction works.

The region where Bagé Airport is located is characterized by the Pampa Biome, with formations of Grassy-Woody Steppe and Seasonal Semideciduous Forest (IBGE, 2004). Around the airport there are fragments of Semideciduous Seasonal Forest, Wetland, Regenerated Reforestation, Reforestation, and Anthropic Field with isolated trees.

Inside the airport site, superficiaries were identified that are not linked to airport activities, an area for livestock exploration, according to the contract signed with Haras Old Friends Ltda, contract nr. 02-2017-051-0001, which will expire in September 30, 2022, whose activity increases the risk of to the fauna at the aerodrome.

The potential for the occurrence of caves was assessed in an area with a radius of 5 km from the center of Bagé Airport. The existence of caves at the airport was not identified, however it should be noted that the airport site is located in a region with a medium probability of cave occurrence and its immediate surroundings is located in a region with low, medium and very high probability of the occurrence of caves.

The existence of mining titles was also assessed in this study, and no issued titles were identified in the immediate surroundings of Bagé Airport.

In relation to the Fauna Risk, due to the airport's operational characteristics and the criteria established in the RBAC 164/2014, it is necessary to elaborate and implement the IPF and PGRF as instruments for adequate management. The airport currently has only one PGRF issued in 2018, but not forwarded to ANAC for validation. To correct this non-conformity, INFRAERO has an approved bidding process, nr. 032 / LALI-7 / SBBG / 2019, for the object "Contracting a company to provide services for the identification of the danger of fauna (IPF) and of the fauna risk management program (PGRF) of Bagé International Airport ", according to the requirements established in RBAC 164/2014".

In addition to assessing the risk of fauna to aviation safety, the impact of airport activities and probable expansions on local fauna was assessed. Based on the Report of Sensitive Areas of Endangered Species Related to Airports, developed by the Chico Mendes Institute for Biodiversity Conservation (2016), it was identified that the airport site is in an area classified as "Moderately Sensitive - Category 1" and its surroundings, in addition to the classification already mentioned, also presents an area classified as "Sensitive - Category 2".

The average annual flights of the last 3 (three) years was less than 7,000, therefore, the elaboration of the Basic Noise Zoning Plan (PBZR) is applicable to the airport. The Bagé Airport does have a Basic Noise Zoning Plan (PBZR) registered with ANAC.

Related to basic sanitation, the supply of the potable water of the airport is done by the Water and Sewage Department of Bagé (*Departamento de Águas e Esgotos de Bagé – DAEBS)*, a public concessionaire.

All the solid waste is disposed a single external collector, with no segregation or temporary conditioning, for later public collection carried out by a company contracted by the Municipality of Bagé.

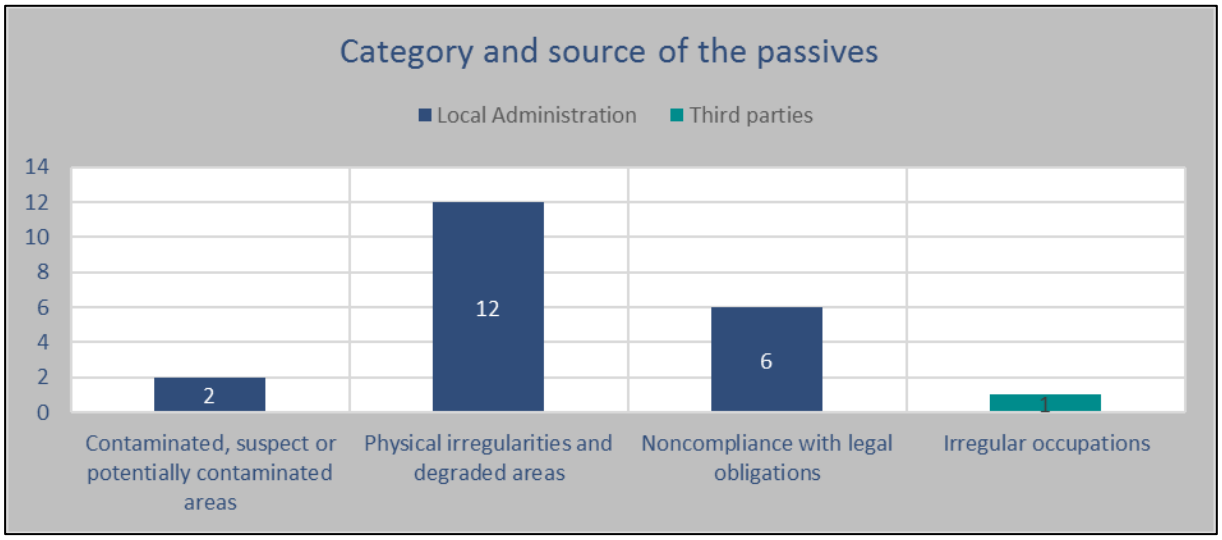
The airport does not have an effluent treatment plant, the sanitary sewage is disposed in septic tanks and sinks installed in the airport area.

Regarding drainage, during a technical visit, a deficient rainfall drainage system was identified. The presence of wetlands in the area, which is attractive to the fauna.

Protected and listed assets, archaeological or prehistoric assets, nor traditional communities were identified on the area of the airport and its immediate surroundings. Only a nearby Integral Protection Conservation Unit, called Pampa Municipal Natural Park was identified.

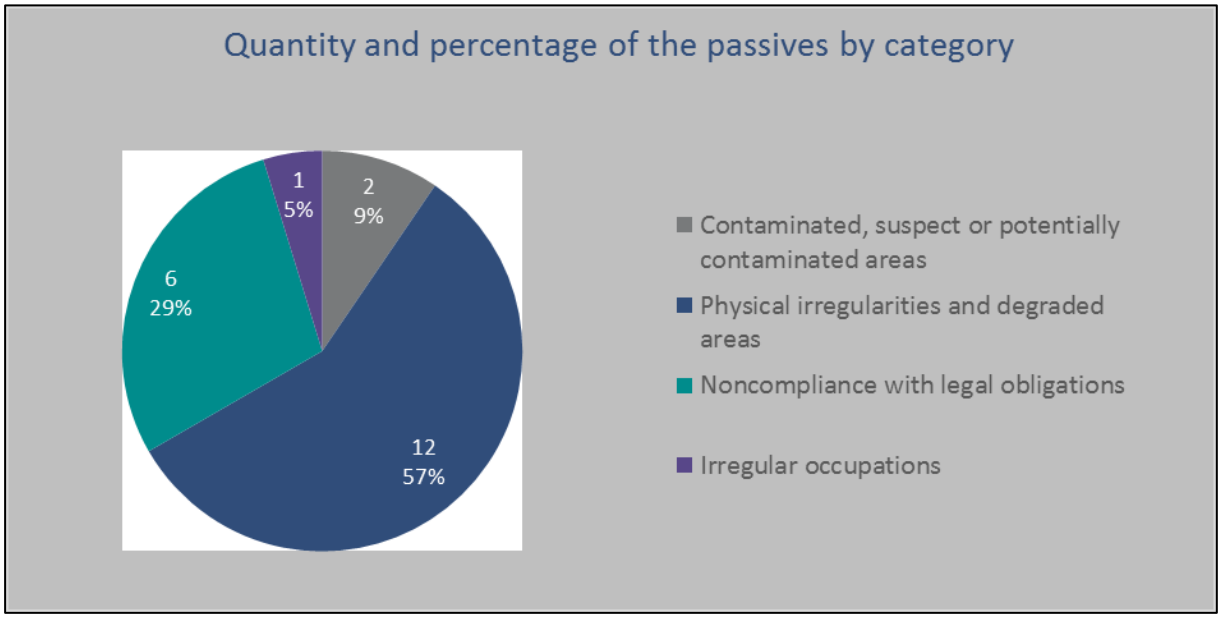
During the preparation of this document, existing socio-environmental passives were surveyed, evaluated and priced. For the Airport of Bagé, 21 passives were identified, 20 originated by local administration and only 01 by third parties. From this total, 9% were related to contaminated areas, 57% to physical irregularities and degraded areas and 29% to noncompliance with legal obligations, and 5% to irregular occupations were identified.

Figure 3-1: Category And Source Of The Passives



Source: GCA Consortium.

Figure 3-2: Quantity And Percentage Of The Passives By Category

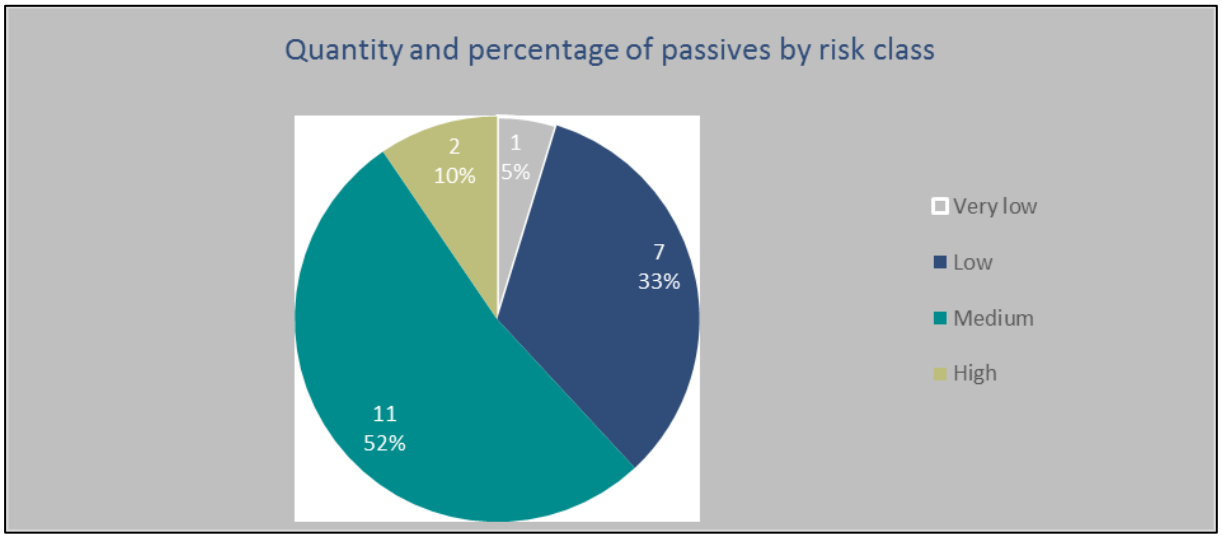


Source: GCA Consortium.

The classification of passives identified according to their Risk Class was assessed based on a methodology adapted from FMEA (*Failure Mode and Effects Analysis).*

Considering the current scenario, the Airport of Bagé presents passives classified as *of High, Medium Low and Very Low* risks. The passives classified as of High risk shall be managed in the short run, and the passives classified as of *Medium to Very Low* risk may be managed according to their respective criticalities in short or medium term.

Figure 3-3: Quantity And Percentage Of Passives By Risk Class



Source: GCA Consortium.

Regarding the compatibility of airport activities and soil use, the report carefully analyzed the territorial norms of the surroundings, to verify if the protection plan against obstacles, noise zoning plan and airport security area were according to the guidelines and laws that regulate the occupation of surrounding airport areas.

For the good development of the enterprise, it is essential to keep the surrounding areas compatible with the airport activities and, for that, it is necessary that the aerodrome operator keeps all the plans updated and approved by the respective authorities, especially when significative changes in operation and infrastructure occur.

With the simulation carried out in the study, it was identified that in the proposed future scenario, the Basic Air Protection Zoning Plan (PBZPA) and the Air Navigation Aid Zoning Plan (PZPANA) will remain covering the 03 current municipalities already affected.

The study also verified, that for both the Current and Future Scenarios, the simulated noise contours go beyond the airport's property limits, however, there are no incompatible uses (sensitive homes and receivers - such as public institutions, hospitals and schools) in the regions affected by the noise contours.

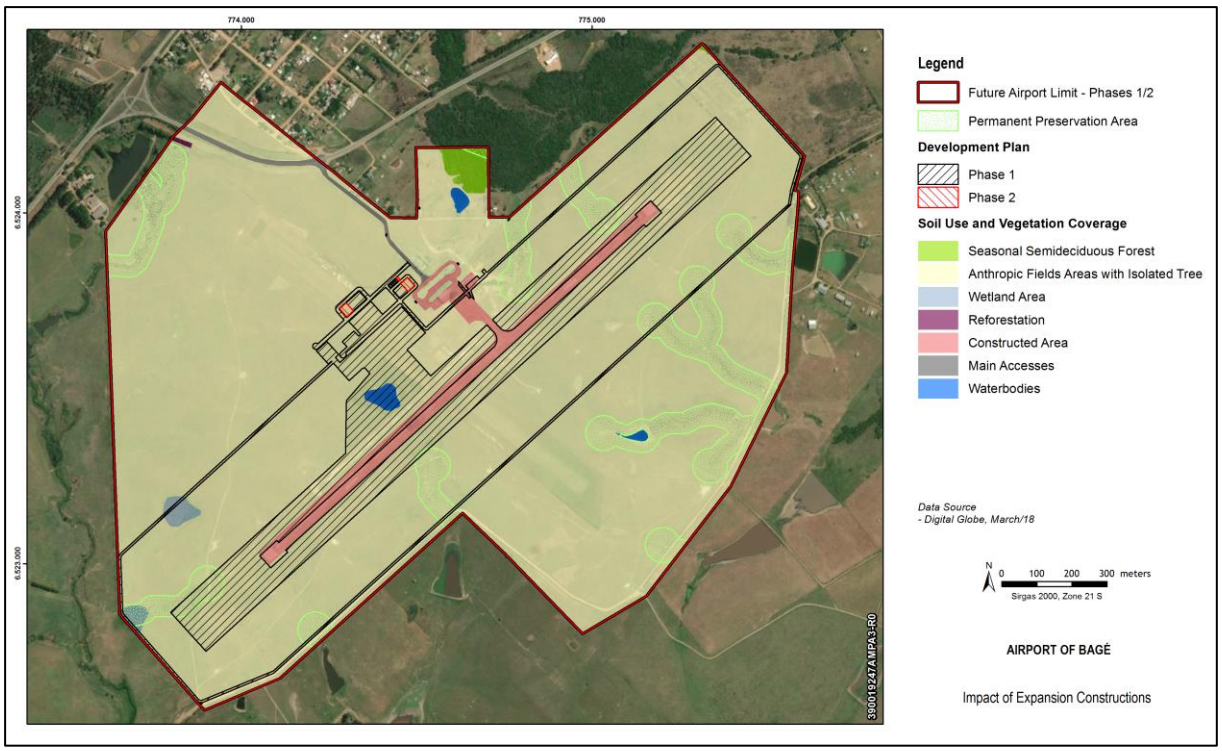
Regarding risks to the Fauna, the study identified the main focuses of attraction inside the Airport Safety Area (ASA), a circular area with 20 km of radius, marked from the geometric center of the longest runway. We highlight the focus related to cold store and lakes in the region. Thus, the airport manager shall help the municipality to monitor the focuses and to develop educational actions in order to avoid the appearance of new focuses.

Based on all these surveys, the main goal of the study was fulfilled, especially regarding the legal and environmental restrictions of the airport and its neighboring areas. Socio-environmental criteria to be incorporated to the project were identified and oriented the Development Plan in order to minimize environmental impacts.

Therefore, the Development Plan for the Airport considered every restriction and environmental criteria surveyed in the study. The solution proposed is the one with the lowest environmental impact

in the airport region and that allows its compliance with applicable legislation. The following figure shows the impact of expansion works on soil use and coverage.

Figure 3-4: Impact Of The Adequation Constructions On Soil Uses And Coverage



Source: GCA Consortium.

Evaluating the construction works impact on soil use coverage in the Airport of Bagé during the Development Plan implementation in its two phases, interventions shall be made: in the Anthropic Fields areas with isolated tree individuals (92.92%), in the already constructed areas (5.38%), in water bodies (1.42%) and the other in wetland and accesses. During phase 1, interventions in APP will be necessary (4.35%).

Concerning socio-environmental risks associated to the project, *i.e.*, situations that may impair or delay the execution of foreseen activities and constructions, two risk situations were identified and summarized below.

Chart 3-2: Risks And Their Respective Strategies To Minimization

Socio-environmental risk management at the Airport	
RISK SITUATION 1	Uncertainties about the compliance with the requirements of the OL
Identified risk	• Undertake the enterprise without an effective OL • Undertake the enterprise with environmental irregularities. • Having to bear additional costs to obtain the LO
Strategies to minimize the risk	• During the operational transfer period, dialogue with INFRAERO and FEPAM to maintain the OL, preventing the airport administrator from falling into an irregular situation • During the operational transfer period, act in partnership with the airport site administrator to address the environmental problems, previously described in Chapter 4, that may result in OL cancellation.
RISK SITUATION 2	Risk that the environmental agency maintains the requirement of the Rural Environmental Registry - CAR
Identified risk	• Mandatory registration of legal reserve, restricting 20% of the total area of the property.
Strategies to minimize the risk	• Dialogue with FEPAM regarding divergences in the concept of Rural Property and sign a commitment that agricultural, livestock, plant extraction, forestry or agro-industrial activities will no longer be carried out, which are even incompatible with the security of air operations.

Source: GCA Consortium.

Considering that the local availability of input and raw material suppliers, and of waste disposal sites required to implement the Development Plan are essential to the Project feasibility, the Environmental Report listed potential licensed suppliers to help estimating costs in the Report of Engineering and Related Issues.

The study also presents the licensing guidelines required for the entire concession period, accompanied by the respective schedules for the implementation and operation phases of the airport.

For the Operational phase, considering that the airport of Bagé is regularized until February 2022 and that the concession period begins in the second half of 2021, the Operating License renewal was foreseen to be requested during the concession period. Normally, the licenses issued for Airport of Bagé expire in 5 years.

Based on these conditions, the chart below presents recommendations to the future airport manager, regarding the conduction of the airport's operating licensing:

Chart 3-3: Recommendations For Conducting The Airport's Operating Licensing

Recommendations for conducting the airport's operating licensing
Once you took over the airport's management, you must request the license titularity transference to your name and CNPJ.
During the airport operation, all the constraints of the future Regularization Operating License (or similar) must be addressed. Periodical reports on the activities' execution must be presented to the environmental agencies.
To request the OL renewal at least 120 days before its expiration date, according to paragraph 4th of article 12 of Complementary Law n. 140, from December 8, 2011.
After the end of each construction phase, if authorized by means of an Installation License, the entrepreneurship shall request these constructions to be included in the current operating license, avoiding the issuing of several OL for the same airport enterprise.

Source: GCA Consortium.

Besides of the operating environmental licensing of the airport, the airport operating activities will be regular by the issuing of authorizations, exemptions and complementary grants and documentation approval by regulatory public agencies. The chart below presents the estimated timeframes used in the present study.

Chart 3-4: Estimated Timeframes For Other Authorizations, Grants And Licenses

Description	Estimated timeframe	TOTAL
Regularization/Renewal/ Transference of Grant for water resources use (AA[1]) and Grant Issuing (OC[2])	2 months (AA[1]) 2 months (OC[2])	4 months
Regularization of Federal and State Technical Registration (AA[1])	2 months (AA[1])	2 months
Elaboration/Regularization/Renewal of IPF and PGRF (AA[1]) and validation in ANAC (OC[2])	15 months (AA[1]) 3 months (OC[2])	18 months
Elaboration /Regularization of noise contours and PZR (AA[1]) and validation and registration in ANAC (OC[2])	6 months (AA[1]) 3 months (OC[2])	9 months
Regularization of PBZPA and PZPANA(AA[1]) and validation in ANAC and DECEA (OC[2])	6 months (AA[1]) 4 months (OC[2])	10 months
Mining block request to DNPM (AA[1]) and mining block issue (OC[2])	2 months (AA[1]) 2 months (OC[2])	4 months

Notes:

[1] AA- Airport manager

[2] OC- Responsible agency

Source: GCA Consortium.

Regarding the expansion and adequation constructions phase, the Development Plan proposed for Airport of Bagé will be implemented in two phases. The chart below summarizes the licensing assumptions for each phase.

Chart 3-5: Licensing Assumptions For The Expansion And Adequation Constructions Of Airport Of Bagé

Evaluated aspects	Phase 1	Phase 2
Impact degree of the constructions	Medium	Medium
Licensing agency	FEPAM (State)	FEPAM (State)
Applicable licenses	LPIA	LPIA
Studies to be performed	RAS e PCA	RAS e PCA
Maximum estimated timeframe for studies and licensing	7 months	7 months

Source: GCA Consortium.

Phases 1 and 2 of the Development Plan were classified as of environmental impact of medium degree. For this reason, a Simplified Environmental Report (RAS) and an Environmental Control Plan (PCA) shall be elaborated to obtain a Preliminary License (PL) and an Installation License (IL) for both phases.

The estimated timeframes for the environmental licensing of the constructions considered the impact degrees previously described, results being presented below.

Chart 3-6: Estimated Timeframes For Licensing Constructions Of Medium Environmental Impact

Description	Estimated timeframe
RAS and PCA elaboration for LPIA issue	3 months (AA[1])
RAS and PCA and new LPIA issue	4 months (OA[2])
TOTAL	**7 MONTHS**

Notes:

[1] AA- Airport manager

[2] OA- Environmental Agency

Source: GCA Consortium.

The airport manager should also analyze verify other authorizations required to enable the Development Plan, concerning the licensing of all its three phases. The chart below summarizes this evaluation for Airport of Bagé.

Chart 3-7: Environmental Authorizations And Procedures Required For Bagé

Authorization/Procedure	Applicability for the Development Plan
Municipality Opinion	Applicable
Authorization for Vegetation Suppression (ASV) and/or Intervention in APP	Applicable
National Institute of Historical and Artistical Heritage (Instituto do Patrimônio Histórico e Artístico Nacional - IPHAN) Opinion	Applicable
Grant of water resources use	Applicable
Mining Block	Applicable
Authorization from Conservation Units Managers	Applicable
Authorization for intervention in traditional communities or its surrounding zones	Not applicable

Source: GCA Consortium.

To achieve excellence in socio-environmental management, this study presented mitigation measures, suggestions on Sustainability Guidelines, Environmental Management System, Environmental Plans and Programmes and Environmental Development Indexes to the future airport manager, considering all the environmental subjects assessed herein.

Finally, the study presents the socio-environmental cost budget foreseen for the expansion constructions (CAPEX) and for the airport operation (OPEX), summarized below:

Chart 3-8: Socio-Environmental Costs In R$ Estimated For The Airport Of Bagé

Activity	Phase 1	Phase 2	TOTAL
Licensing and Analysis Fees	36,823.28	36,823.28	73,646.56
Environmental Studies	312,351.91	312,351.91	624,703.83
Environmental Management of the Constructions	1,985,050.09	2,052,654.34	4,037,704.43
Vegetation Suppression and Forest Compensation	30,557.40	-	30,557.40
Confirmatory Investigation of Passives	121,571.44	-	121,571.44
Environmental Passives Recuperation	-	-	-
Environmental Compensation SNUC *	-	-	-
Total	**2.486.354,13**	**2,401,829.53**	**4,888.183.66**

* Not applicable in this case

Source: GCA Consortium.

Chart 3-9: Environmental OPEX Estimated For The Airport Of Bagé

Item	Activity	Total Cost (R$)
2.1	Environmental Licensing Fees	905,962.74
	OL Renewal	*210,355.14*
	TCFA – IBAMA	*695,607.60*
2.2	Operation Environmental Management	3,572,471.16
2.3	Elaboration of PBZPA and PZPANA	205,678.91
2.4	Fauna Management Programme	2,854,361.15
	PF and PGRF Elaboration	*2,494,361.15*
	Fauna handling actions	*360,000.00*
2.5	Noise Management Programme	89,252.79
2.6	Energy and Air Emissions Management Programme	23,817.19
2.7	Water Resources and Effluents Management Programme	3,313,271.07
	Sampling Plan Elaboration	*23,817.19*
	Water Resources Monitoring	*3,289,453.87*
2.8	Solid Waste Management Programme	37,282.87
2.9	Social Communication, Environmental Education and Training	481,192.34
	TOTAL	**11,483,290.23**

Source: GCA Consortium.

The Environmental Studies maintained the innovations presented in the study is elaborated by GCA Consortium of the 5th Round of Airport Concessions from Federal Government, which culminated in the concession of 12 airports for private initiative. They are:

- Analysis of soil use and occupation inside noise contours, by means of identifying the quantity of residences and their respective areas, people and average quantity of people per residence based on census information (IBGE, 2010);
- Survey of focuses of fauna attraction, using criteria defined by specific aeronautical legislation;
- Survey and analysis of collision indexes involving aircrafts and fauna, according to data provided by CENIPA;
- Identification of areas vulnerable to the airport activities, since there are fauna and flora species of restrict distribution located in regions under the aerodrome influence, according to ICMBIO criteria;
- Risk evaluation of environmental passives based on a methodology adapted from FMEA (Failure Mode and Effects Analysis);
- Indexes proposition according to GRI Standards (version 2016) and GRI G4- Airport Operator Sector Disclosures (version 2013) references, correlating them to the

Sustainable Development Goals (*Objetivos de Desenvolvimento Sustentável -ODS*), to the IFC Performance patterns, and with the guidelines of Global Pact.

In addition, with the participation of several professionals specialized in the environment area and with effective practice on airport operation, the flowing innovations were performed in the Environmental Studies:

- Identification of all kinds of irregular superficiaries and occupations in the property and the expansion area;
- Survey of potential cave occurrences in the airport area and its surroundings;
- Information on the existence of mineral deposits in the airport area and its surroundings;
- Evaluation of mining rights in the airport area and its surroundings;
- Amplification of identified classes of environmental passives and its respective results presented by an Excel spreadsheet, with friendly and intuitive interface;
- Survey on receptors sensitive to aircraft noise – public institutions, hospitals and schools – located inside the airport noise contours;
- Indication of licensed potential suppliers of inputs and raw materials, close to the airport, for the Development Plan constructions;
- Indication of licensed sites for adequate waste disposal, close to the airport;
- Evaluation of the airport position on the ranking of airports used for animal traffic, as well as proposition of actions to prevent traffic;
- Use of indicators from the Guide of Good Practices for Elaborating Indicators of Operational Safety elaborated by the Brazilian Group of Operational Safety in Airport Infrastructure (BAIST), published in August 2019;
- Quantification of the expansion construction impacts in Permanent Preservation Areas (APP) and proposition of differentiated forest compensation, according to local legislation;
- Use of data on water, obtained by SPT drilling performed by GCA, to guide the estimated budget of Confirmatory Investigations and sites with suspected contamination in the airport;
- Incorporation of sustainable proposals in the Development Plan;
- Definition of Sustainability guidelines for the airport operations, aligned with the policies adopted by the Ministry of Infrastructure.

4 ECONOMIC AND FINANCIAL EVALUATION

This section presents the Executive Summary of the Economic and Financial Evaluation for the 30-year concession of **Bagé Airport - SBBG** modelled between 01/October/2021 and 30/September/2051. Currently, the airport's total revenue is R$0.2MM and its EBITDA margin is -1212% (considering 2018 data)[7].

Revenues

The economic and financial evaluation is based on revenue projections which include:

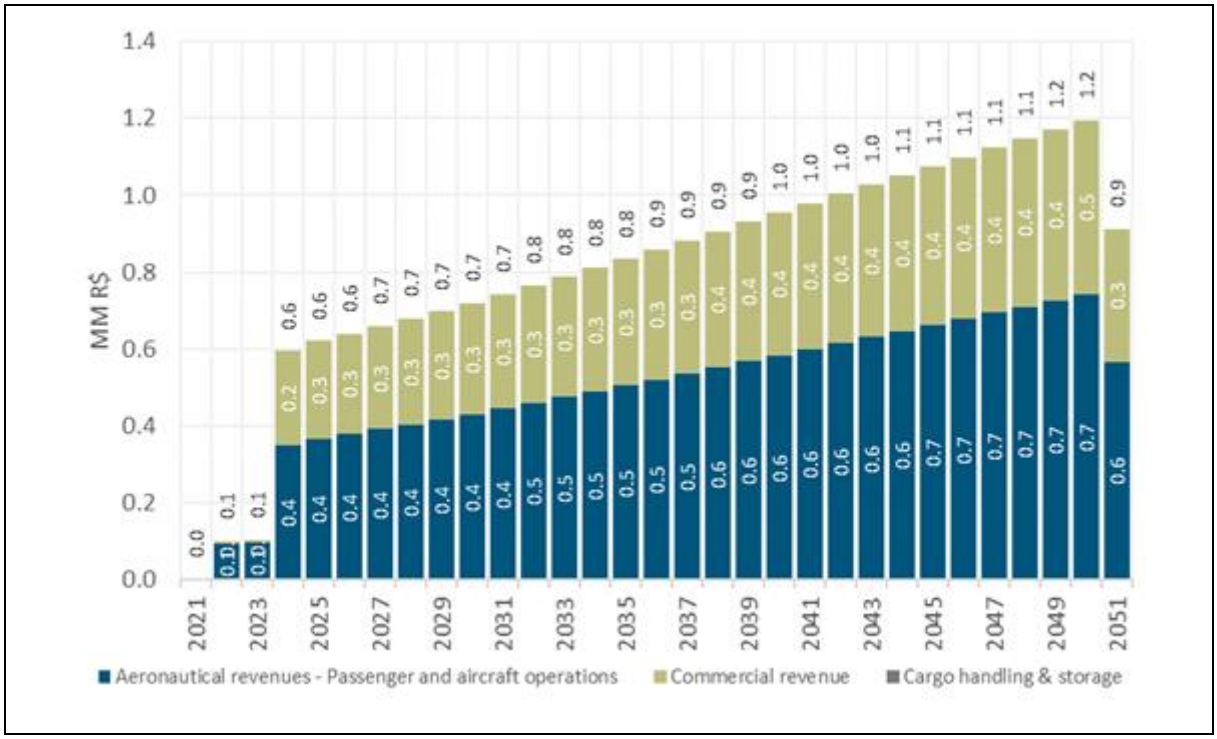
- Aeronautical revenues, resulting from regulated fees on the various operation types. These have been categorized as passenger and aircraft fees and cargo handling and storage fees;
    - Aeronautical revenues – passengers and aircraft operations: applicable to both passenger flows (domestic and international boarding or connection fees) and aircraft operation and parking, by operation type (domestic and international landing and parking fees, and landing and boarding and parking fees for general aviation);
    - Cargo handling and storage: due for cargo handling and storage services where rendered directly by the Airport operator at the air cargo terminal (TECA), and may divide into import, export and domestic cargo;
- Commercial revenues, related to services and goods provided to passengers, airlines and other business users, i.e. retail, food & beverages, car parking, aircraft fuelling, car rental etc.

Forecasts for aeronautical revenues are based on expected Airport throughput, which include passenger flows, cargo, mix of aircraft types and aircraft operations, and their respective fees. Meanwhile, forecasts for commercial revenues consider not only expected demands and their respective impacts over each category of business, but also efficiency gains resulting from contract renegotiations between the concessionaire and the lessees of commercial areas, following market benchmarks.

Total revenues are expected to grow on an average of 2.7%p.a. between 2025 and 2050. Commercial revenues will increase during the concession period, from 59% in 2025 to 62% in 2050.

[7] All monetary value presented in this report is given in constant Real (R$) values based on January/2019 real prices, following SAC/MI guidance.

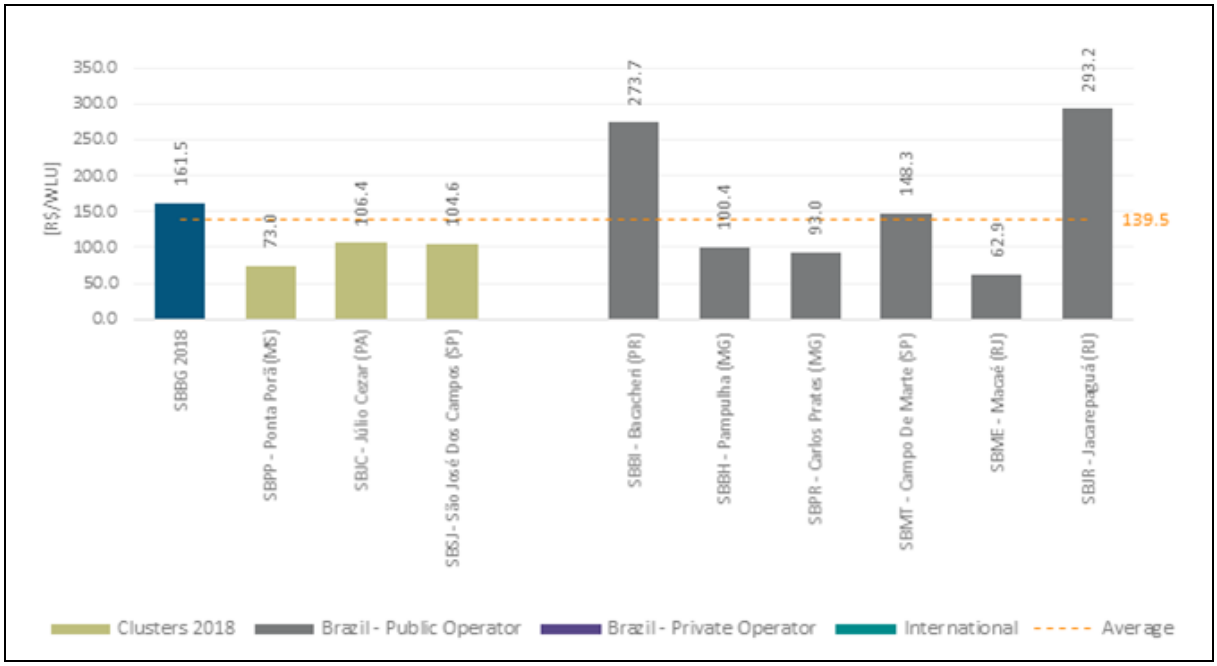
Figure 4-1: Total revenues during concession



Source: GCA Consortium.

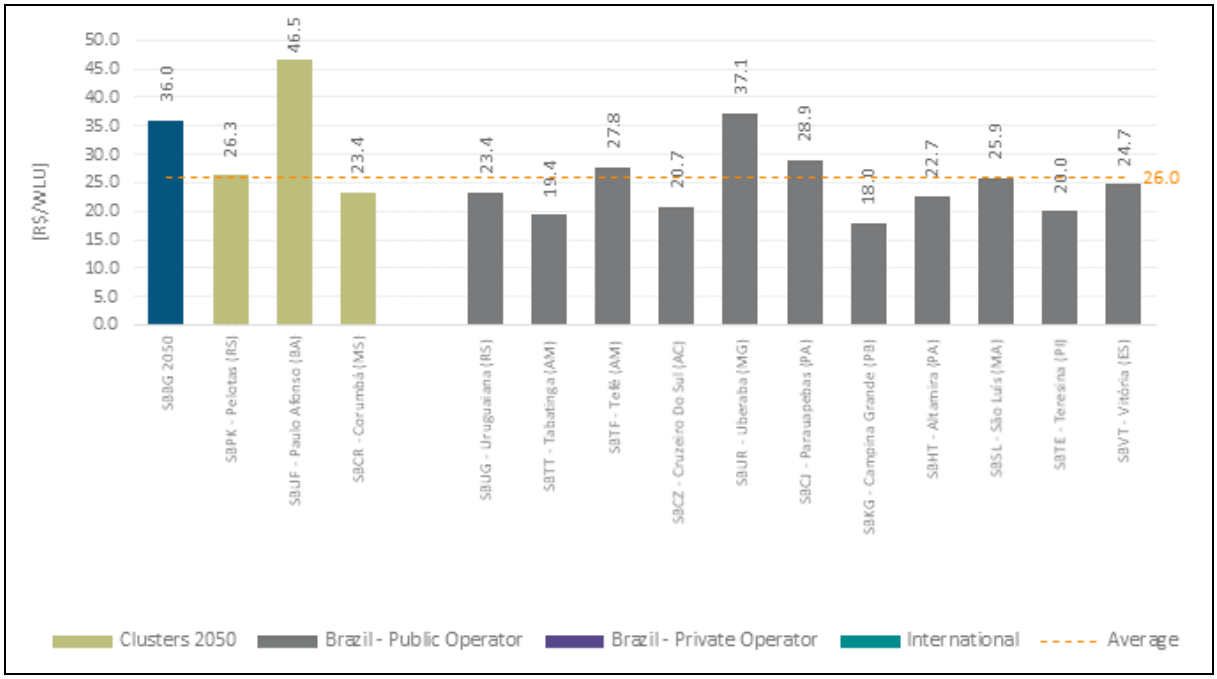
In 2050, the Airport's revenue per WLU will be R$39.3. Airport indicators are above the average of comparable airports (Figure 4-2 and Figure 4-3).

Figure 4-2: Revenue per WLU benchmark in 2018



Source: GCA Consortium.

Figure 4-3: Revenue per WLU benchmark in 2050



Source: GCA Consortium.

Costs and expenses

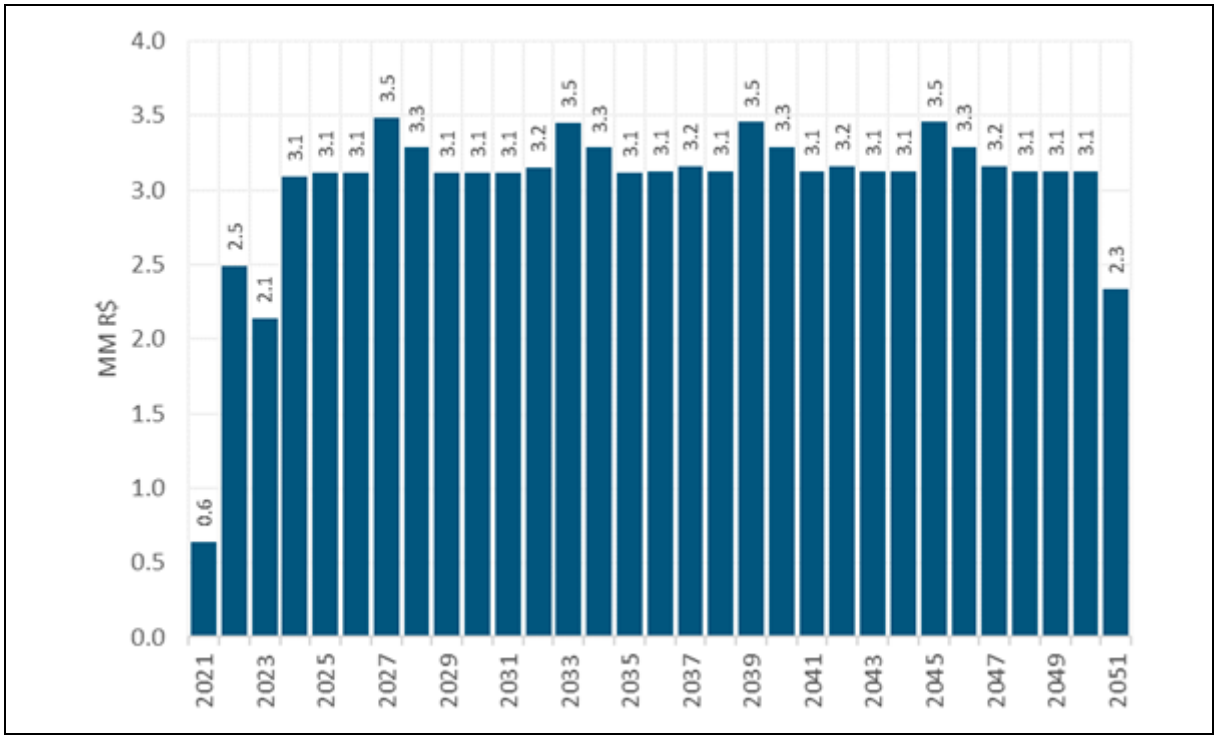
Airport operating costs and expenses are mainly related to personnel and outsourced services, in addition to utilities and public services and consumables.

After the concession, the concessionaire will take up new obligations, which include performance bond, socio-environmental expenses and property tax (IPTU). The concessionaire must also pay grants, applicable according to the feasibility of the concession and therefore not discussed under this item.

Costs and expenses forecast take into account the most appropriate forecast drivers for each item, that is, the variables that best explain the evolution of the observed costs. Additionally, costs and expenses forecasts were based on current values and considered initial efficiency gains derived from private management as well as economies of scale, determined from benchmark analyses.

Airport costs and expenses ranged around R$ 3.1MM over the concession period (Figure 4-4). Personnel and Utilities costs are the most significant, representing 38% and 29% of total costs in 2050, respectively.

Figure 4-4: Costs and expenses during concession (prior to grant values)



Source: GCA Consortium.

It is important to emphasize that, before entering into the concession agreement, the concession holder will be required to settle funds for Infraero's staff readjustment program, reimbursement to authors of the feasibility studies, and compensation to São Paulo stock exchange (B3) for holding the auction. (Table 4-1).

Table 4-1: Obligations to be met prior to signing the contract

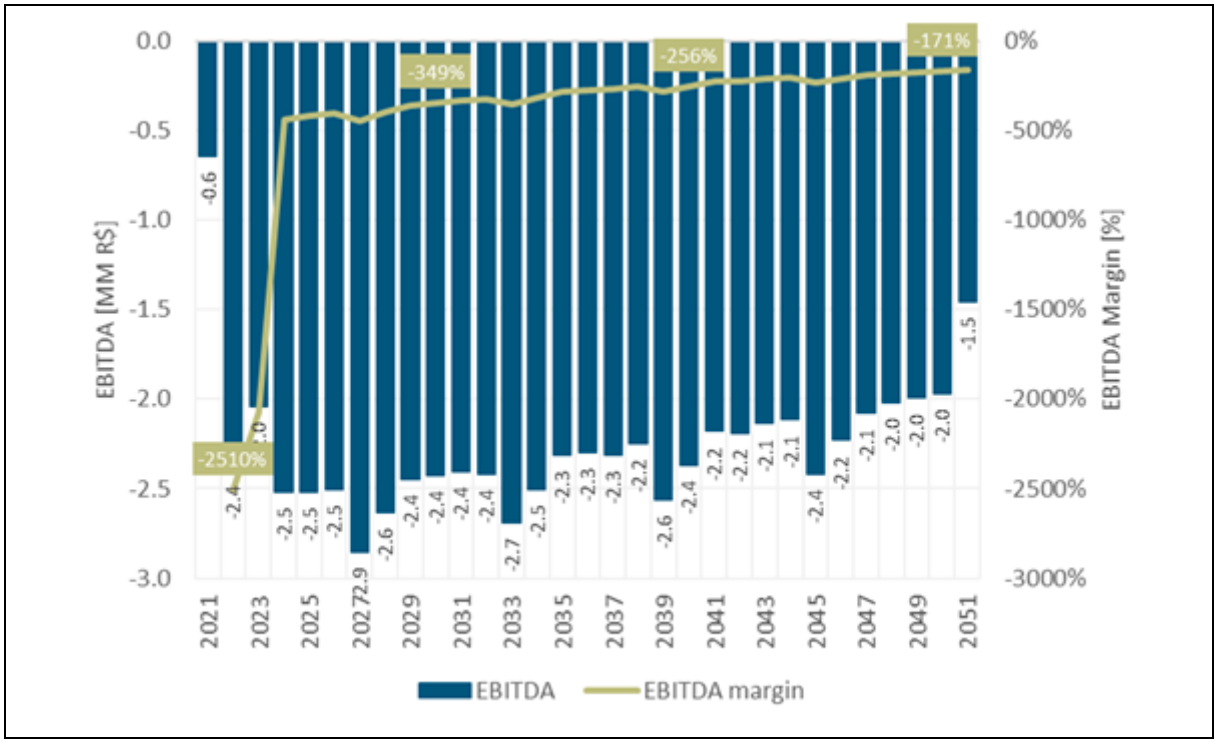
Values in MM R$	TOTAL
OBLIGATIONS TO BE MET PRIOR TO SIGNING THE CONTRACT	**(7.8)**
Funds for Infraero's staff readjustment program	(5.7)
Reimbursement to authors of the feasibility studies	(2.0)
Payment to B3 for holding the auction	(0.1)

Source: GCA Consortium.

EBITDA and margin

Net of grant payments, the concession EBITDA is forecast to be R$2.5MM negatives in 2025 and to reach R$2.0MM negatives in 2050 (Figure 4-5). EBITDA margins increase is forecast throughout the concession due to expected economies of scale.

Figure 4-5: EBITDA and EBITDA margins during concession



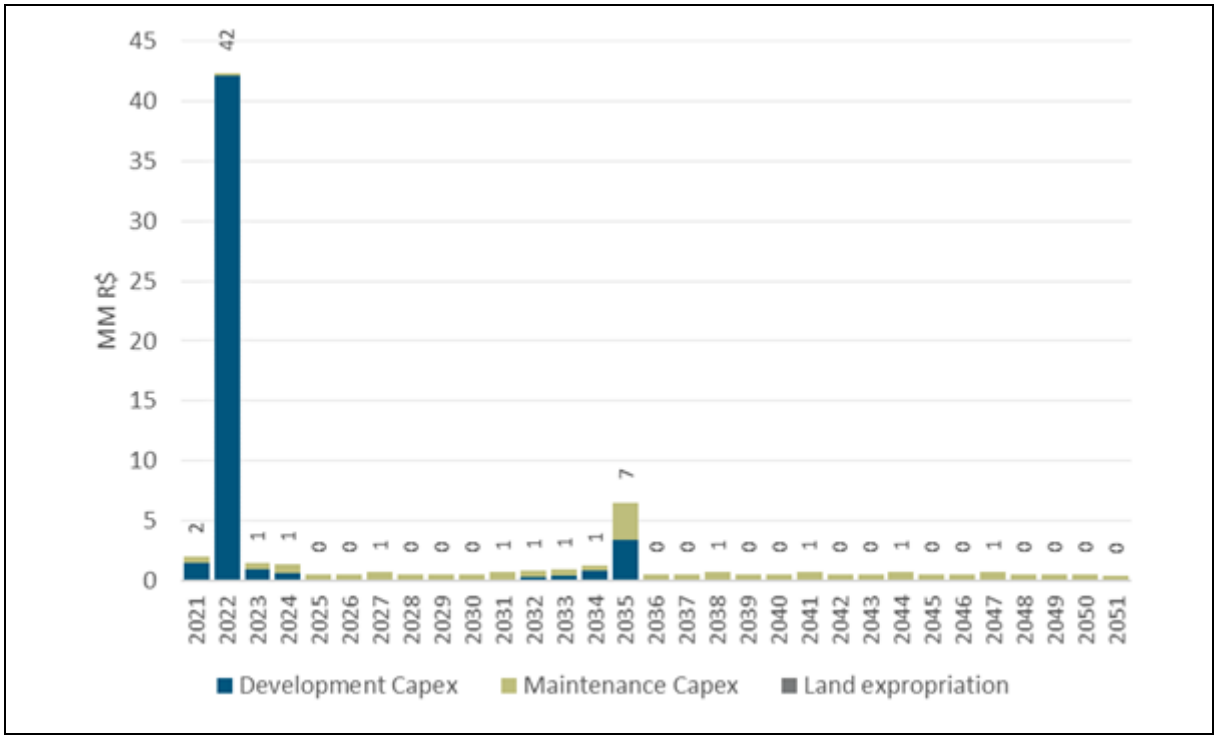
Source: GCA Consortium.

CAPEX

The development plan, expansion of airport assets to meet growing demands and ensure appropriate level of service, requires a total investment of R$69MM.

Development investments (topical and intended to expand airport assets, including expropriations) will be divided into different phases and amount to a total R$50MM. Maintenance investments (periodical and intended to maintain and replace assets, including re-paving cycles) add up to R$19MM throughout the concession period. (Figure 4-6).

Figure 4-6: CAPEX during concession

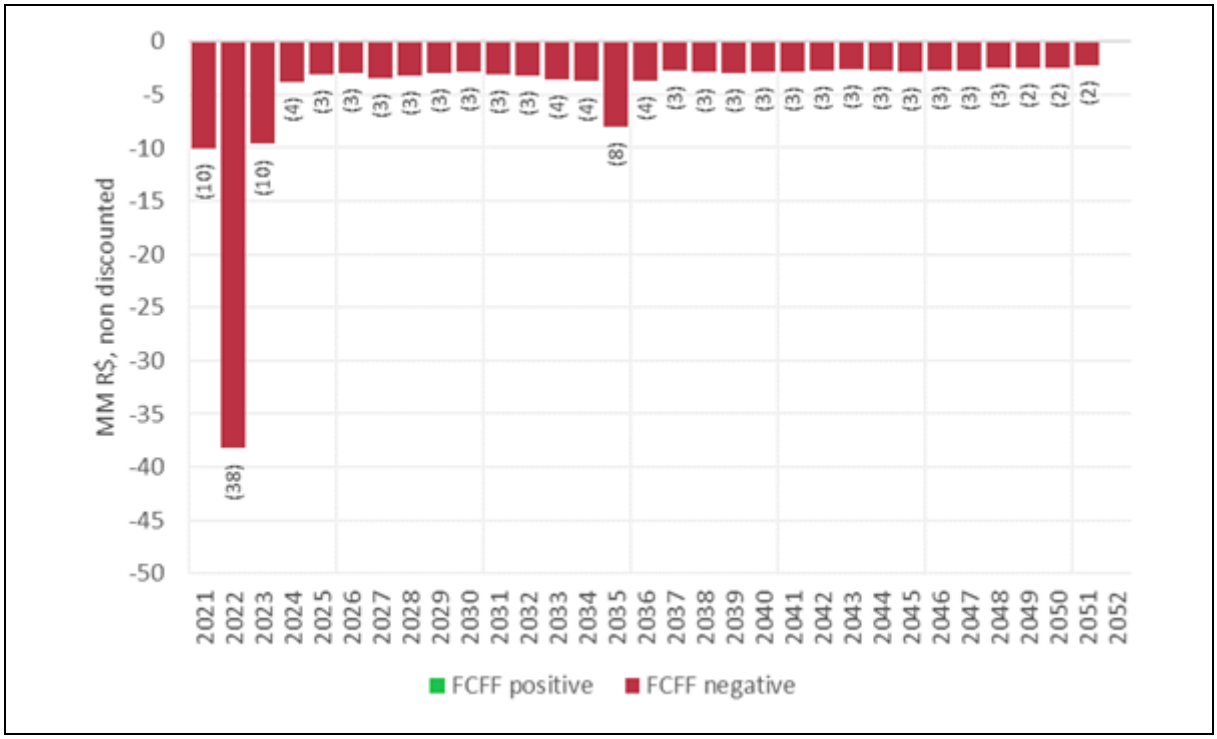


Source: GCA Consortium.

Evaluation of concession's financial feasibility

The project's forecasted free cash flow (FCFF) is presented in Figure 4-7, which shows the FCFF is negative throughout the concession. This being the case, it is not possible to compute either IRR or MIRR for the project, and the concession is not financially feasible.

Figure 4-7: Free cash flow to firm (non-discounted – prior to grant values)

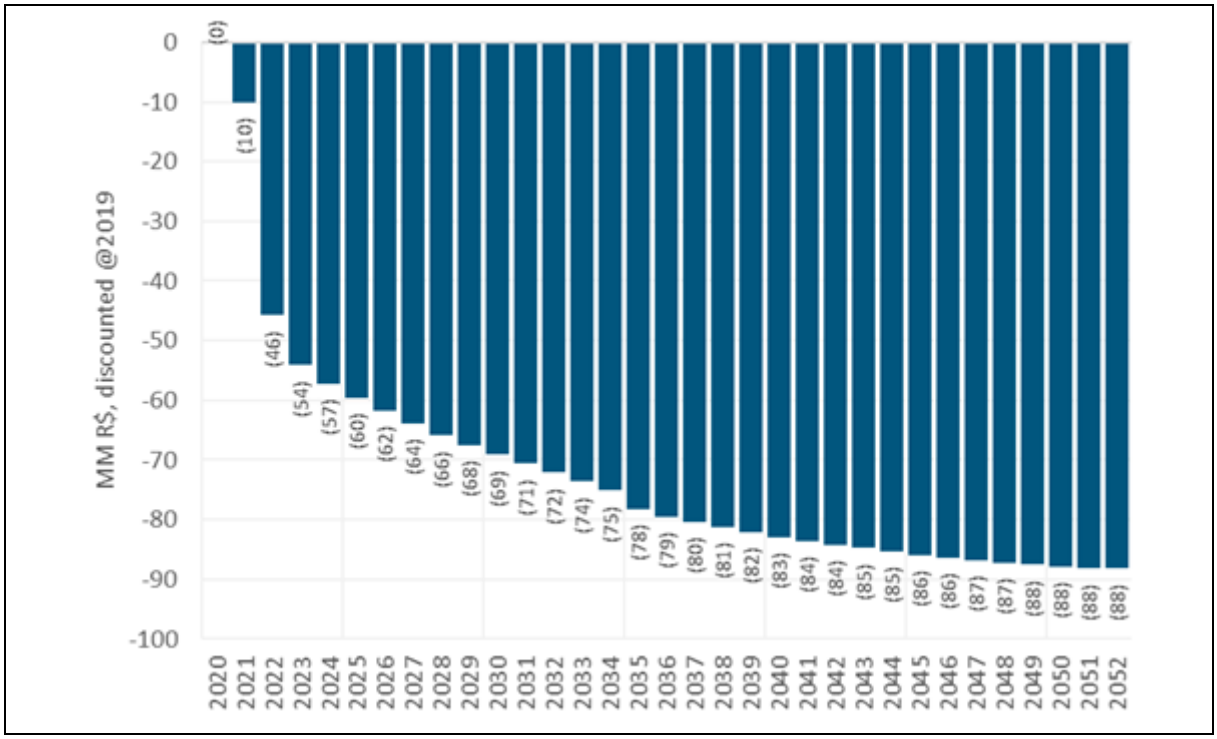


Source: GCA Consortium.

The cumulative discounted FCFF (given the referential weighted average cost of capital – WACC set at 7.23%p.a., real), from which the NPV net of grant payments is determined, is shown in Figure 4-8. Project does not offer a rate of return to its capital providers, consequently, the NPV is negative (**R$-88.2MM**). As such, the isolated concession of the Airport is not financially feasible and cannot support grant payments made out to the Government.

This result is mainly due to the high relevance of the initial investments to meet required airport's appropriate level of service, in addition to its inability to generate positive cash flow.

Figure 4-8: Cumulative discounted free cash flow to firm (net of grant payments)



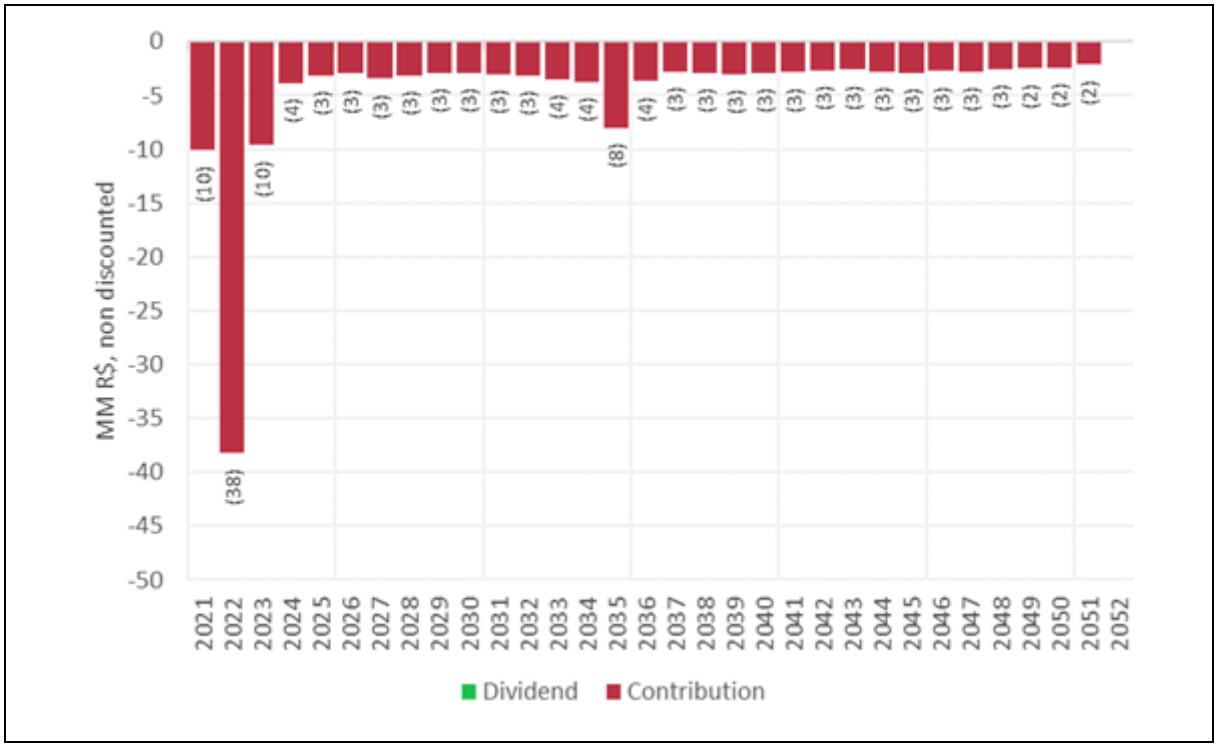
Source: GCA Consortium.

Attractiveness to shareholders

Analyses of the project's attractiveness to shareholders consider: (i) third-party funding (long term BNDES loan and issuing of debentures, given market conditions and minimum covenants); (ii) equity needs; and (iii) the possibility of dividend payments throughout the concession.

Figure 4-9 presents the forecast flows of capital injections and dividend distributions. The concessionaire needs to inject equity resources for the duration of the concession. The main contributions occur during the first two development phases, with equity needs decreasing as airport demand and efficiency gains increase. Given this scenario, there is no equity IRR.

Figure 4-9: Contribution and dividend flows, non-discounted (post-payment of grants)



Source: GCA Consortium.