EXECUTIVE SUMMARY

NAVEGANTES INTERNATIONAL AIRPORT
MINISTRO VICTOR KONDER
SBNF/NVT

BACCO arquitetos associados · CPEA · INFRAWAY ENGENHARIA · MP Moysés & Pires Sociedade de advogados · Proficenter NEGÓCIOS EM INFRAESTRUTURA · TERRAFIRMA

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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 Navegantes International Airport/SC Ministro Victor Konder – SBNF/NVT 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 **Navegantes International Airport/SC – Ministro Victor Konder** (IATA NVT or ICAO SBNF), the 24th busiest in Brazil, having processed 1.9 million passengers in 23 thousand operations in 2018.

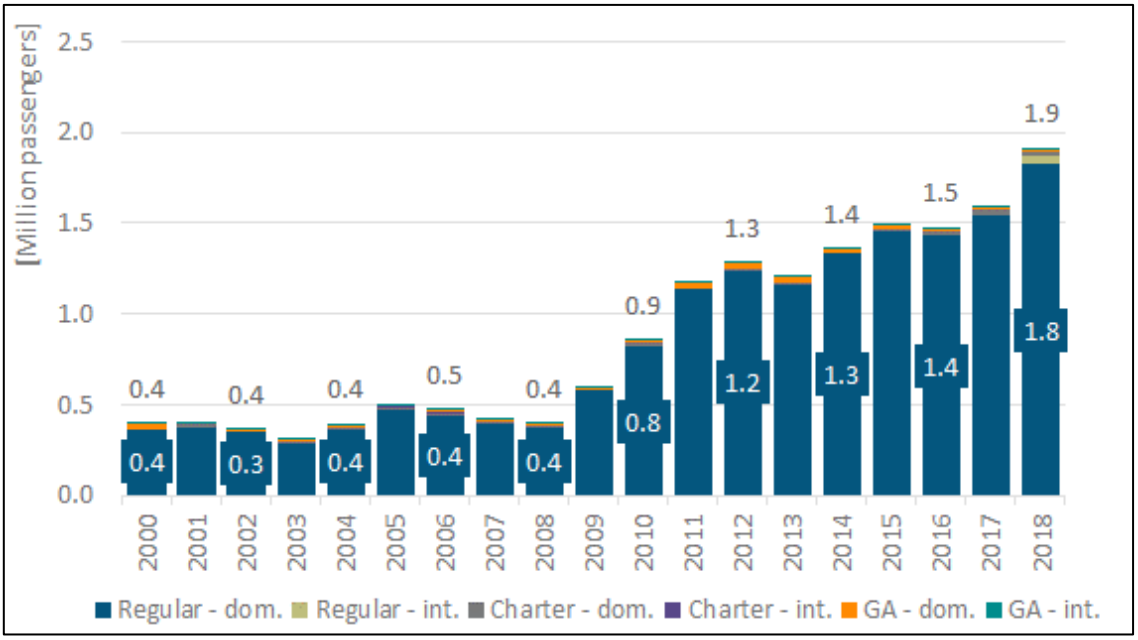
1.1 Overview

The Airport lies in Navegantes, state of Santa Catarina, and serves the Itajaí Valley region, which includes, among other municipalities, Itajaí, Balneário Camboriú and Blumenau, all of which are relevant to the state's economy and tourism. The region has various tourist attractions, including theme park Beto Carreiro World, Oktoberfest celebrations, and Balneário Camboriú itself. Passengers boarding at SBNF either originate or have destinations at Navegantes (38%), Blumenau (19%), Balneário Camboriú (14%) and Itajaí (14%)[1].

A highlight of the region's economy is the seaport sector. The Airport lies close to the Port of Itajaí (4.5 km) and the Portonave private terminal (2.5 km), one of the busiest in Brazil. They serve as outlets for the bulk of Santa Catarina's output, and focus on containers and general cargo. The region is also a relevant manufacturing hub, with naval, textile and information technology plants.

The number of passengers at SBNF has increased five-fold from 2000 to 2018, when it logged 1.9 million passengers (9.1% average annual growth rate in 2000-2018).

Figure 1-1: Passenger history (origin, destination and connections) for the Airport

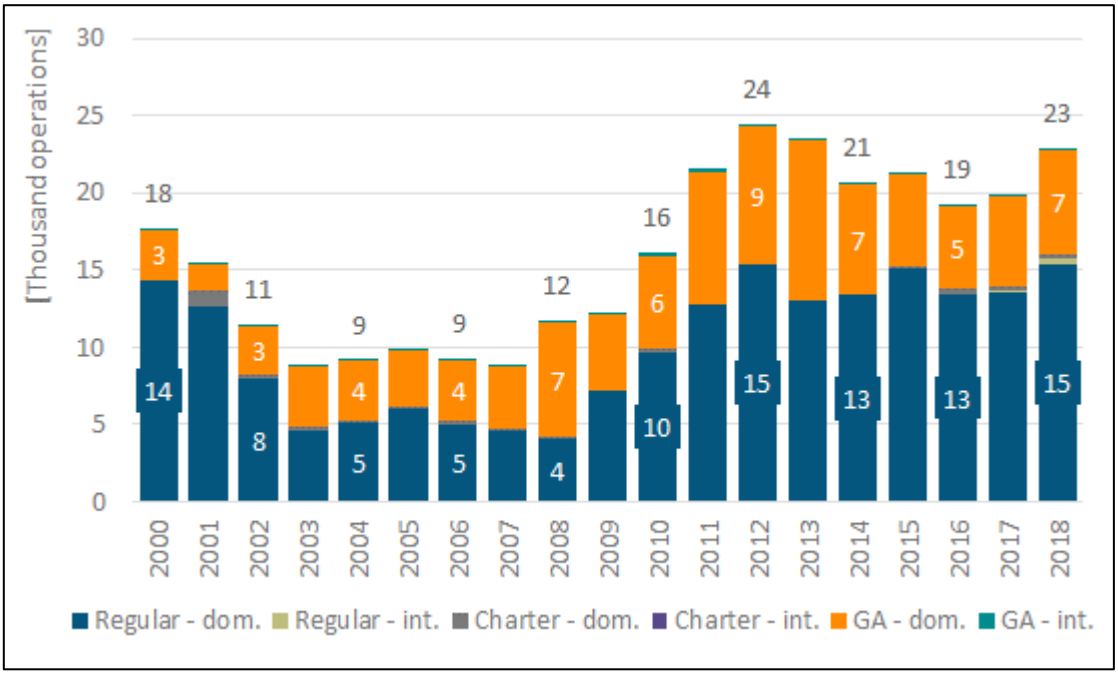


Source: Infraero

[1] Source: BQV (2014).

The Airport had 23 thousand operations in 2018, of which 67% were regular domestic flights and 29% were domestic general aviation (Figure 1-2).

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



Source: Infraero

In 2018, the Airport had 6 regular domestic routes[2] connecting only with the South and Southeast regions of Brazil, as Figure 1-3 shows (line thickness reflects relative route frequency).

[2] Only considers routes with twice-weekly or greater frequency (SBGL, SBGR, SBKP, SBPA, SBRJ and SBSP).

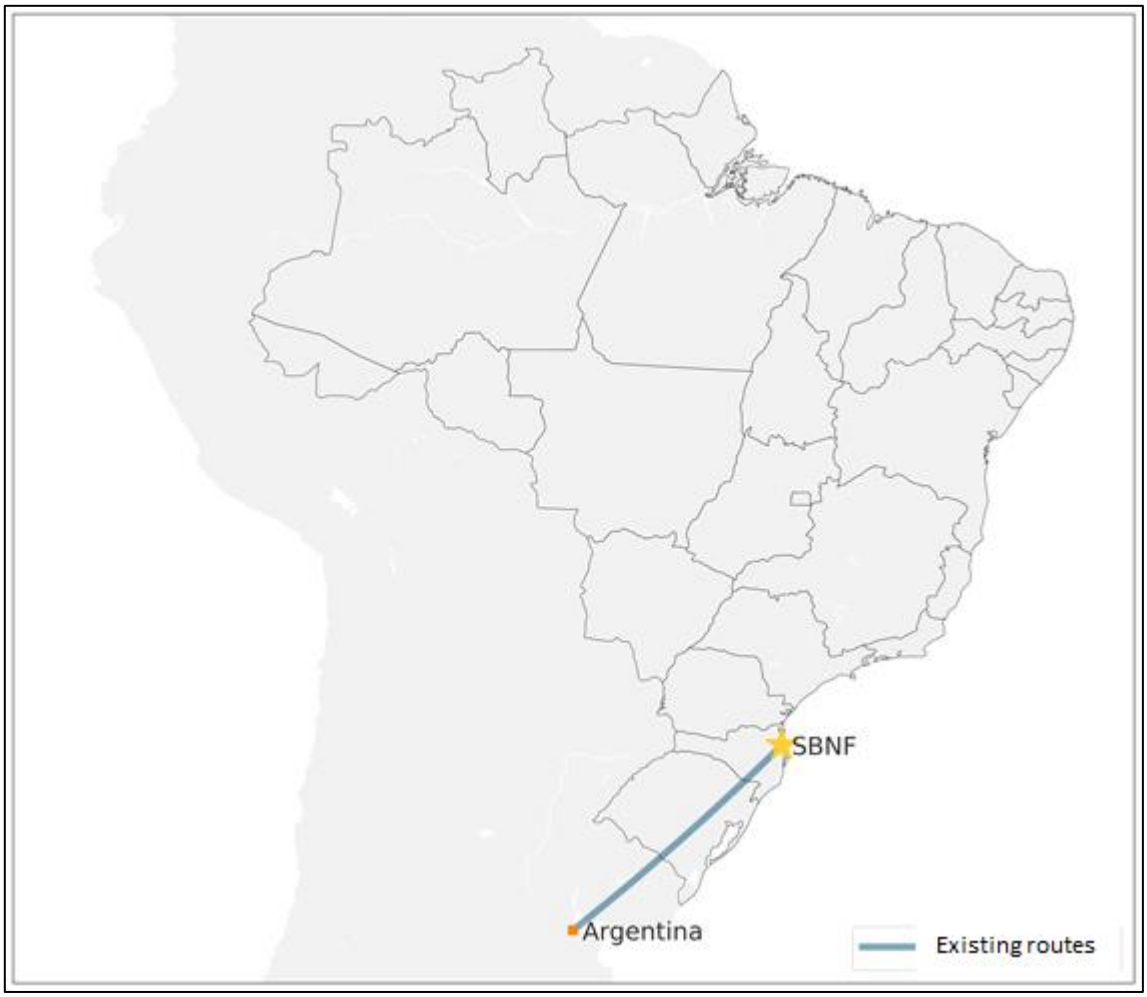
Figure 1-3: Map of the Airport's domestic routes in 2018

Source: OAG and ANAC

In 2018, 42% of all domestic passengers at SBNF had their origin/destination at São Paulo/Congonhas (SBSP) and 17% at Guarulhos (SBGR). Furthermore, an estimated 80% of domestic passengers at SBNF flew direct routes and 20% had layovers or connections.

As concerns international routes, SBNF had flights to Argentina in 2018 (Figure 1-4).

Figure 1-4: Map of the Airport's international routes in 2018



Source: OAG and ANAC

The main final destinations for international passengers at SBNF are Buenos Aires (Argentina), Miami (USA) and Los Angeles (USA). Because of the low international connectivity, 80% of international passengers with origin or destination at SBNF had connecting flights elsewhere, mostly in SBGR.

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 70% of the previous month. However, in April, the airport had its operations completely interrupted.

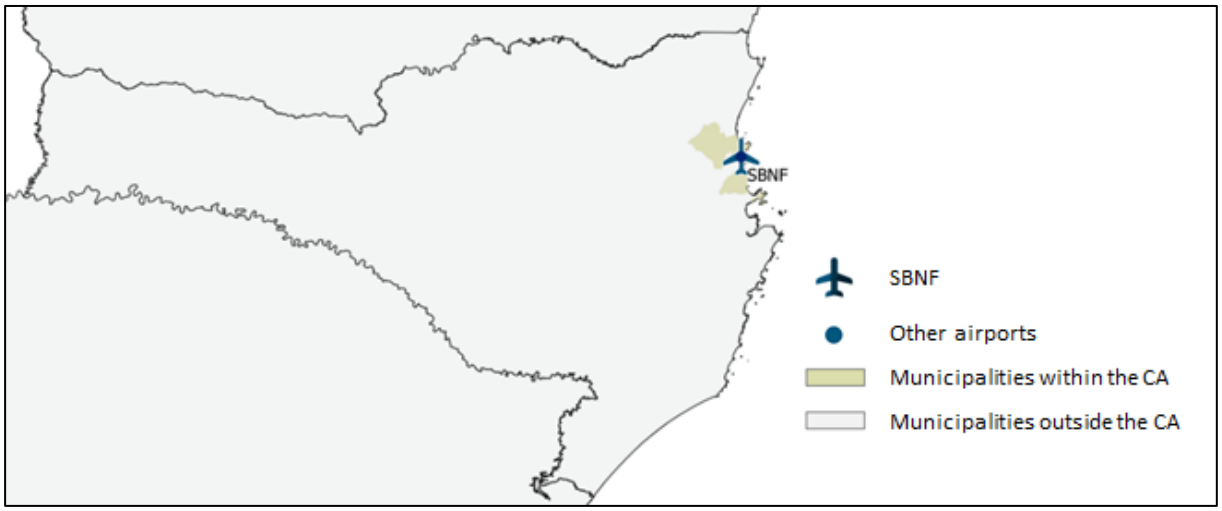
As concerns cargo handling, the Airport processed 4 thousand tons in 2018 in the holds of commercial passenger aircraft.

Catchment area

SBNF's Catchment Area (CA) is defined based on the "City Catchment Areas" ("Regiões de Influência das Cidades" – REGIC)[3] study, by the Brazilian Geography and Statistics Institute (IBGE), which comprehensively covers a range of economic and socio-cultural aspects of the population.

The Airport lies in Navegantes but serves the entire Itajaí Valley region. Therefore, to correctly determine the Airport's Catchment Area the study must also include Itajaí. This, according to the REGIC, lies under the influence of Florianópolis, which is by its turn influenced by the Metropoles of Curitiba and Porto Alegre. Therefore, the Itajaí CA is contained within the Florianópolis CA and, more generally, within those of de Curitiba and Porto Alegre. Overall the Navegantes CA, which Figure 1-5 shows, covers 9 municipalities and a total area of 1.1 thousand square kilometers

Figure 1-5: Airport CA according to the REGIC



Source: REGIC, ANAC and GCA Consortium

To forecast the Airport's volumes and demand profile, the CA was adjusted to compatibility with the effective passenger catchment area according to the origins and destinations survey published in the study Brasil Que Voa (BQV), which EPL[4] conducted in 2014.

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.

1.1.1 Passengers

Domestic passengers

To forecast domestic passengers with origin or destination in the CA, 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

[3] 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.
[4] EPL is a Federal-government agency focused on country-wide transportation & logistics planning.

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, compatibility adjustments were made between forecast demand and 2019 volumes; additional consistency adjustments were made with international passenger forecasts [5] and adjustments regarding the COVID-19 pandemic.

Connecting and layover[6] passengers were forecast as function of the Airport's increased airline-network capillarity and domestic connections rate benchmarks.

International passengers

All international airports in Brazil compete for this passenger flow. Therefore, Brazilian demand is initially forecast based on Brazil GDP, World GDP, average airline fare in Brazil and international QAV[7] price, also adjusting for long-term GDP elasticity and considering the effects of the demand reduction due to the COVID-19 pandemic.

Then the method forecasts SBNF's total passengers with international origins or destinations, regardless of whether on international (direct) or domestic (indirect) flights. Then the study estimates the evolution of the percentage demand from direct international flights departures, both in existing routes and in routes to be created over the duration of the concession. This phase of the forecast is integrated with the aircraft routes and operations forecast described ahead.

General aviation passengers

For general aviation passengers, the report first forecasts total aircraft operations based on several independent variables, such as Services 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 1-6 shows the consolidated results of the above forecasts. Total passengers at SBNF will grow 4.8% p.a. from 2021, the first, and 2050, the final full year of the concession, at which time 7.4 million passengers are expected.

[5] Because a portion of domestic passengers have their origin or final destination abroad, the creation of international routes at the Airport overtime requires adjustments to domestic forecasts, replacing domestic passengers for international ones associated with the newly created routes, and adding domestic passengers for international connections.
[6] Passengers who do not deplane at the Airport and therefore generate no fee revenues.
[7] Jet fuel.

Figure 1-6: Total passengers forecast at the Airport by flow type

Source: GCA Consortium

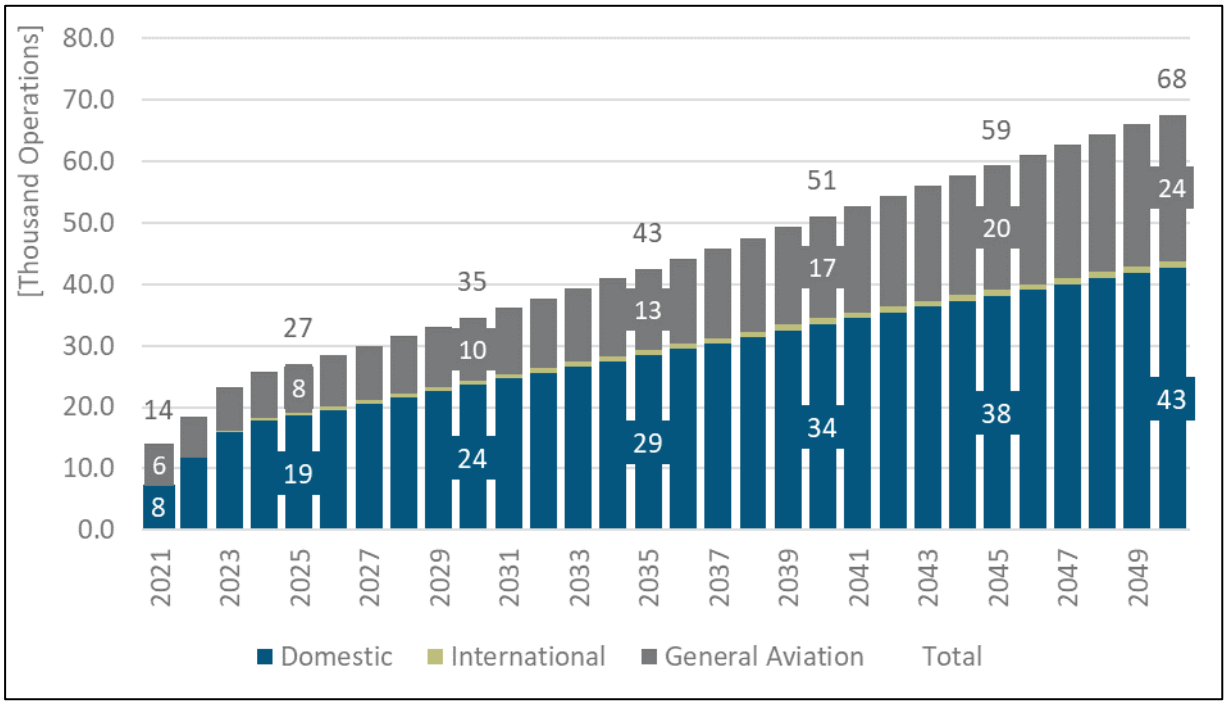
1.1.2 Aircraft operations and airline network

Domestic and international aircraft operations

Commercial aircraft operations were forecast based on passenger flows by origin-destination (OD) pairs, load factor, and aircraft mix, and are related with the evolution of the Airport's airline network. As demand increases, routes that existed before the pandemic are restored and new routes become feasible (the triggers for route creation vary according to the distance and allocated aircraft type) – therefore, the mix and number of aircraft evolves in harmony with the forecast airline network.

The study forecasts that in 2050 the Airport will log 43 thousand domestic and 1 thousand international commercial aviation operations, with average annual growth rates of 6.2% and 3.0%, respectively. For general aviation, 24 thousand operations are expected in 2050, a growth of 4.8% p.a.

Figure 1-7: Total annual Airport operations forecast

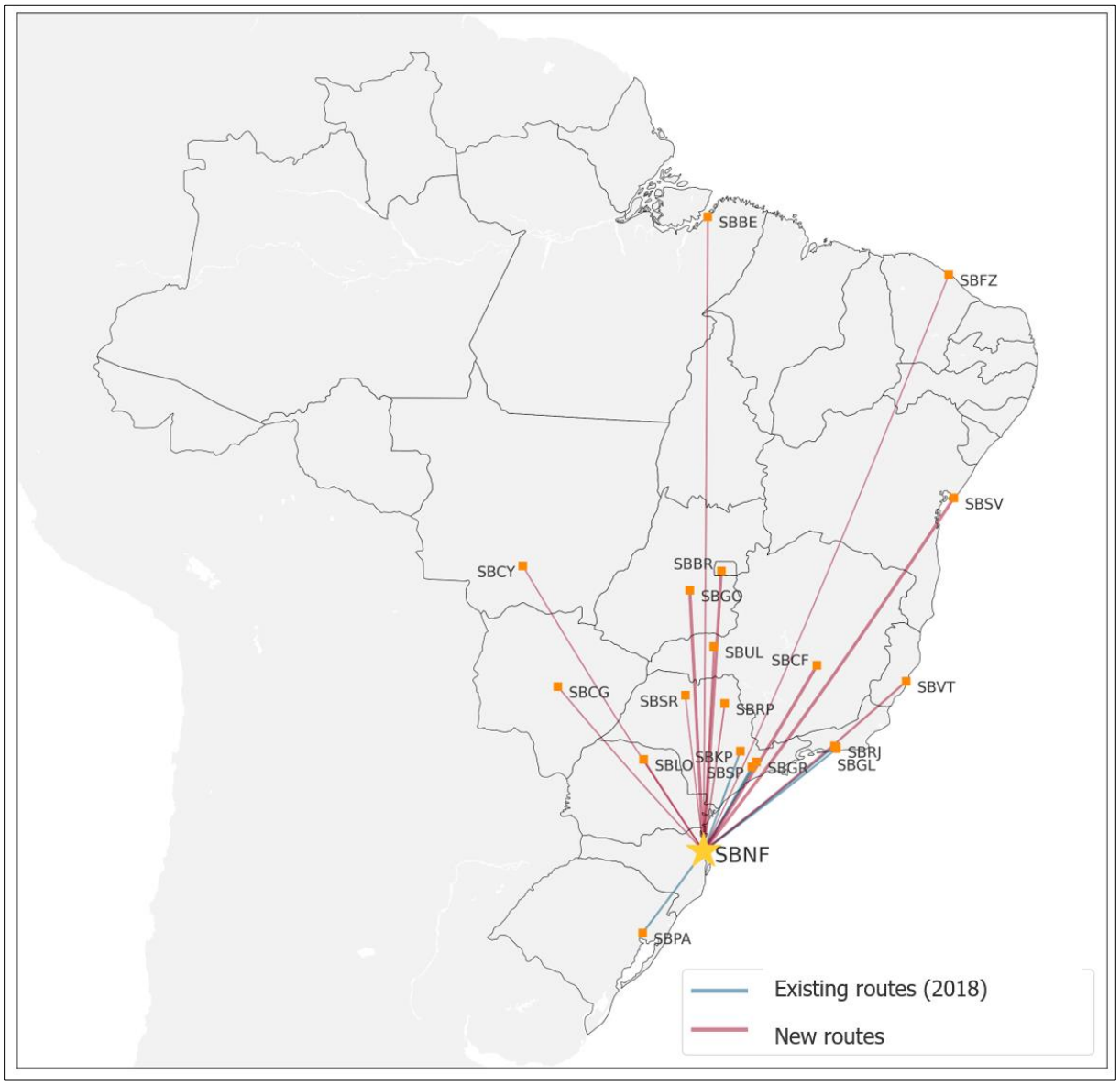


Source: GCA Consortium

Airport insertion in the airlines network

The Navegantes Airport connects the Itajaí Valley region of Santa Catarina with the main urban hubs in the Brazilian South and Southeast Regions, such as Porto Alegre, São Paulo and Rio de Janeiro. During the concession period, new connections between SBNF and as-yet unserved state capitals is expected, with operations commencing for service to the Center-West, Northeast and North regions of Brazil. As Figure 1-8 shows, the number of domestic destinations at SBNF is expected to triple in 2018-2050, from 6 to 19.

Figure 1-8: Domestic commercial routes in 2050



Source: GCA Consortium

As for the international network, no new connections are forecast during the concession period.

1.1.3 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 more than one million passengers per year, like SBNF, the applicable service level criterion is based on the 30th busiest hour of the year. The results have been calculated for 2018 based on Infraero records and forecast according to domestic peak-factor benchmarks (peak demand/annual demand).

Table 1-1: 1-hour peak demand (30th event) at the Airport – Baseline year, concession start and concession end

Nature	Flow	2018	2021	2050
Domestic	Departure	626	451	1,079
	Arrival	602	434	1,037
	Connecting	16	12	28
International	Simultaneous	906	653	1,561
	Departure	117	-	204
	Arrival	116	-	202
	Connecting	-	-	-
Simultaneous	Simultaneous	118	-	206
	Departure	626	446	1,075
	Arrival	647	461	1,112
	Connecting	16	11	27
	Simultaneous	962	686	1,653

Source: Infraero and GCA Consortium

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 15 commercial aircraft runway operations per hour in 2050.

Dimensioning also considers peak usage of apron positions based on 2018 maximum usage records [8] and peak factor benchmarks. According to the forecasts, a minimum 13 apron positions will be required by the end of the concession period.

Given the various systems' capacities (see Engineering Report), the study assesses potential restrictions on forecast demand. No restrictions on growth are expected in the light of the Airport's forecast improvement and expansion works.

1.1.4 Cargo

Concerning international cargo, only import flows are expected, reaching 5.7 thousand tons in 2050. As for domestic cargo flows, the study projects a total 6.9 thousand tons by the end of the concession period.

[8] Based on ANAC data.

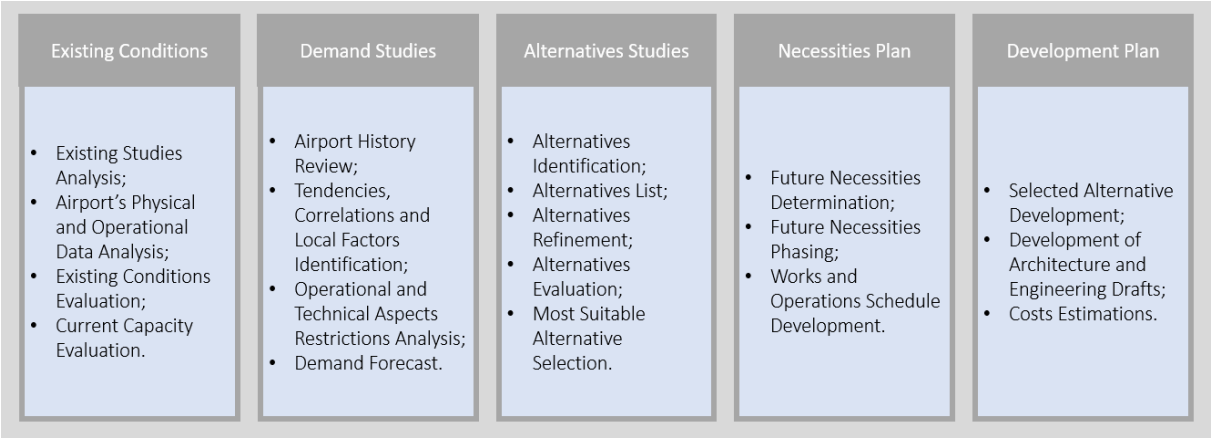
Both cargo traffic projections, international and domestic, consider the impact of the pandemic due to the restriction on people movement, to the economic downturn and to the changes in consumption behaviors.

2 ENGINEERING STUDIES

This section presents the Executive Summary of the Engineering Studies for the concession of the Navegantes International Airport/Ministro Victor Konder – SBNF/NVT.

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.

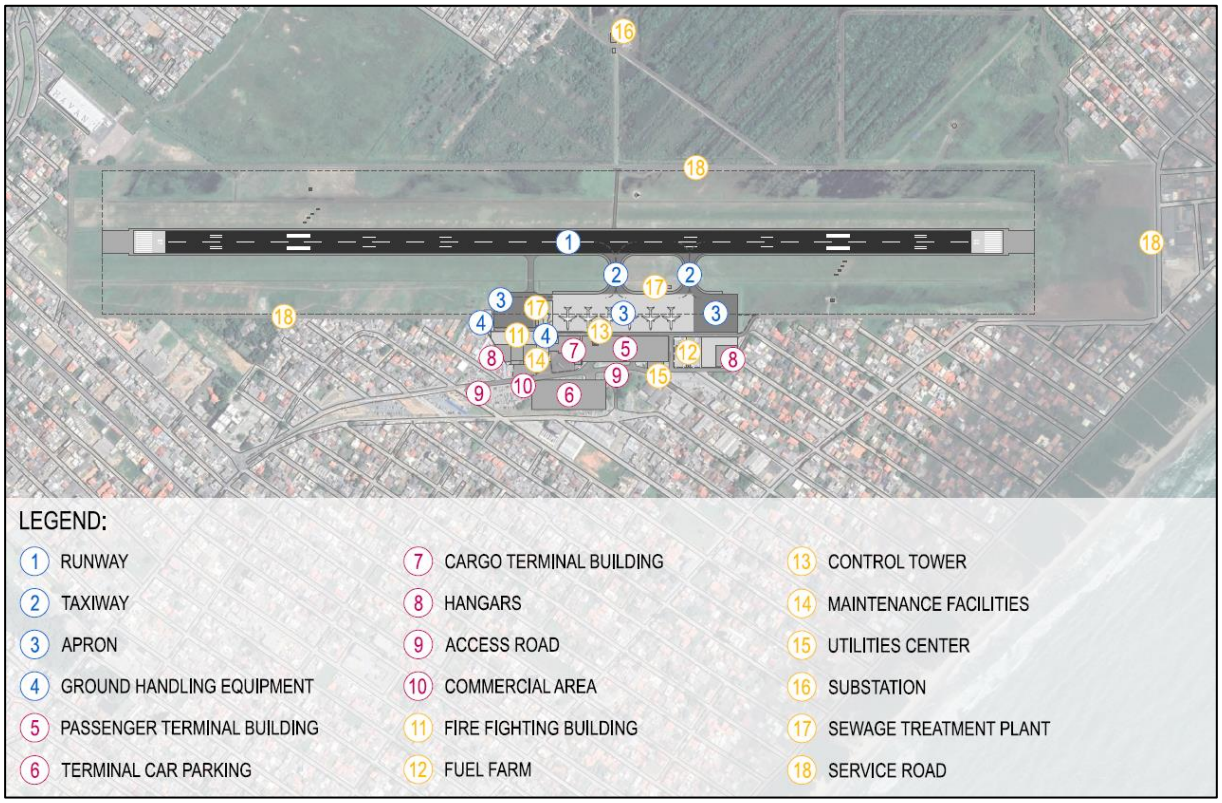
2.1 Existing Conditions

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.

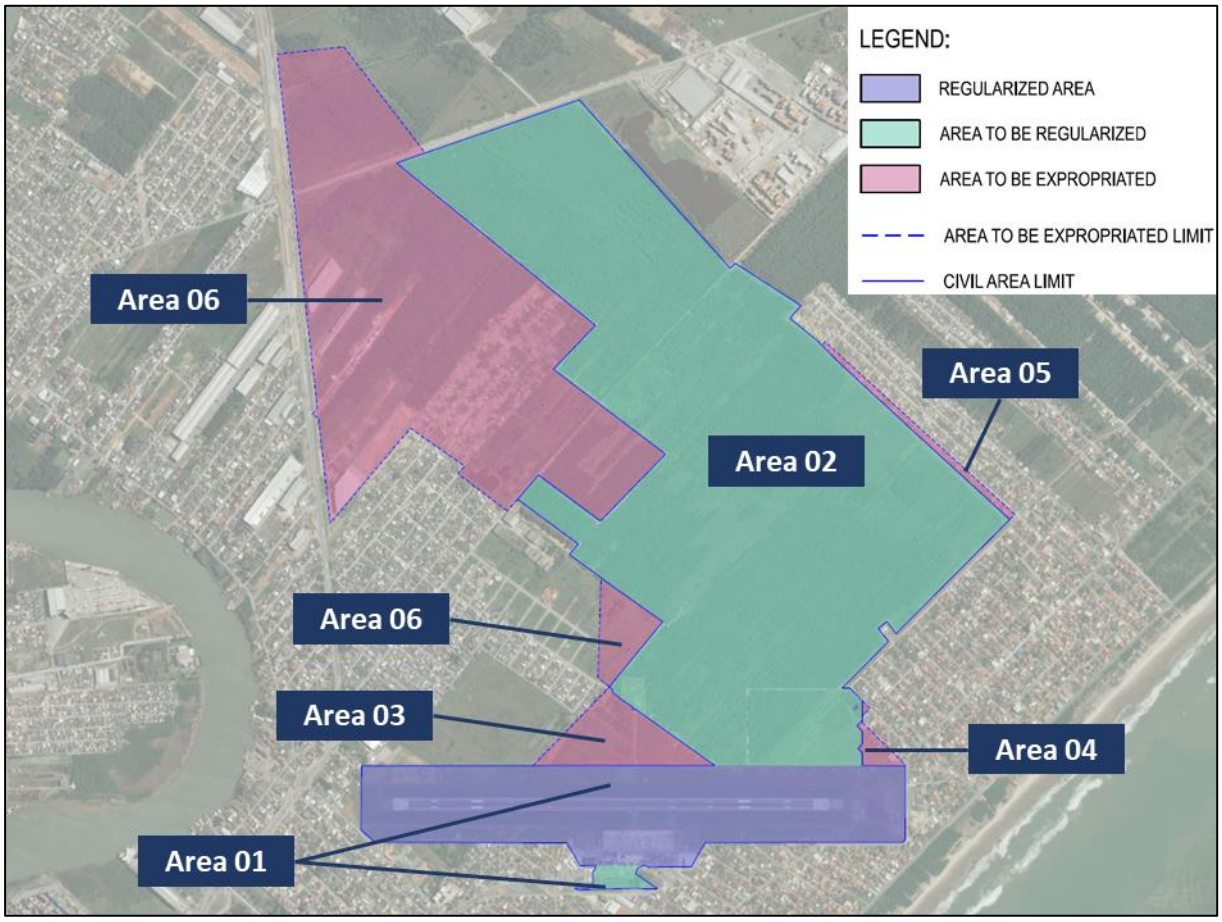
Figure 2-2: Current Facilities Situation



Source: GCA Consortium.

Furthermore, regarding the present patrimonial situation, it should be noted that the airport under study is in a patrimonial area divided in regularized area, area to be regularized and area to be expropriated. The regularized estates belong to the Ministry of Aeronautics in possession of INFRAERO. The estates to be regularized are properties of the Navegantes City, going through transference process and the areas to be expropriated are under private third parties possession. 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.

Currently, there are works in progress at the Airport, whose projects have been approved by INFRAERO. These works have as main objectives the reform and expansion of the PTB, the construction and implantation of a utility center, the construction of a Solid Waste Area, the construction of an airlines administrative building and the implantation of a new Sewage Treatment Unit. 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. The amount of R $ 9,671,000.00, which refers to the percentage of the work that will not be completed by that date, was considered in the financial modeling of the airport.

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	11	Suitable

Source: GCA Consortium.

Table 2-2: Taxiways Capacity

Taxiway	Width (m)	Width Without Shoulders (m)	RBAC154 Code	Critical Aircraft	Situation
Taxiway A	25	18	C	AT72	Suitable
Taxiway B	25	18	C	AT72	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 prioritize 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

Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
E	-	-	-	-	0
F	-	-	-	-	0
Remote Stands	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	8
C	-	-	-	-	6
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	-	-	-	-	8
C	-	-	-	-	6
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0
Total Boarding Bridges	-	-	-	-	0
Total Remote Stands	-	-	-	-	14
Total Number of Stands	-	-	-	-	14

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

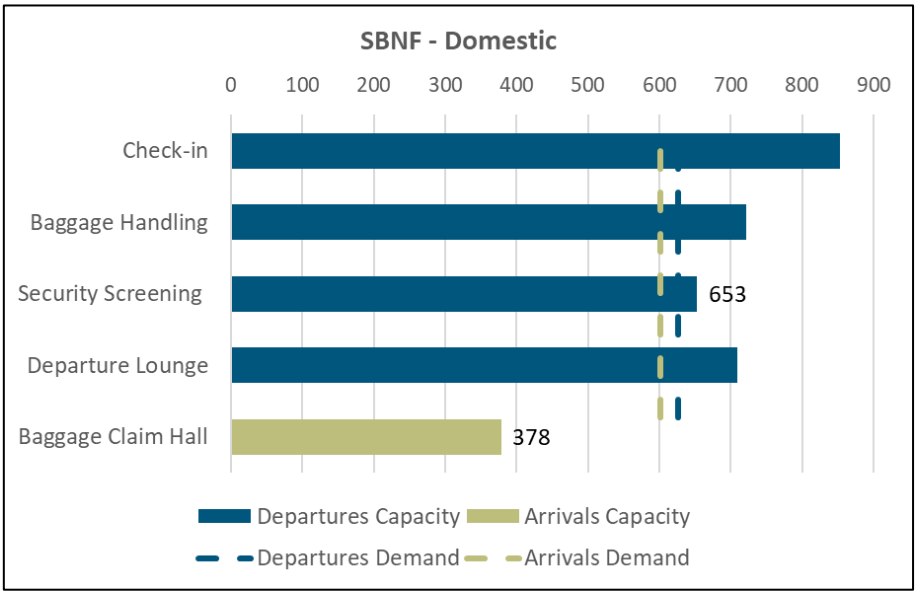
Type	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
E	-	-	-	-	85
F	-	-	-	-	130
Capacity	F/E/D/C	E/D/C	E/C	D/C	C
A	-	-	-	-	0
B	-	-	-	-	19
C	-	-	-	-	8
D	-	-	-	-	0
E	-	-	-	-	0
F	-	-	-	-	0
Total	-	-	-	-	27

Source: GCA Consortium.

2.1.2.2 Passenger Terminal System

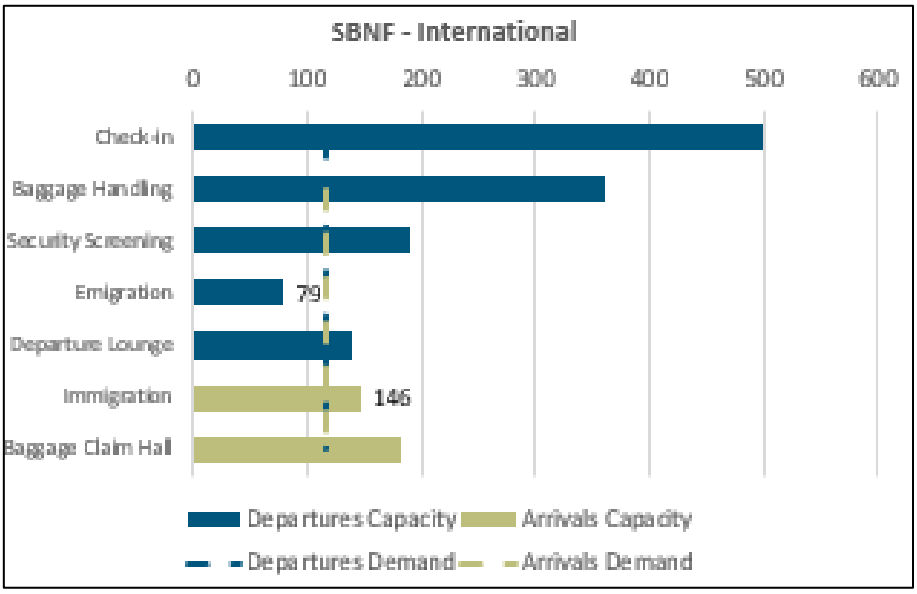
Figure 2-4, Figure 2-5 and Figure 2-6 summarize the results obtained from the installed capacity and the existing demands of the departures and arrivals flows. The components of the terminal were evaluated considering the international and domestic segments.

Figure 2-4: Terminal's Components Capacity – Domestic



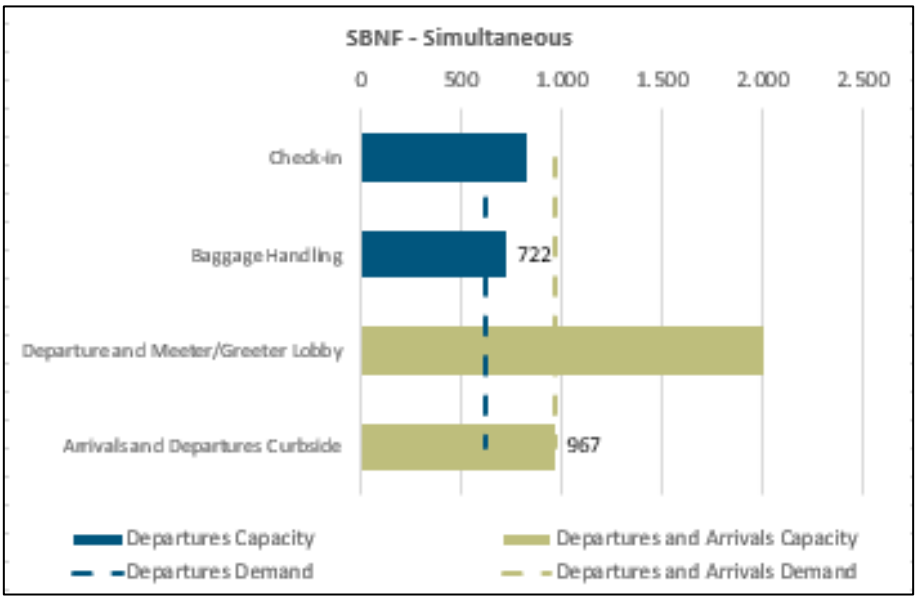
Source: GCA Consortium.

Figure 2-5: Terminal's Components Capacity – International



Source: GCA Consortium.

Figure 2-6: Terminal's Components Capacity – Simultaneous



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 both thresholds (07-25). With PAPI systems at both thresholds, the runway is capable of landing jet aircraft by either threshold.
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:** not suitable to current demand.
General Aviation System	• **General Aviation Terminal:** suitable to current demand. • **General Aviation Aprons:** suitable to current demand. • **General Aviation Hangars:** suitable to current demand. • **General Aviation Terminal Parking:** suitable to current demand.
Administration and Maintenance System	• **Administration:** not suitable to current demand. • **Maintenance:** not suitable to current demand.
Operation Support System	• **Fuel Farm:** suitable to current demand. • **Fire Fighting Installations:** suitable to current demand.
Airlines Support System	• **Cargo Processing:** not suitable to current demand. • **Airlines Support Maintenance:** suitable to current demand. • **Maintenance and Hangars:** not suitable to current demand.
Industrial Support System	• **Mail:** suitable to current demand. • **Catering:** not suitable to current demand. • **Airport Services:** not suitable to current demand.
Basic Infrastructure System	• **Electric Power:** suitable to current demand. • **Water Consumption:** not suitable to current demand. • **Sewage Treatment:** 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 2-7 shows the results of the studies of demand.

Figure 2-7: 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 2-8, 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 2-8: Necessities Plan

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

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

SBNF	Current	Phase 01	Phase 02	Phase 03
DEMAND	**2018**	**10 Years**	**20 Years**	**30 Years**
Annual Passengers Movements				
Regular Aviation	1,881,798	3,182,972	4,494,165	5,680,875
General Aviation	21,719	33,759	54,442	78,275
Total	1,903,517	3,216,731	4,548,607	5,759,150
Cargo (tons)				
Total	5,392	4,787	5,318	5,801
Aircraft Movements				
Passengers	15,783	24,300	34,455	43,805
Air Cargo	-	-	-	-
General Aviation	6,760	10,330	16,610	23,829
Total	22,543	34,630	51,065	67,634
RUNWAY SYSTEM				
Design Aircraft Code	C	C	C	C
Number of Runways	1	1	1	1
Runway Lenght (m) (1)	1,611	1,750	1,750	1,750
Operation Type	NPA	NPA	NPA	NPA
APRON SYSTEM				
Passengers Apron (2)				
Contact Stands	-	5C	5C	8C
Remote Stands	6C	5C	7C	5C
Total Number of Stands	6C	10C	12C	13C
Cargo Apron (2)				
Total Number of Stands				
PASSENGERS TERMINAL SYSTEM				
Departure Peak Hour Capacity	559	805	969	1,075
Arrival Peak Hour Capacity	967	832	1,002	1,112
Terminal Building				
Total Area (m^2)	11,950	21,450	29,250	33,750

SBNF	Current	Phase 01	Phase 02	Phase 03
Baggage Handling System				
Processing Capacity (bhp)	535	716	842	949
Car Parking				
Total Area (m²)	8,380	15,000	21,000	26,250
Number of lots	310	556	778	972
Curbside				
Departure Curbside Length (m)	93	154	183	206
Arrival Curbside Length (m)	93	159	189	213
Total Length (m)	185	313	372	418
Ground Handling Equipments				
Total Area (m²)	1,410	2,400	2,850	3,300
CARGO TERMINAL SYSTEM				
Cargo Terminal Building Area (m²)	2,010	2,010	2,010	2,010
GENERAL AVIATION SYSTEM				
General Aviation Terminal (m²)	320	2,270	2,270	2,270
Total Number of Stands	8	17	17	17
General Aviation Terminal Car Parking	150	7,330	7,330	7,330
Hangars and Aprons Area (m²)	5,860	5,860	5,860	5,860
ADMINISTRATION AND MAINTENANCE SYSTEM				
Administration [(3)]				
Total Area (m²)	520	907	916	1,527
Maintenance				
Total Area (m²)	1,360	1,950	3,000	3,600
OPERATION SUPPORT SYSTEM				
Fuel Farm				
Total Area (m²)	3,170	4,000	4,600	6,000
5-day storage (m³)	432	734	1,058	1,347
Fire fighting Building				
Category	7	7	7	7
Total Area (m²)	1,540	1,540	1,540	1,540

SBNF	Current	Phase 01	Phase 02	Phase 03
AIRLINES SUPPORT SYSTEM				
Maintenance Area (m²)	-	2,600	3,600	4,400
Cargo Processing Area (m²)	-	900	900	900
Aircraft Maintenance Area (m²)	-	-	-	-
INDUSTRIAL SUPPORT SYSTEM				
Mail Area(m²)	-	-	-	-
Catering Area (m²)	-	1,200	1,600	2,000
Airport Services Area (m²)	40	2,440	3,640	4,440
BASIC INFRASTRUCTURE SYSTEM				
Water Tank (m³)	101	921	1,291	1,621
Solid Waste Area (m²)	-	180	180	180
Eletric Power Area (m²)	-	800	800	800
Sewage Treatment Units[5]	- [6]	5	7	9

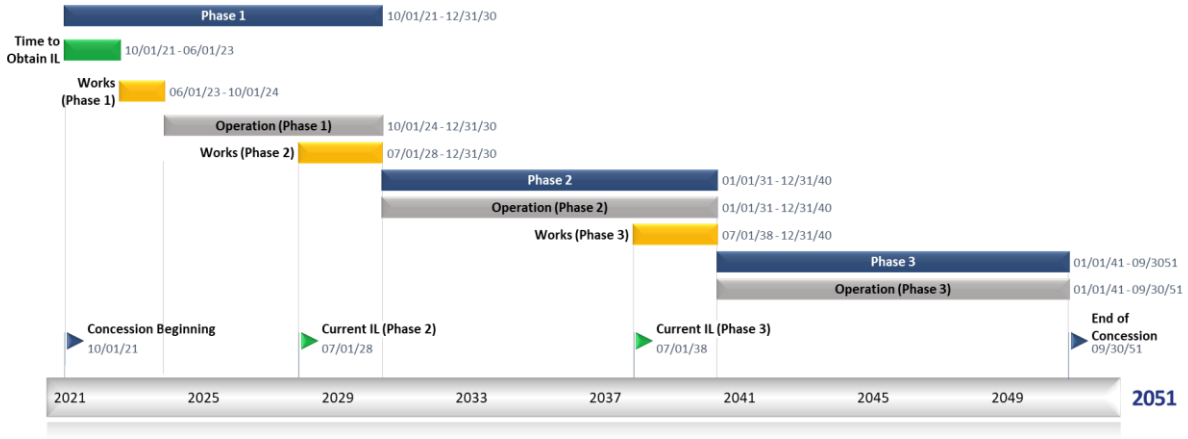
(1) It's been considered the Landing Distance Available (LDA).
(2) The cargo apron can be reversible, that means, shared with the commercial aviation.
(3) The area can be considered inside the PTB.
(4) Area can be considered inside the PTB or Cargo Terminal Building.
(5) Compact Sewage Treatment Unit, D70 model.
(6) Currently the airport has an area of 60 m² 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 20-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 2-9.

Figure 2-9: Phasing and Works Estimated Schedule



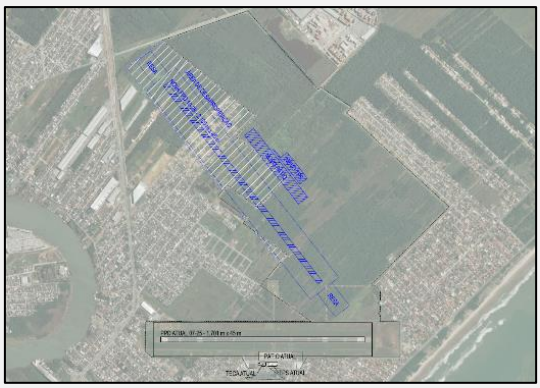
Source: GCA Consortium.

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 2-10.

Figure 2-10: Proposed Alternatives

Alternative 01		• New runway with 2,100 m for 4C IFR NPA operations (Costs > R$ 40 MM); • New passenger terminal building with 23,200 m² (Costs > R$ 230 MM); • New apron with 57,000 m² (Costs > R$ 18 MM); and • Expropriation of 700,000 m².
Alternative 02		• New runway with 2,100 m for 4C IFR NPA operations (Costs > R$ 40 MM); • Passenger terminal building extension from 12,000 m² to 23,200 m² (Costs > R$ 110 MM); • Apron implementation (Costs > R$ 15 MM); and • Expropriation of 700,000 m².

Alternative 03		• Runway extension of 110 m (Costs > R$ 2 MM); • New passenger terminal building implementation with 23,200 m² (Costs > R$ 230 MM); • New apron implementation with 57,000 m² (Costs > R$ 18 MM); and • Expropriation of 140,000 m².

Source: GCA Consortium.

The presented costs were obtained from reference figures by square meter (m²) 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.

Among the studied solutions, alternative 01 clearly has the greater implementation costs. It practically corresponds to the construction of a new airport, with very little use of the existing facilities.

Alternative -2, however, once that it uses the existing passenger terminal structure, as well as its access roads and other existing facilities, tends to be the most economic alternative. Nevertheless, considering operational aspects, it is the most disadvantageous alternative, due to the great distance between the passenger terminal and the predominant threshold. Furthermore, its implementation works would cause major inconveniences to the airport operation.

Finally, considering that payload-range analysis indicate that a 1.750 m long runway is enough to allow the operation of the critical aircraft, alternative 03 was chosen as the most advantageous one, because besides solving all unconformities in the existing airport, it also demands minor expropriation area and its implementation works imply less inconveniences to the airport operations.

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.

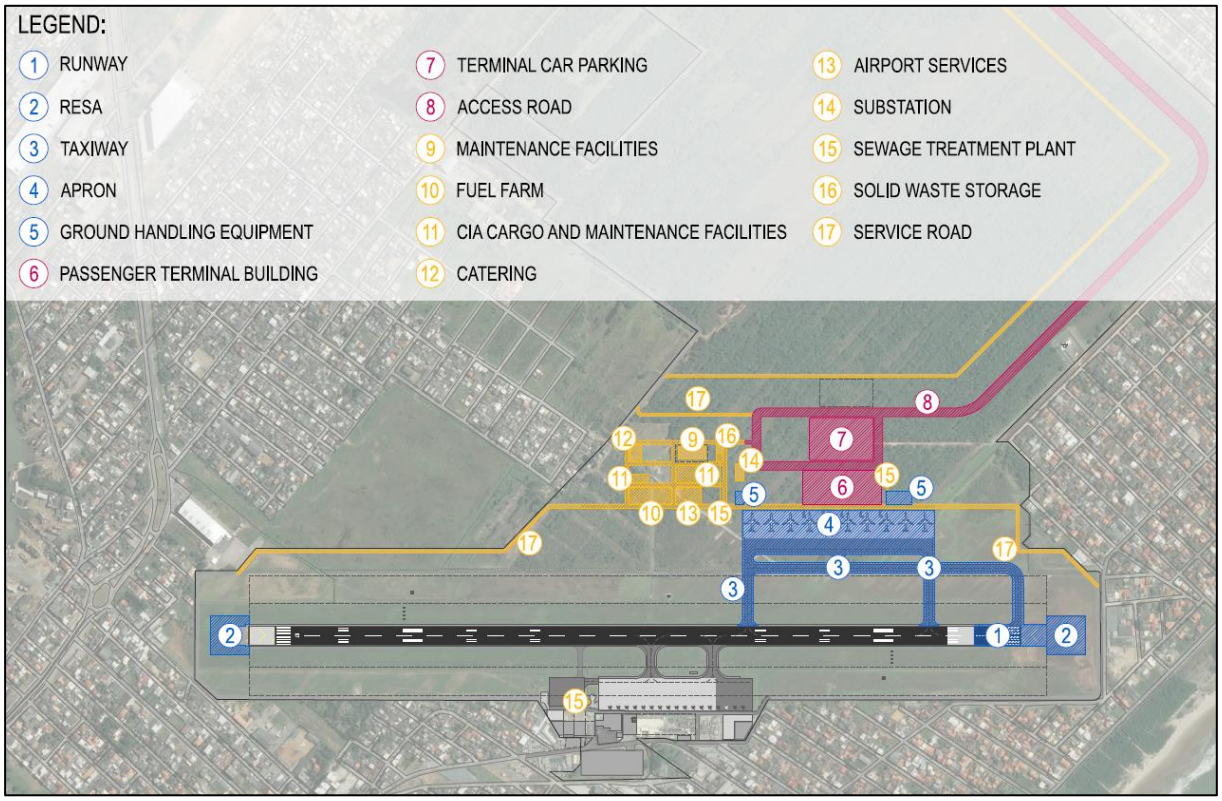
Below, the main investments for each phase of the planning are presented, as well as the implementation plants identifying the interventions at the airport and their subsequent level of details.

2.5.1 Phase 1

The first phase of the concession is expected to occur between the years 2024 and 2030, 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 2030.

In the Figure 2-11, it is presented the implementation proposed to Navegantes International Airport, considering Phase 01.

Figure 2-11: Development Plan – Phase 01 Implementations



Source: GCA Consortium.

The main interventions proposed in this phase are:

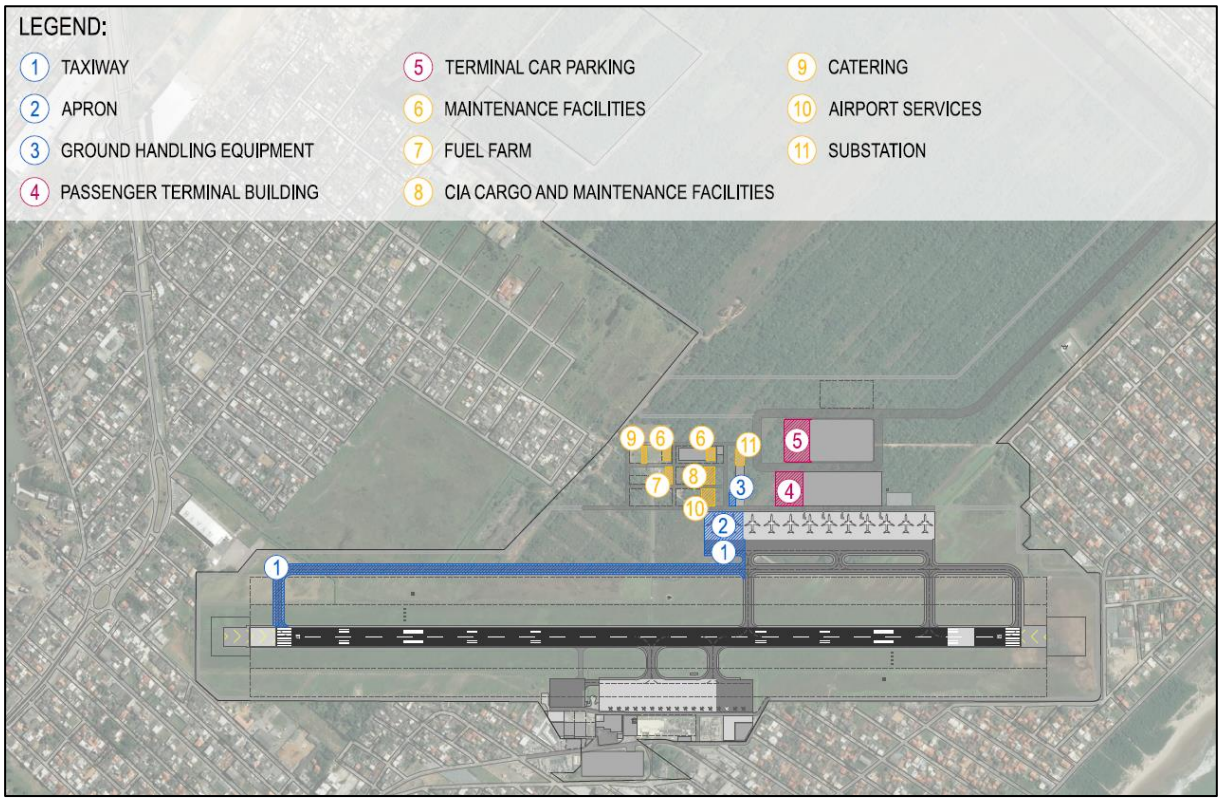
- Extension of Runway 07/25 and threshold 25 displacement by 110 m;
- Implementation of blast pad at threshold 25;
- Implementation of RESAs at threshold 07 and 25;
- Thereshold 07 displacement by 61 m and RESA implementation;
- Runway 07/25 shoulder adequation;
- Construction of a new apron 4 for general aviation, on the opposite side of the current apron;
- Construction of a parallel taxiway J, access taxiways D, E, F and G, and taxilane H from the new apron 4;
- Consideration of the investments required to complete the works in progress to reform the existing passenger terminal building;
- Construction of a new passenger terminal building, terminal car parking and support systems near the new apron 4, the existing terminal being used for general aviation; and
- Implementation of boarding bridges at the new passenger terminal building.

2.5.2 Phase 2

The second phase of the operation is expected to be between the years 2031 and 2040, 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 2040.

In Figure 2-12, it is presented the proposed implementation for the Navegantes International Airport, considering the Phase 02.

Figure 2-12: Development Plan – Phase 02 Implementations



Source: GCA Consortium.

The main interventions proposed for this phase are:

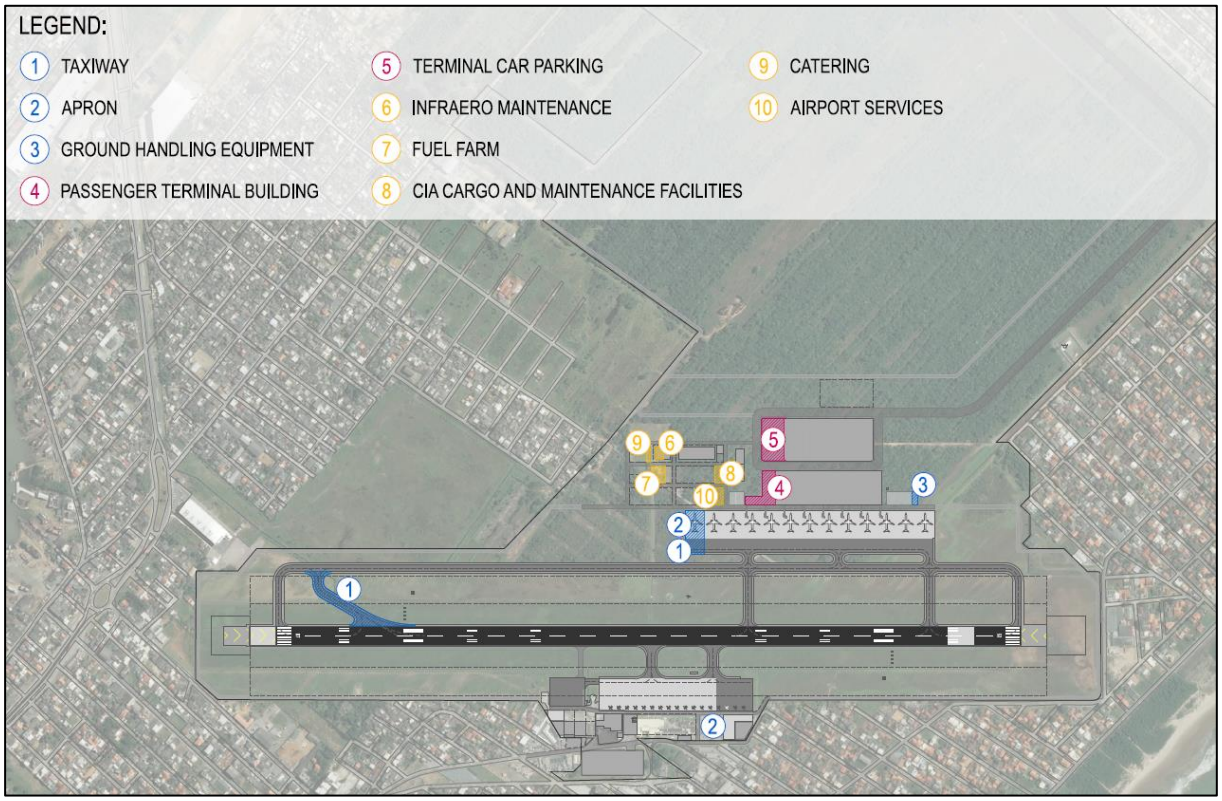
- Ampliation of apron 4 and its taxilane H;
- Extension of parallel taxiway J and construction of access taxiway k to the threshold; and
- Extension of the passenger terminal building and terminal car parking.

2.5.3 Phase 3

The third phase of operation is expected to occur between the years 2041 and 2051, since the period for obtaining the environmental licenses and constructions take place in earlier stage, so that all proposed works meet the demands of 2050.

In Figure 2-13, presents the implementations proposed for the Navegantes International Airport, considering Phase 03.

Figure 2-13: Development Plan – Phase 03 Implementations



Source: GCA Consortium.

The main proposed interventions for this phase are:

- Apron 4 extension and its taxilane H;
- Extension of apron 1;
- Implantation of access taxiways M;
- Extension of passenger terminal building and terminal car parking; and
- Implementation of new boarding bridge.

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	249,098,210.19
Phase 2 Airport Expansion	103,714,308.19
Phase 3 Airport Expansion	55,406,150.17
Airport Expansion Subtotal	**408,218,668.55**
Phase 1 Airport Expropriations	37,905,155.19
Phase 2 Airport Expropriations	-
Phase 3 Airport Expropriations	-
Airport Expropriations Subtotal	**37,905,155.19**
CAPEX Total	**446,123,823.74**

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	244,505,640.80	4,592,569,39	-	249,098,210.19
Phase 2 Airport Expansion	89,158,566.97	14,555,741,22	-	103,714,308.19
Phase 3 Airport Expansion	43,639,553.86	11,766,596,31	-	55,406,150.17
Airport Expansion Subtotal	**377,303,761.63**	**30,914,906,92**	**-**	**408,218,668.55**
Phase 1 Airport Expropriations	-	-	37,905,155.19	37,905,155.19
Phase 2 Airport Expropriations	-	-	-	-
Phase 3 Airport Expropriations	-	-	-	-
Airport Expropriations Subtotal	**-**	**-**	**37,905,155.19**	**37,905,155.19**
CAPEX Total	**377,303,761.63**	**30,914,906.92**	**37,905,155.19**	**446,123,823.74**

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 Navegantes.

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 Environmental Institute of Santa Catarina (*Instituto de Meio Ambiente de Santa Catarina - IMA*) on April 24 and August 18, 2019.

These data oriented the technical field visit to the Airport of Navegantes, which occurred on May 10, 2019.

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.

The airport of Navegantes is in Navegantes city, Center-North coast of Santa Catarina, South of Brazil. In the 70s, the airport space of Navegantes was created when the runaway and the parking lot for small aircrafts was constructed in the Real Fazenda lands. In March of the same year, the first landing was made at the Airport of Itajaí, as it was known. In 1978, the airport had its runaway expanded, with enhancements made in the Yard and Passenger Terminal. From then on, it was named airport of Navegantes. In 2004, the passenger terminal was remodeled, with expansion and inclusion of international landing arrival, becoming international in October of that year.

The airport of Navegantes is regular concerning the operating licensing of its current activities and infrastructure. The Environmental Institute of Santa Catarina (*Instituto do Meio Ambiente de Santa Catarina – IMA)*, the environmental agency of Santa Catarina 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
LAO n. 171/09	FATMA (current IMA)	DIV n. 219/CFI	July 1st, 2009	July 1st, 2013	Expired

Source: GCA Consortium.

The report detailed the compliance *status* of Operating Licenses (OL) n. 171/09 constraints, as well as the historical and relevant points of the processes.

After the study of all the available documentation, it was clear that the main reason for the delay of OL renewal has to do with the effluents treatment system at the airport. Besides, LAO renewal and LAI issue were linked concerning the expansion constructions, what seems to delay LAO specific issues.

The LAI n. 375/2019 was issued in January 2019 and was recently extended until January 2021. Such LAI provides works to expand existing structures, including, among others, the expansion of TPS, SCI, Solid Waste Center, recovery of PPD and the main aircraft yard and installation of the new ETE - effluent treatment (works already delivered on July 14, 2020). However, it does not include the demand for the works provided in the development plan proposed in the Engineering and Related Report.

.Since the beginning of its operations, the enterprise received several expansion and improvement constructions. The environmental report presents the main actions, constructions, intended constructions and their respective environmental licenses obtained after 2004.

The following documents were surveyed and reported, regarding the airport manager: authorizations, license agreements and other licenses, including those obtained by its concessionaire enterprises. A list of ongoing agreements, with the activities susceptible to licensing, was also presented.

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*).

The airport presents some ongoing judicial processes, especially concerning to real estate expropriation for construction works. Also, three infraction notices were issued by ANVISA and one by ANC – which was treated by means of a TAC – and solved by the PEZR elaboration and registration.

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

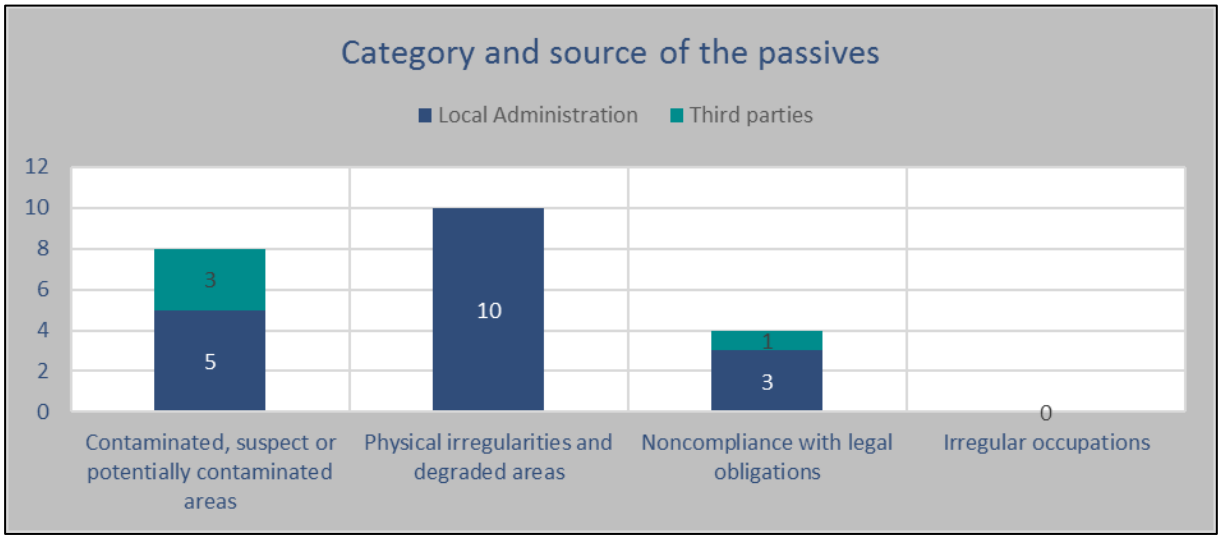
- Soil Use and Coverage including approaches to water resources, permanent preservation areas (APP) and vegetation;
- Irregular superficiaries and occupations in the airport assets area;
- Potential of Cave Occurrence;
- Mining rights;
- Fauna and Fauna Risk;
- Noise;
- Atmospheric Emissions;
- Energy;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

Some highlight points concerning the aspects listed above were identified:

- Nine mining titles were issued at the airport site and surroundings. The airport manager shall request the cancellation of the titles previously conceded and request mining block for the airport area at the DNPM;
- The airport has a PMFA, which generated the AuA n. 03/2018 issue for Pampas fox handling;
- The airport's waste center requires adequation constructions;
- The airport has septic tanks and sinks, besides of and ETE by roots zone and a main ETE with inadequate efficiency;

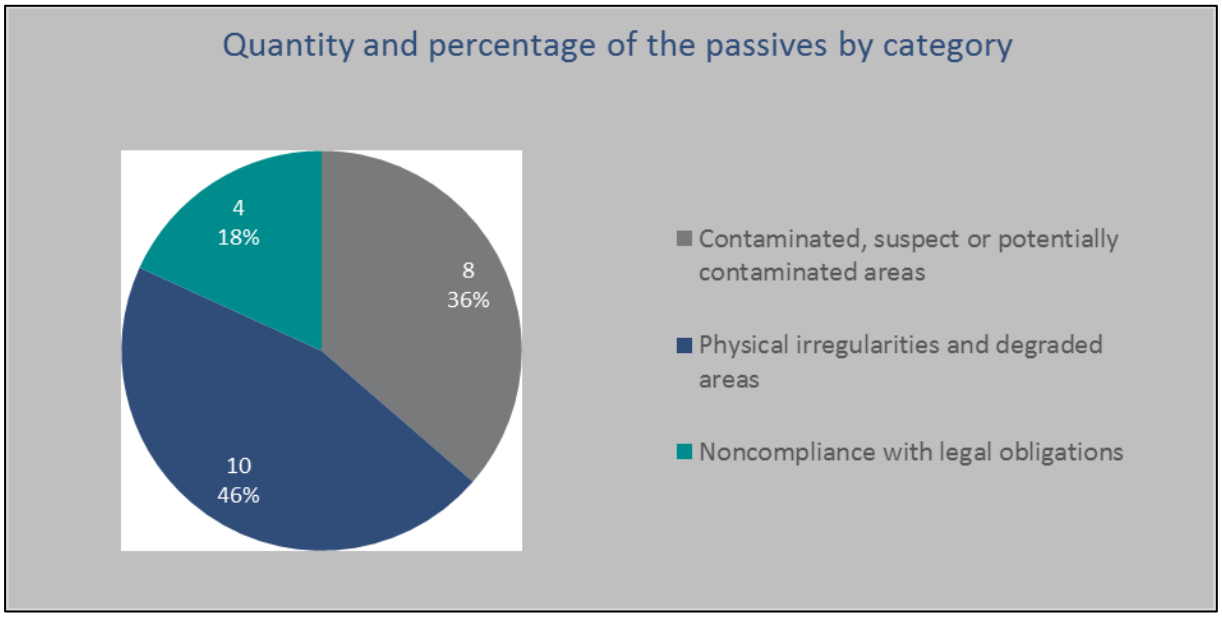
During the preparation of this document, existing socio-environmental passives were surveyed, evaluated and priced. For the Airport of Navegantes, 22 passives were identified, 18 originated by local administration and only 04 by third parties. From this total, 36% were related to contaminated areas, 46% to physical irregularities and degraded areas and 18% to noncompliance with legal obligations. No passives related 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

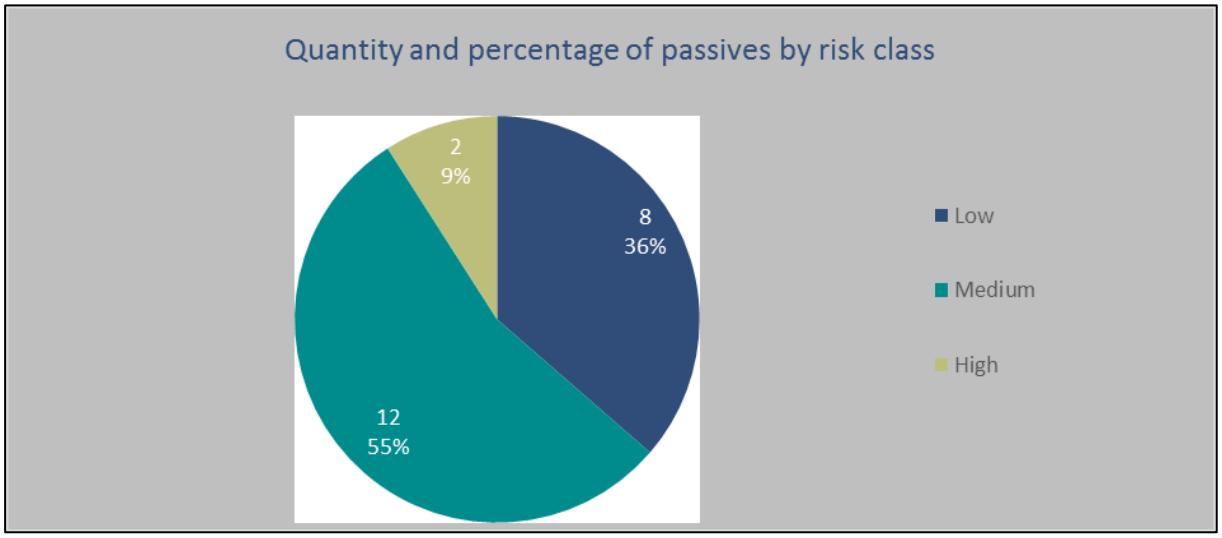


Source: GCA Consortium.

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 Navegantes presents passives classified as High, Medium and Low risks. The passives classified as of High risk shall be managed in the short run, and the passives classified as of Medium to 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.

The study includes a detailed analysis of current and future compatibility of the airport activities and soil use, dedicated to verify if the protection plan against obstacle, the noise zoning plan and airport

safety area were properly incorporated in the guidelines and legislation that regulates the occupation of the airport's neighboring areas.

In order to guarantee the good development of the enterprise, the neighboring areas shall continue to be compatible with the airport activities. To achieve this goal, the airport manager shall update and approve the appropriate plans, especially in case of meaningful alterations in operation and infrastructure.

The study also estimated the quantity of people affected by the aeronautical noise levels, according to the chart below, for the Current and Future development scenarios.

Chart 3-2: Aeronautical Noise Impacts On The Neighboring Population In The Current And Future Scenario

Area inside noise contours	Number of people living inside the contours		Number of residences inside the contours	
	Current Contours	Future Contours	Current Contours	Future Contours
65 -70dB	63	1,599	20	490
70 - 75dB	0	253	0	78
75 - 80dB	-	-	-	-
80 - 85dB	-	-	-	-

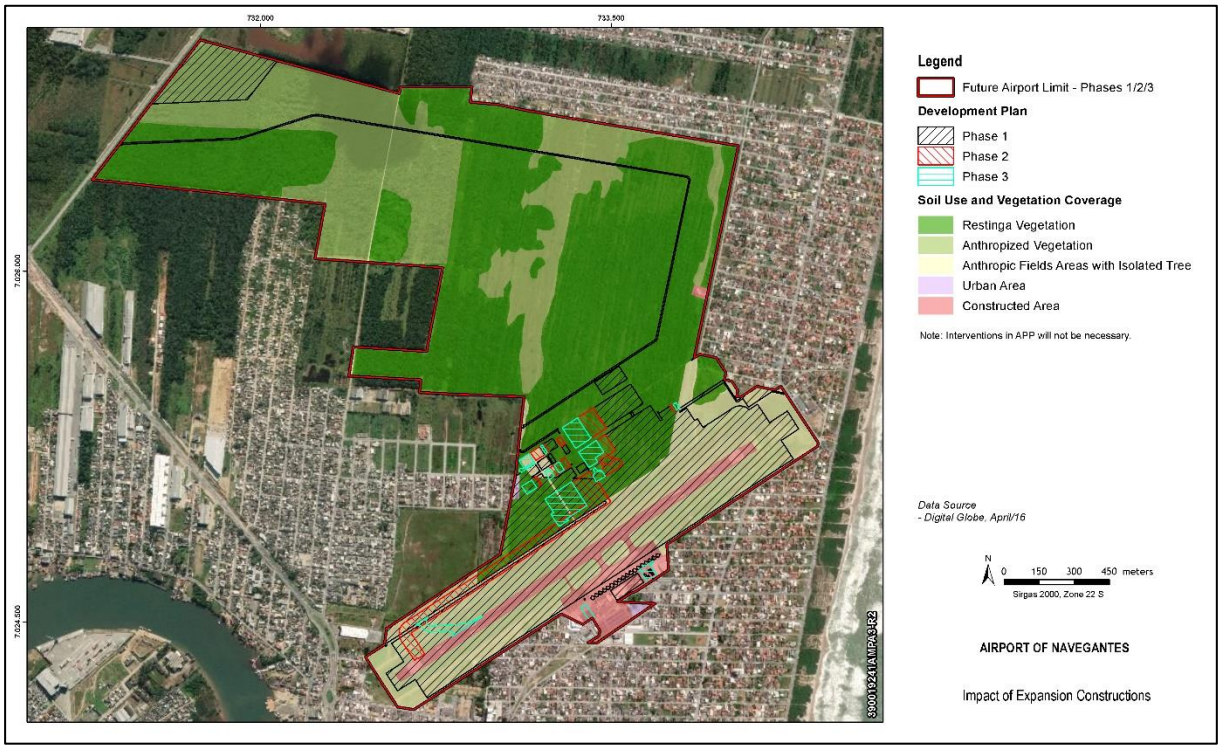
Source: GCA Consortium.

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 two focuses related to Itajaí landfill, the intense presence of birds, besides of inadequate waste disposal, dump and industries. 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 expansion constructions impact ton soil uses and coverture in the airport of Navegantes site, during the implementation of two of the three phases of the Development Plan, vegetation suppression will be required. Interventions in APP will not be required.

As for the social-environmental risks associated to the project, *i.e.*, situations that may hinder or delay the activities execution and foreseen constructions, 03 risks were identified and summarized below.

Evaluating the construction works impact on soil use and coverage in the Airport of Navegantes, during the Development Plan implementation in its two phases, we verified that 48,42% are in the Anthropic Fields areas, with isolated tree individuals, 38,46% in the Restinga vegetation, 1,05% in the Anthropized Vegetation, 11,57% in constructed area and 0,49% in urban area. Interventions in APP will not be necessary.

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

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

Socio-environmental risk management at the Airport	
RISK SITUATION 1	Absence of LAO
Identified risk	• Irregularities in the airport's operation by noncompliance with legal procedures; • Issuing of Infraction Notices; • Unfeasibility of obtaining other Licenses required to perform development constructions in the airport site;
Strategies to minimize the risk	• To comply with all the constraints; • To perform technical partnership with INFRAERO for activities follow up • To maintain a good relationship with the environmental agency, complying with the demands and presenting justifications whenever required.
RISK SITUATION 2	Intense population density in the airport's surroundings
Identified risk	• Airport operations may affect the neighboring population with unpleasant levels of noise. • Conflicts between airport activities and surrounding soil use and occupations.
Strategies to minimize the risk	• To elaborate and submit PEZR; • To establish technical partnership with São Luís municipality to incorporate the Specific Noise Zoning Plan (PEZR) in municipal legislation and in the procedures of real estate approval in areas affected by the airport noise contours. • To negotiate with the municipality occasional adequations required in the Master Plan of Sustainable Development (Plano Diretor de Desenvolvimento Sustentável) of Navegantes city, which subsidizes the Urbanistic Code (Código Urbanístico) of Navegantes (Complementary Law n. 055 of July 22, 2018); • To perform educational and awareness activities with the surrounding Community on the importance of preserving and respecting the airport's property limits.
RISK SITUATION 3	Delay on expropriation procedures concerning the surrounding area
Identified risk	• Difficulties or delay concerning the expropriations; • Delay on the development of Phase 1 constructions, since the site organization is fundamental for the airport's development.
Strategies to minimize the risk	• To perform technical partnership with municipal administration of Navegantes for activities follow up; • If the expropriations do not fully occur up to the IL issue, the concessionaire may require the partial IL issue, authorizing the constructions in areas effectively expropriated and under its domain.

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 Navegantes is regularized, and the beginning of the concession is foreseen for the second half of 2021, the renewal will be requested by INFRAERO, since the contract for projects elaboration and implementation construction of the new ETE were in progress. The airport of Navegantes has an ongoing renewal process of Operating License since 2013, especially related to noncompliance with effluents treatment issues. If INFRAERO does not solve all the pending issues until the operational transference procedure, the future administrator shall take over the regularization process and continue dealing with such pending issues.

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

Chart 3-4: 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 3-5: 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 Navegantes will be implemented in three phases. The chart below summarizes the licensing assumptions for each phase.

Chart 3-6: Licensing Assumptions For The Expansion And Adequation Constructions Of Airport Of Navegantes

Evaluated aspects	Phase 1	Phase 2	Phase 3
Impact degree of the constructions	High	Medium	Medium
Licensing agency	IMA (State)	IMA (State)	IMA (State)
Applicable licenses	LAP and LAI	LAI effective from Phase 1*	LAI effective from Phase 1*
Studies to be performed	EIA/RIMA and PCA	-	-
Maximum estimated timeframe for studies and licensing	20 months	Effective licensing	Effective licensing

*Legislation foresees that the LAI may be renewed up to the execution of constructions from Phase 2 and Phase 3.

Source: GCA Consortium.

The Phase 1 constructions of the Development Plan, including PPD expansion, construction of a new TPS, taxiways, yard, parking lot, TECA, among other structures, were classified as of high environmental

impact. Considering the legislation criteria – *Instrução Normativa* IMA n. 65/2018, we adopted the assumption that the environmental agency will request, for Phase 1 expansion works, a Preliminary Environmental License (*Licença Ambiental Prévia – LAP*) and an Installation Environmental License (*Licença Ambiental de Instalação – LAI*), subsidized by an Environmental Impact Study (*Estudo de Impacto Ambiental - EIA*) and an Environmental Control Plan (*Plano de Controle Ambiental - PCA*), with an estimated timeframe of 20 months for the Licenses issue.

According to IN IMA 65/2018 the elaboration of EIA is required every time there are construction works classified as of high impact.

Still concerning Phase 1 constructions, for enterprises subject to EIA/RIMA elaboration, the entrepreneur shall support the installation and maintenance of conservation unit from the Integral Protection Group (*Grupo de Proteção Integral*), according to the National System of Conservation Units (*Sistema Nacional de Unidades de Conservação - SNUC*). So, 0.5% from Phase 1 total investments of the socio-environmental budget will be destined to environmental compensation in conservation units.

For Phases 2 and 3 the same LAI, effective for Phase 1, will be used, appropriately subsidized by previous studies. We highlight that LAI is effective for 06 years and may be renewed.

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

Chart 3-7: Estimated Timeframes For Licensing Constructions Of Medium Environmental Impact

Description	Estimated timeframe
EIA/RIMA elaboration for LAP issue	9 months (AA[1])
PCA elaboration for LAI issue (simultaneous to EIA/RIMA elaboration)	3 months (AA[1])
EIA/RIMA analysis and new LAP issue	6 months (OA[2])
PCA review and compliance with the constraints after the L AP issue	1 month (AA[1])
Analysis and new LAI issue	4 months (OA[2])
TOTAL	**20 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 Navegantes.

Chart 3-8: Environmental Authorizations And Procedures Required For Navegantes

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 3-9: Socio-Environmental Costs In R$ Estimated For The Airport Of Navegantes

Activity	Phase 1	Phase 2	Phase 3	TOTAL
Licensing and Analysis Fees	94.285,31	42.658,54	42.658,54	179.602,39
Environmental Studies	964.755,79	-	-	964.755,79
Environmental Management of the Constructions	1.731.659,68	2.052.654,34	2.052.654,34	5.836.968,36
Vegetation Suppression and Forest Compensation	1.534.252,11	141.827,41	81.461,41	1.757.540,93
Confirmatory Investigation of Passives	265.565,72	-	-	265.565,72
Environmental Passives Recuperation	-	-	-	-
Environmental Compensation SNUC *	1.193.356,79	432.480,91	206.497,27	1.832.334,97
Total	**5.783.875,40**	**2.669.621,20**	**2.383.271,56**	**10.836.768,16**

* Corresponds to 0.5% of the investment value in case of significant environmental impact analyzed by EIA/RIMA

Source: GCA Consortium.

Chart 3-10: Environmental OPEX Estimated For The Airport Of Navegantes

Item	Activity	Total Cost (R$)
2.1	Environmental Licensing Fees	894,681.44
	OL Renewal	*199,073.84*
	TCFA – IBAMA	*695,607.60*
2.2	Operation Environmental Management	9,548,810.18
2.3	Elaboration of PBZPA and PZPANA	205,678.91
2.4	Fauna Management Programme	3,574,361.15
	PF and PGRF Elaboration	*2,494,361.15*
	Fauna handling actions	*1,080,000.00*
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	829,344.89
	TOTAL	**18,516,500.50**

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 **Navegantes International Airport - SBNF** modelled between 01/October/2021 and 30/September/2051. Currently, the airport's total revenue is R$55MM and its EBITDA margin is 23% (considering 2018 data)[9].

Revenues

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

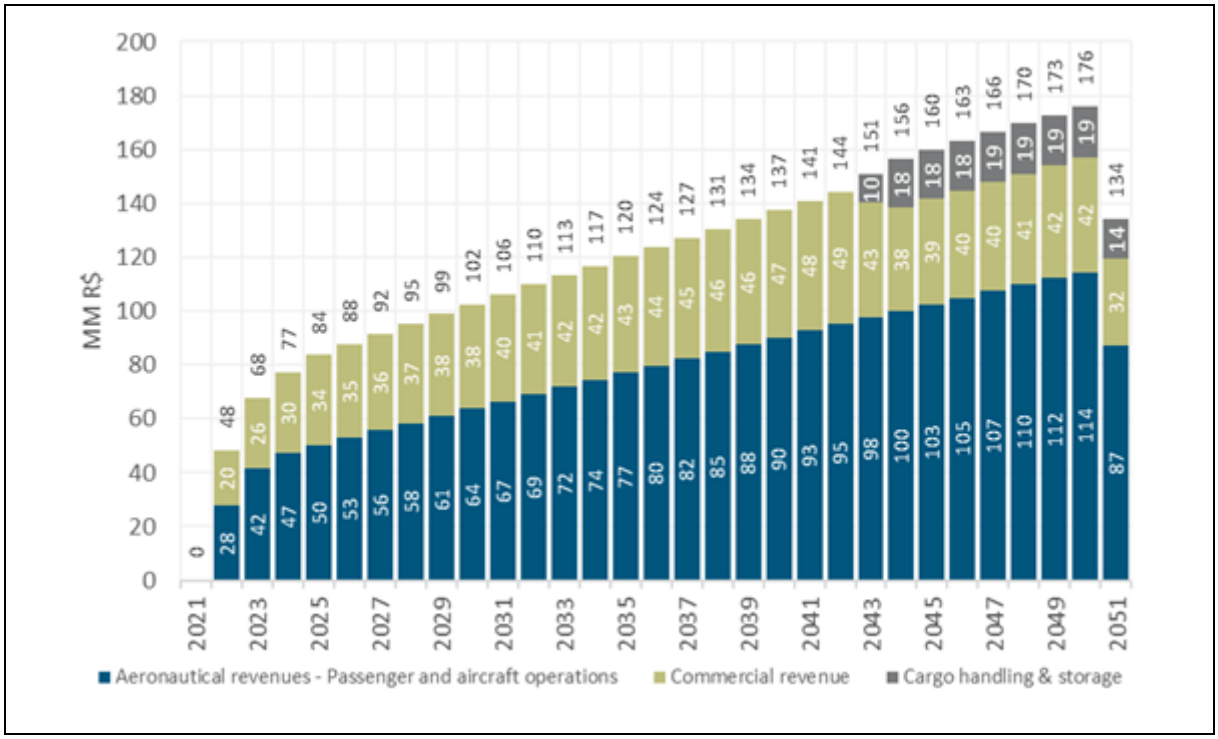
- Aeronautical revenues, resulting from regulated fees on the various operation types. These have been categorized as passenger and aircraft fees and cargo handling and storage fees;
    - Aeronautical revenues – passengers and aircraft operations: applicable to both passenger flows (domestic and international 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. international air cargo terminal, 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 regulated 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 an average of 3.6%p.a. between 2023 and 2050 (first and final full year of the concession). Aeronautical will increase during the concession period, from 62% in 2023 to 76% in 2050. It is worth pointing out the increase in revenues from the end of the TECA sub-concession agreement (2043).

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

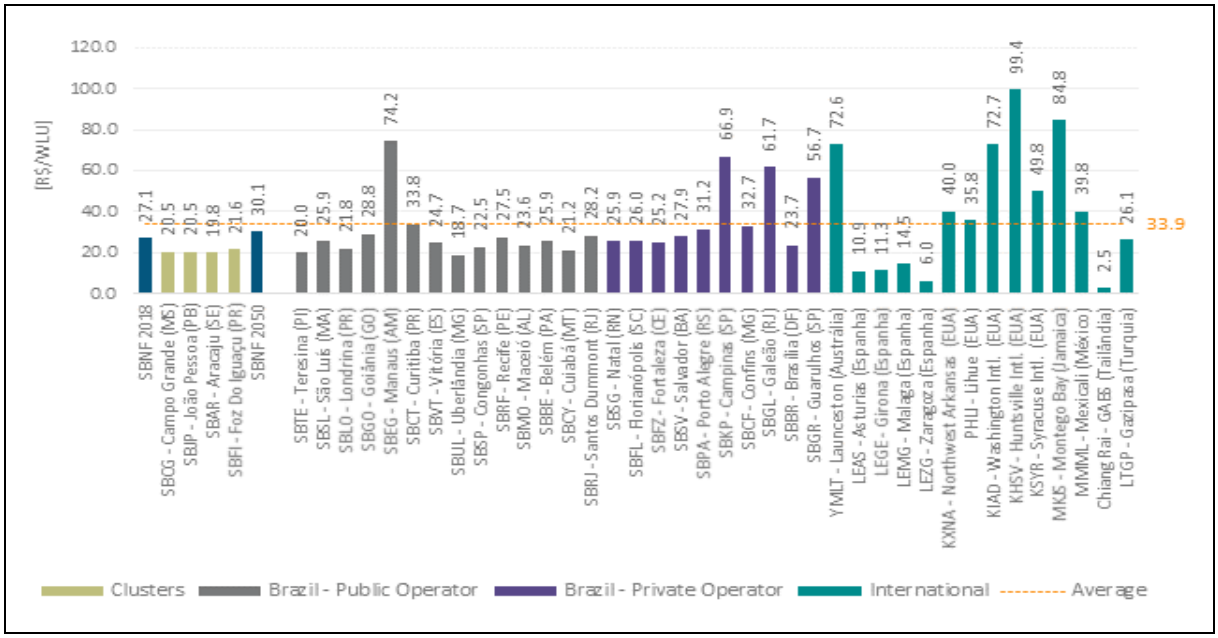
Figure 4-1: Total revenues during concession



Source: GCA Consortium.

In 2050, the Airport's revenue per WLU will be R$30.1. Airport indicators are below the average of comparable airports (Figure 4-2).

Figure 4-2: Revenue per WLU benchmark



Source: GCA Consortium.

Costs and expenses

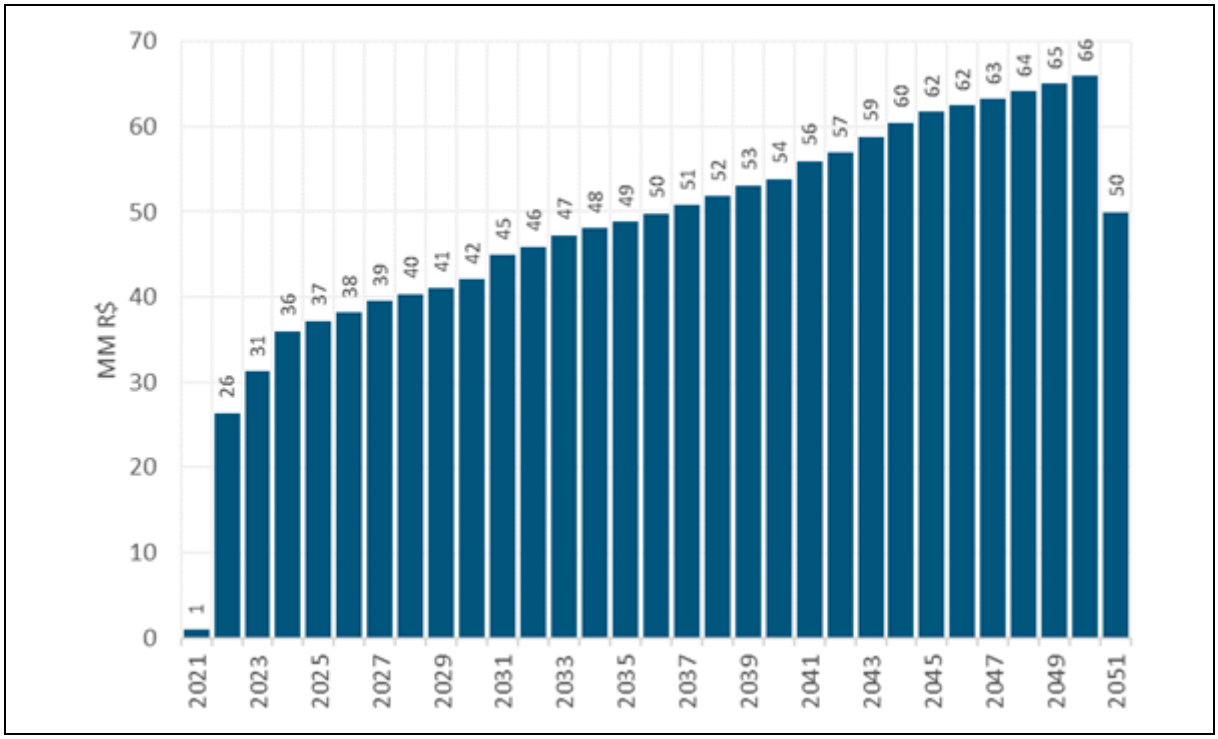
Airport operating costs and expenses are mainly related to personnel and outsourced services, in addition to utilities and public services and consumables.

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.

Total costs and expenses forecasts show an annual average growth rate of 2.8% between 2023 and 2050, increasing from R$31MM to R$66MM (Figure 4-3). Personnel and Outsourced services costs are the most significant, representing 52% and 30% of total costs in 2050, respectively.

Figure 4-3: 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

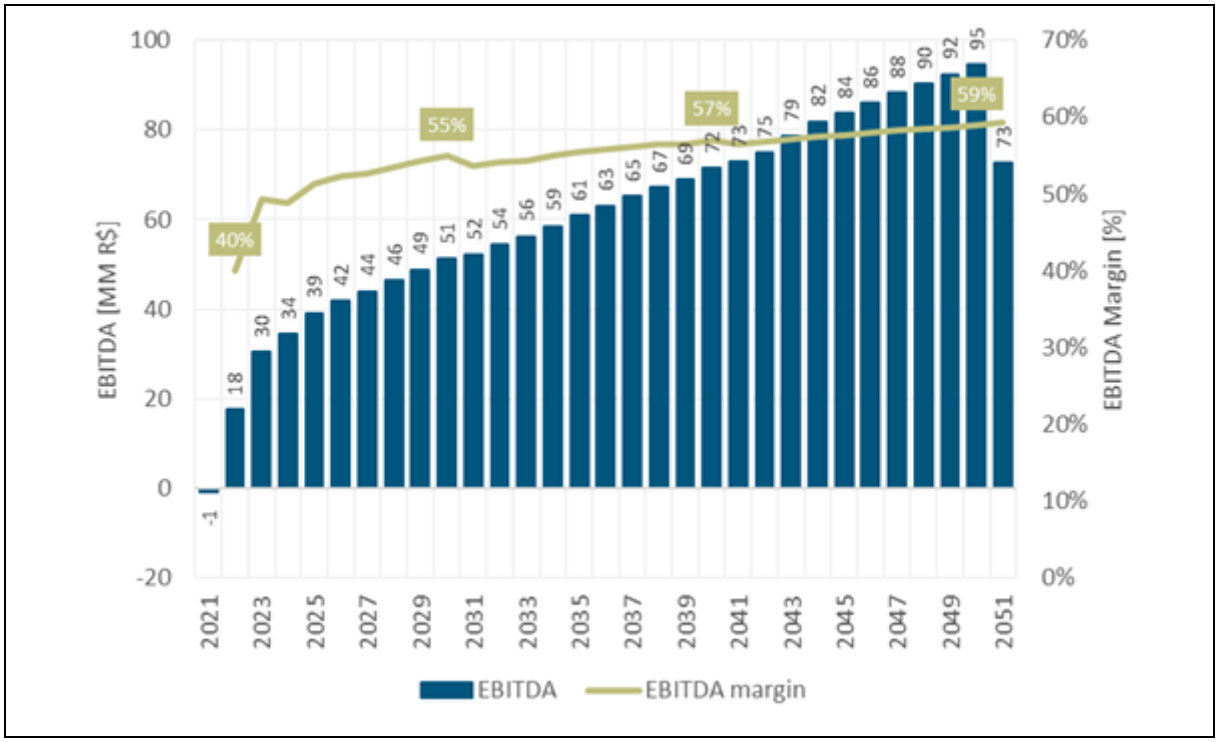
Values in MM R$	TOTAL
OBLIGATIONS TO BE MET PRIOR TO SIGNING THE CONTRACT	**(65.6)**
Funds for Infraero's staff readjustment program	(61.2)
Reimbursement to authors of the feasibility studies	(4.3)
Payment to B3 for holding the auction	(0.1)

Source: GCA Consortium.

EBITDA and margin

Net of grant payments, the concession EBITDA is forecast to be R$30MM in 2023 and to reach R$95MM in 2050 (Figure 4-4), with an average growth of 4.3%p.a. EBITDA margins increase is forecast throughout the concession due to expected economies of scale.

Figure 4-4: EBITDA and EBITDA margins during concession



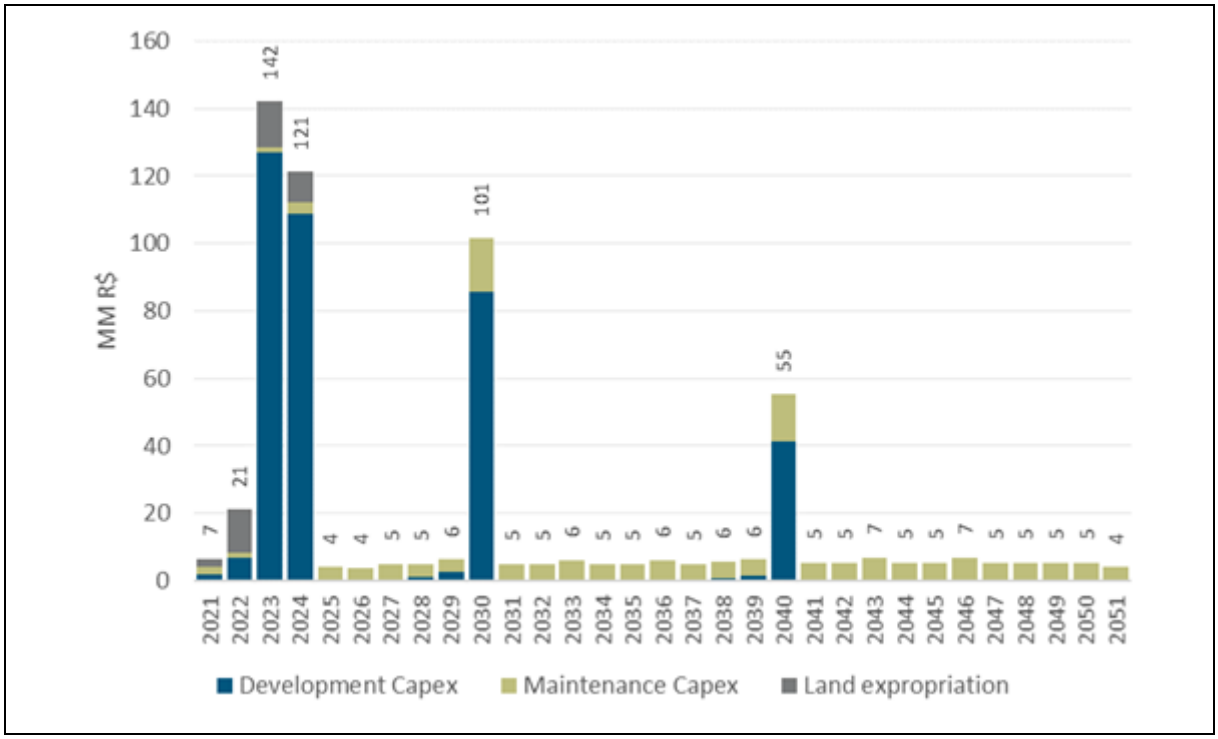
Source: GCA Consortium.

CAPEX

The development plan, expansion of airport assets to meet growing demands and ensure appropriate level of service, requires a total investment of R$582MM.

Development investments (topical and intended to expand airport assets, including expropriations) will be divided into different phases and amount to a total R$415MM. Maintenance investments (periodical and intended to maintain and replace assets, including re-paving cycles) add up to R$167MM throughout the concession period (Figure 4-5).

Figure 4-5: CAPEX during concession

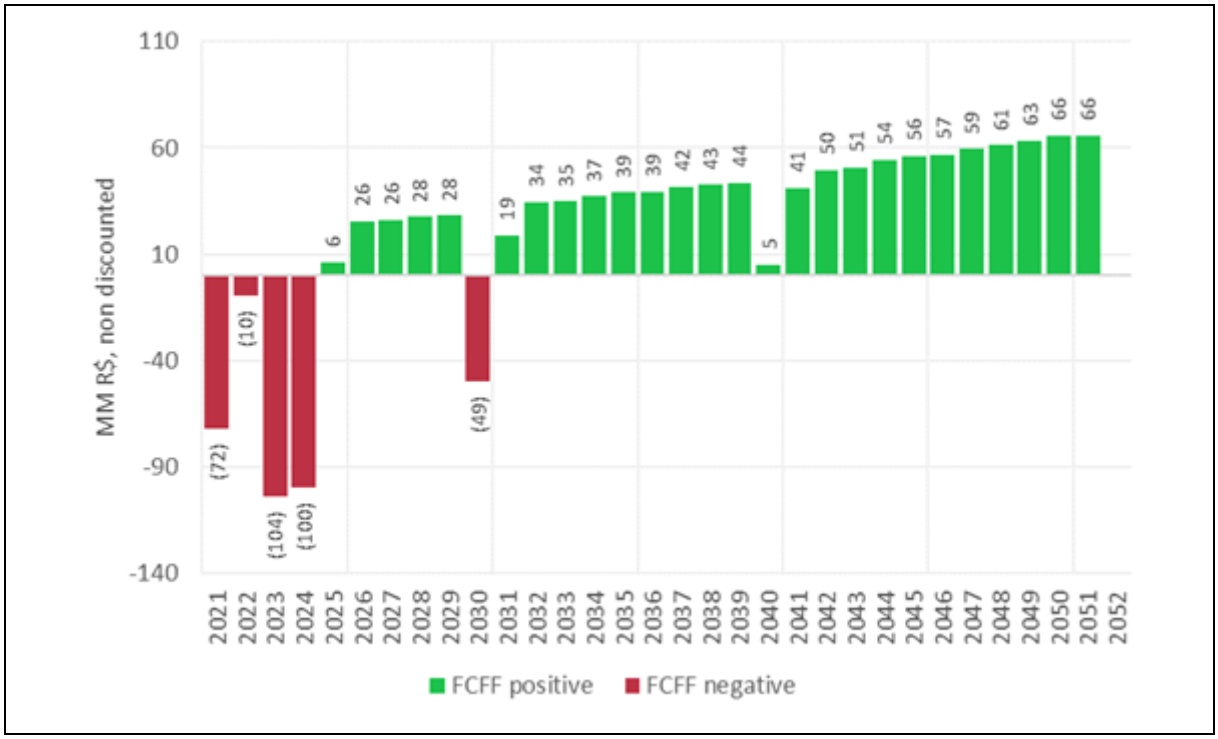


Source: GCA Consortium.

Evaluation of concession's financial feasibility

The project's forecasted free cash flow (FCFF) is presented in Figure 4-6, which shows the FCFF is positive during most of the concession, except during investment cycles: the project's first two development phases will require funding, while the third phase will lead to FCFF reduction. The project's IRR, prior to grant values, is 8.0%p.a. (real) and its MIRR is 7.4%p.a. (real).

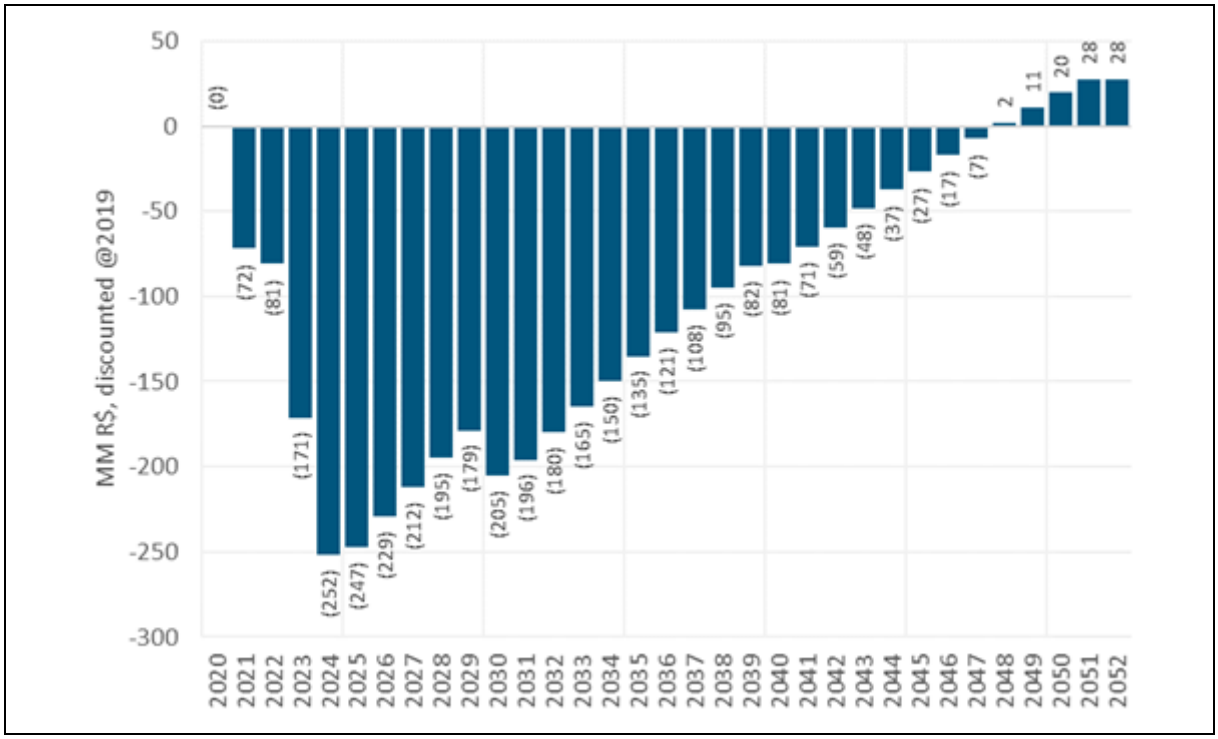
Figure 4-6: Free cash flow to firm (non-discounted – prior to grant values)



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 4-7. The NPV of the project is **R$27.7MM** (net of grant payments). Since the internal rate of return is higher than the cost of capital and the NPV is positive, the concession is financially feasible.

Figure 4-7: Cumulative discounted free cash flow to firm (net of grant payments)



Source: GCA Consortium.

Definition of grant payments

Once the concession's financial feasibility is confirmed, it is possible to determine the grant payments that allow for a fair return to the concessionaire, given the project's risk pattern (i.e. identical to the costs of capital).

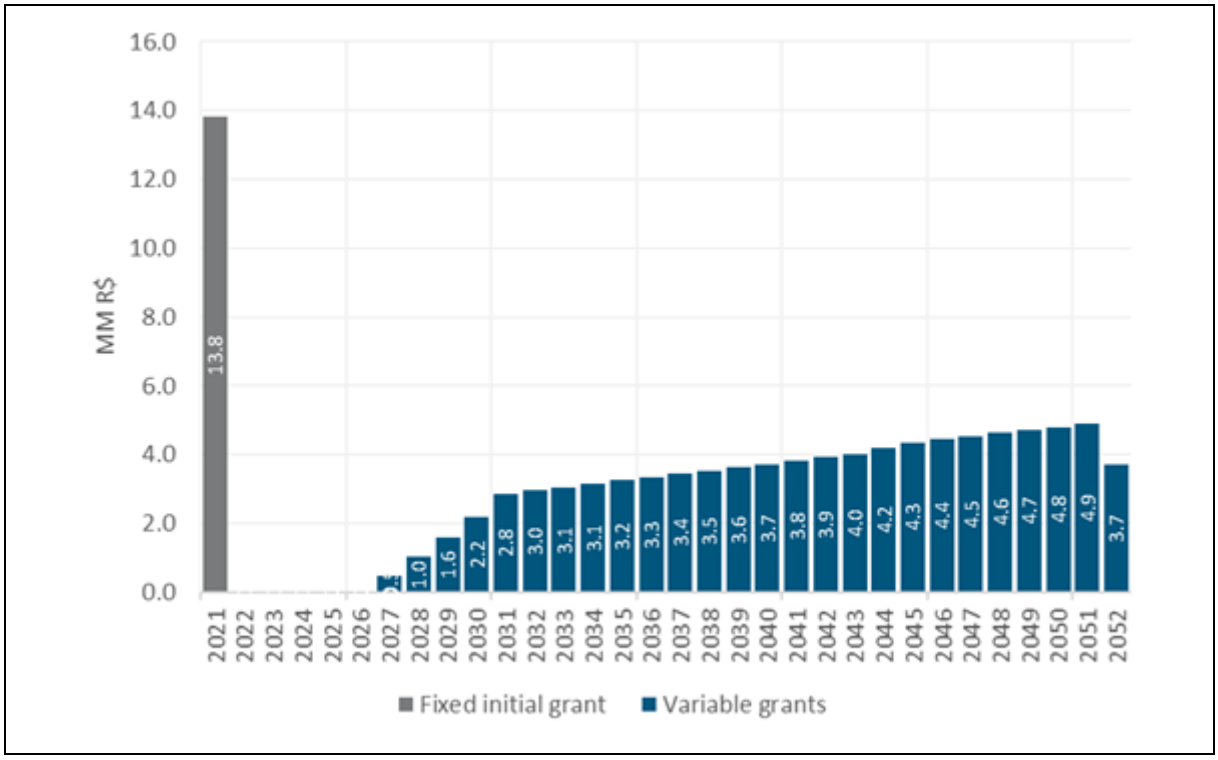
- SAC/MI defined grant payments divided in an initial fixed payment, equivalent to 50% of pre-grants NPV (to be paid by the concessionaire as lump sum upon entry into the agreement), and variable annual payments (equal to a percentage of the concession holder's gross revenues in each period)[10] and set so that project NPV = 0 at the regulatory cost of capital.

Resulting grants are:

- Fixed initial payment: R$13.8MM (based on January/2019 real prices);
- Variable payments: final percentage of 2.9% of gross revenues.

[10] The following methodology is prescribed: on the fifth full calendar year of the concession, the concession holder will begin to determine the variable grant, to be proportional with the previous fiscal year's gross revenues. From the 6th to the 8th calendar year, the concession holder will recognize increasing shares – at 40%, 60% and 80% - of the final variable-grant percentage. From the 9th calendar year, the final variable grant rate would apply (that is, the rate set to make the concession' NPV equal to zero). According to the applicable provisions, payment may be made until May of the year immediately subsequent to that of the determination – therefore, the first payment has been assumed to be made in 2027, and the final one in 2052.

Figure 4-8: Grant payments flow during concession



Source: GCA Consortium.

Table 4-2 shows the sum of the grant payments flow over the concession period in two forms: (i) non-discounted; and (ii) at present value net of cost of capital.

Table 4-2: Total grants to the government (discounted and non-discounted)

Values in MM R$	Total, non discounted	Total discounted @7.23% a.a.
TOTAL	**104.0**	**37.8**
Fixed initial grant	13.8	13.8
Variable grants	90.2	23.9

Source: GCA Consortium.

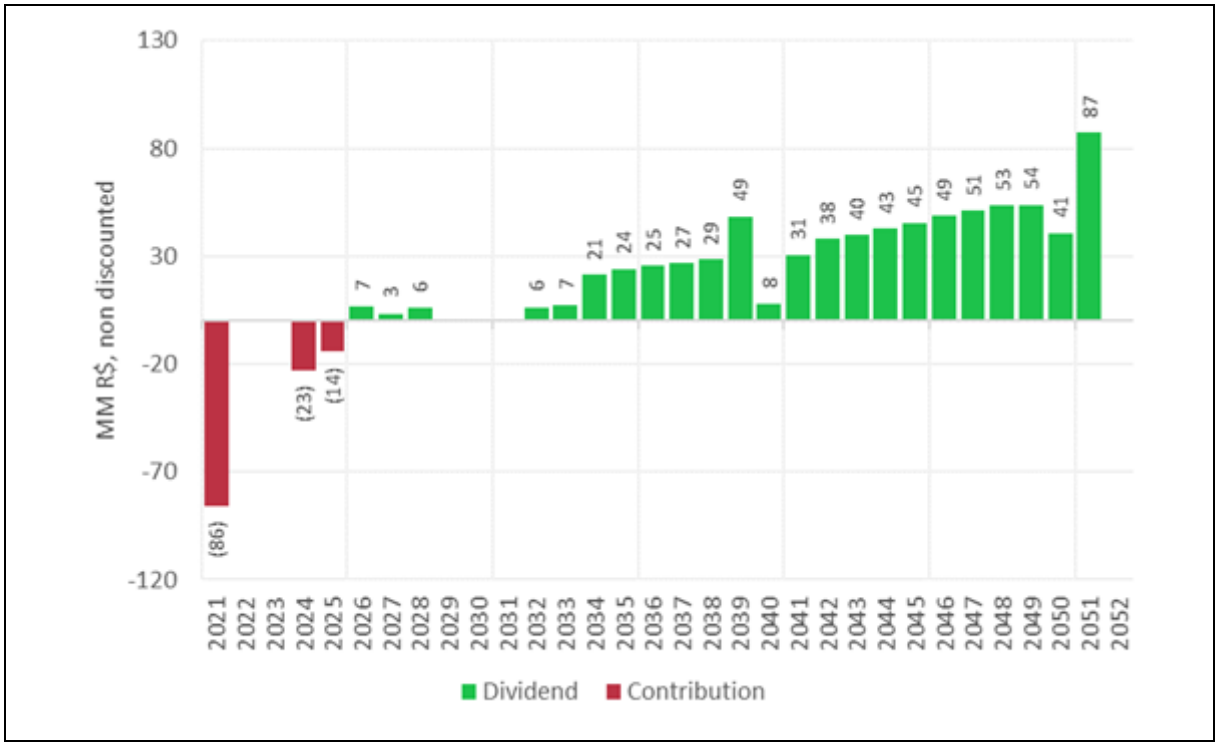
Attractiveness to shareholders

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 resourses during the first development phase, collecting increasing dividends over the remainder of the concession period. Dividend distribution is interrupted only during funding and respective grace periods and is immediately followed by accumulated resource distribution. In 2039 there is a new funding cycle and the availability of cash leads to an anticipation of the dividends distribution, with a reduction in the distribution in subsequent years. Between 2048 and 2050 distribution is limited when minimum capital stock requirement must be met. By the end of the

concession the paid-in capital is returned to shareholders. The equity IRR, calculated based on contribution and dividend flows, is 9.4%p.a. (real).

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



Source: GCA Consortium.