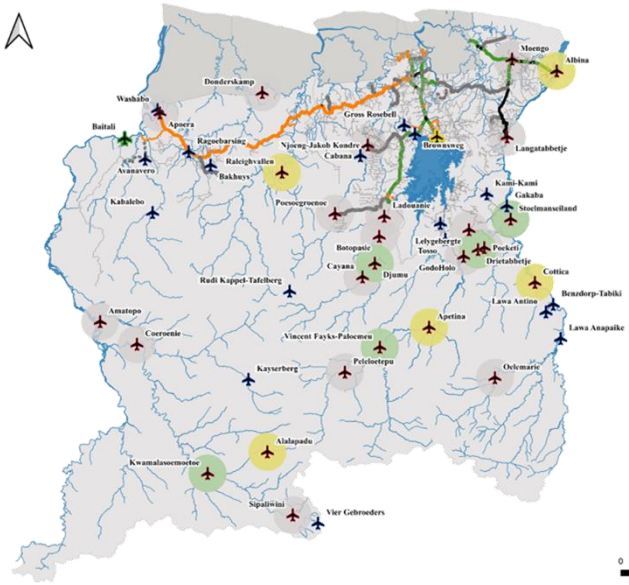
DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

# SURINAME

## SUPPORT TO THE AIR TRANSPORT SECTOR IN SURINAME

**(SU-L1071)**

## OEL#4 – IDENTIFICATION OF REQUIRED MAINTENANCE AND REPAIR ACTIONS ON GRASSHOPPER AIRSTRIPS




# Final Report

*12th of Apr 2024*

***Identification of required maintenance and repair actions on grasshopper airstrips***

Inter- American Development Bank (IDB)

ILACO Project Number: IS-440

Project title: Identification of required maintenance and repair actions on grasshopper airstrips

Project number: IS - 440
Document: Final Report

| Version | Status | Compiled by | Validated by | Signature | Date |
|---|---|---|---|---|---|
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| 2 | Final Draft | Kishoen Misier;<br>M. Blenman;<br>T. Mendonça | R. Patandin, | RP | 12 Apr 2024 |

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**ABBREVIATIONS**

| | |
|---|---|
| AIS | Aeronautical Information Service Suriname |
| AML/ LHB | N.V. Luchthavenbeheer (Airport Management Ltd.) |
| ANSP | Air Navigational Service Provider |
| APAPI | Abbreviated Precision Approach Path Indicator |
| ATC | Air Traffic Control |
| BOT | Build-Operate-Transfer |
| CAA | Civil Aviation Authorities |
| CARS | Civil Aviation Regulations Suriname |
| CASAS | Civil Aviation Safety Authority Suriname |
| GoS | Government of the Republic of Suriname |
| ICAO | International Civil Aviation Organization |
| IDB | Inter-American Development Bank |
| KPI | Key Performance Indicators |
| LVD/ CADSUR/ DCA | Luchtvaart Dienst (Civil Aviation Department of Suriname) |
| LVT | Dienst Luchtvaartterreinen (Aerodrome Department) |
| MCA | Multi Criteria Analysis |
| NCCR | Nationaal Coördinatiecentrum voor Rampenbeheersing (National Coordination Centre for Disaster Management) |
| NGO | Non-governmental organization |
| PAPI | Precision Approach Path Indicator |
| PCN | Pavement Classification Number |
| Prio. | Priority |
| SLM | Surinaamse Luchtvaart Maatschappij (Surinam Airways) |
| TCT | Ministerie van Transport, Communicatie en Toerisme (Ministry of Transport, Communication and Tourism) |

# 1 INTRODUCTION

## 1.1 Context of the project

The Inter - American Development Bank (IDB) is supporting the Government of Suriname on maintaining good quality infrastructure in rural areas of the country and formulated a project to determine the priority infrastructure interventions required for investment based on socio-economic data, productive factors, exposure and vulnerability to climate events (such as floods). The efforts will predominantly focus on grasshopper airstrips in the districts of Sipaliwini, Brokopondo, Para and Marowijne.[1]

The objectives of the Consultancy are as follows:

1. define typical interventions for routine maintenance or repairs for the airstrips;
2. define referential costs for each intervention identified above indicating whether or not further operation and maintenance costs would be expected once the intervention is over;
3. produce basic georeferenced cartography of the infrastructure to be maintained or repaired and its adjacent area;
4. estimate the existing traffic demand of each grasshopper airstrip considering the economic sectors that use the infrastructure at hand;
5. prioritise interventions (identifying the components of infrastructure that will provide the biggest benefits); and
6. identify the need of additional studies (if any) as preparation for the interventions.

## 1.2 Aim and outline of this report

This document is part of the project: "*Identification of required maintenance and repair actions on grasshopper airstrips"*. The project consists out of the following main activities indicated in Figure 1.

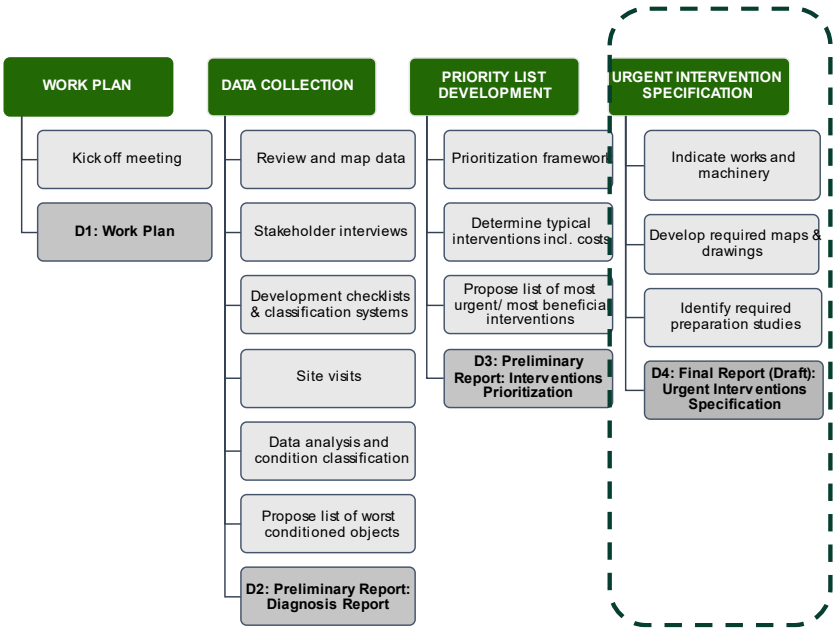



**Figure 1: Main activities of the project.**

[1] The scope of the project was adjusted after de Data Collection phase and thus the identified interventions are now solely related to the rural (grasshopper) airstrips and no longer on rural productive roads and bridges.

An inventory of the airstrips and their conditions is reported in the "*D2: Diagnosis Report*". This "*D4: Final Report*" aims to specify the identified interventions for rehabilitation and upgrading of the rural grasshopper airstrips identified in the "*D3: Interventions Prioritization Report*". This report provides:

- an overview of the ICAO guidelines
- proposed aviation management structure for sustainable investment
- a prioritization framework for airstrips to invest in
- overview of the proposed interventions
- specification of the interventions

# 2 AVIATION STANDARDS AND REGULATIONS

The Surinamese Aviation act (S.B. 2002 no.24), governs the aviation structure as a whole, and forms the basis for the establishment of the Civil Aviation Safety Authority Suriname (CASAS). This authority governs the national aviation safety and security. It is its responsibility to ensure that all aviation operations are being conducted in accordance with international standards and regulations from the International Civil Aviation Organization (ICAO). The ICAO standards are translated into the local regulations better known as the Civil Aviation Regulations Suriname (CARS).

All aerodromes/airports/airstrips in Suriname should comply with the ICAO Annex 14 - Aerodromes standard (ICAO, 2018) and locally with the CASAS - CARS 12 Aerodromes for the Category 1B aerodrome. These rules, standards and recommendations are applicable worldwide and set a high level of safety, which the domestic airstrips may not be able to comply with, due to the rural location and the limited facilities and conditions. This type of operation is internationally identified as Bush Flying. In other countries there are amended rules and regulations written by the correspondent Civil Aviation Authority (CAA), in a Directors Directive, to identify the minimal standards to be met by the airstrips to guarantee the safety and security whilst operating.

Suriname does not provide these amended rules, and thus should comply with all the regulations. However, the domestic operations have always been operated as is, and are thus tolerated. Even with this informal toleration, many shortcomings have been identified in the aerodromes' infrastructure and facilities that are essential to be upgraded.

A brief overview of the international certification standards for the applicable aerodrome according to ICAO (2018) is provided in this section.

## 2.1 Critical aeroplane

The critical aeroplane used for domestic flights in Suriname is the Twin Otter DHC-6, which has the following relevant specifications (Viking, 2018):

| | |
|---|---|
| Wingspan | = 19.81 m |
| Outer Main Gear Wheel Span (OMGWS) | = 3.7 m |
| Takeoff Distance to 50 ft. (15.2m) | = 454 m |
| Landing Distance from 50 ft. (15.2m) | = 460 m |
| Accelerate – Stop Distance | = 675 m |
| Maximum Takeoff Weight | = 5,670 kg |
| Fuel Capacity | = 1,419 l |
| Maximum Range | =1,300 km |
| Maximum Endurance | = 6.9 hrs |

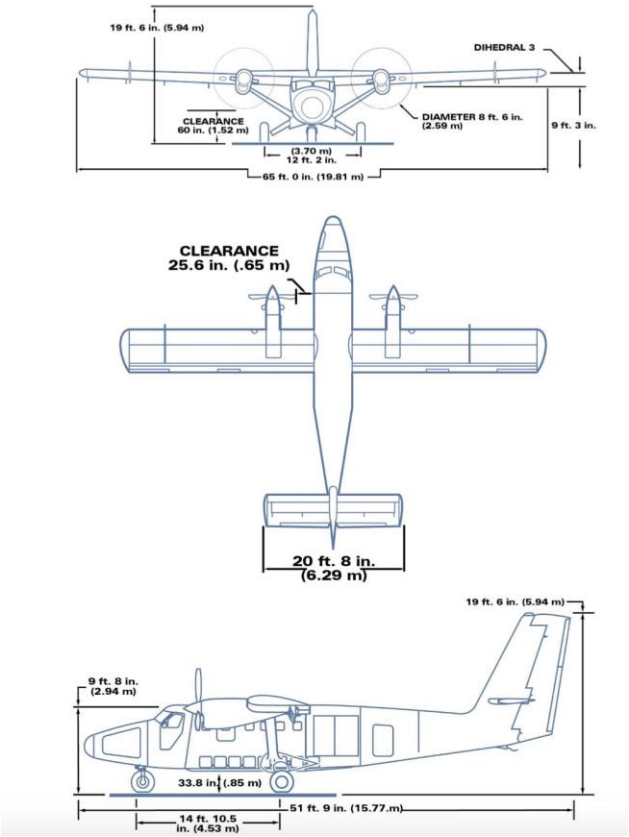



**Figure 2: General dimensions Twin Otter DHC-6.**
*Source: Viking (2018).*

## 2.2 Aerodrome dimensions

The aerodrome reference code used for the assessment of the certification is 'Category 1B', indicating an aerodrome with an aeroplane reference field length up to 800 m and accommodating aeroplanes with wingspans up to 24 m. All aerodromes are to comply with non-instrument runways specifications.

### 2.2.1 Runway

- Length: The runway length should be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length determined by applying corrections for local conditions to the operations (elevation, temperature, runway slope, humidity and the runway surface characteristics) and performance characteristics of the relevant aeroplanes.
- Width: 18 m
- Longitudinal slope: < 2%
- Transverse slope: 2% (symmetrical camber for drainage of water)
- Strength: capable of withstanding the traffic of Twin Otter DHC-6
- Surface: without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane. Paved surface texture depth ≥ 1mm in order to provide the required surface friction between the tires and the paved surface.
- Thresholds are to be placed at extremities of a runway.

### 2.2.2 Runway shoulders

Not applicable (NA)

### 2.2.3 Runway turn pads:

180-degree turn, but can also be provided along the runway if plane does not need full runway length. Clearance distance between any wheel of the aeroplane landing gear and the edge of the turn pad ≥ 1.5 m.

- Longitudinal slope < 2%
- Transverse slope = 2% (symmetrical camber for drainage of water)
- Strength: at least equal to runway. Capable of withstanding horizontal shear forces.

### 2.2.4 Runway strip

- Length: extension threshold/ stopway > 30 m
- Width: ≥ 30 m on each side of the runway center line and its extended line
- Obstacle free within 45 m of the runway center line
- Grading: ≥ 30 m from the runway center line and its extended line.
- Longitudinal slope: 2%
- Transverse slope: < 3%
- Strength: sufficient load-bearing capacity in event of aeroplane running off the runway

### 2.2.5 Runway end safety area:

Not required but recommended.

- Length: > 30 m extension from end of the runway strip.
- Width: ≥ 2x width of runway

### 2.2.6 Clearways

Not required, depends on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes.

### 2.2.7 Stopway

Not required, depends on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes.

- Width: = width of runway
- Slopes: minimal slope change from runway
- Strength: capable of supporting aeroplane that abandoned take-off
- Surface: surface friction characteristics at or above those of the associated runway.

### 2.2.8 Taxiway

- Clearance: ≥ 1.5 m
- Width: ≥ 7.5 m
- Transverse slope: 2%
- Strength: at least equal to the runway it serves.
- Distance between taxiway and runway center lines: ≥ 42 m

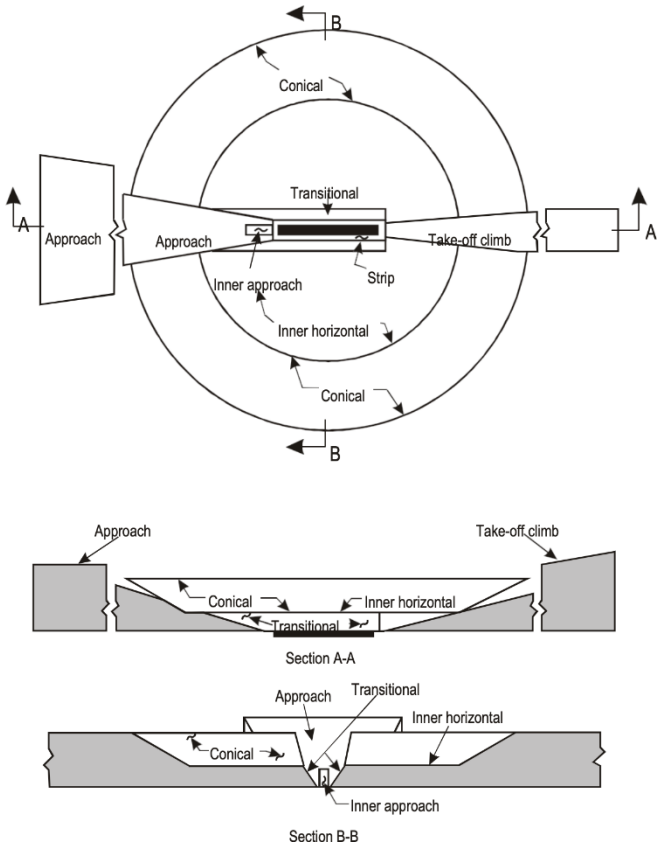
### 2.2.9 Apron

Required for the on- and off-loading of passengers, cargo or mail and servicing of aircraft without interfering with aerodrome traffic.

- Slope: < 1%
- Clearance between aircraft and buildings/ other aircraft/ objects: ≥ 3 m

## 2.3 Obstacle restrictions

The airspace around aerodromes is to be maintained free from obstacles for safety purposes. A series of obstacle limitation surfaces are defined as indicated in Figure 3.




| Surface and dimensions[a] (1) | 1 (2) |
|---|---|
| CONICAL | |
| Slope | 5% |
| Height | 35 m |
| INNER HORIZONTAL | |
| Height | 45 m |
| Radius | 2 000 m |
| INNER APPROACH | |
| Width | — |
| Distance from threshold | — |
| Length | — |
| Slope | |
| APPROACH | |
| Length of inner edge | 60 m |
| Distance from threshold | 30 m |
| Divergence (each side) | 10% |
| First section | |
| Length | 1 600 m |
| Slope | 5% |
| Second section | |
| Length | — |
| Slope | — |
| Horizontal section | |
| Length | — |
| Total length | — |
| TRANSITIONAL | |
| Slope | 20% |
| INNER TRANSITIONAL | |
| Slope | — |
| BALKED LANDING SURFACE | |
| Length of inner edge | — |
| Distance from threshold | — |
| Divergence (each side) | — |
| Slope | — |

**Figure 3: Obstacle limitation surfaces as well as the relevant dimensions for a Category 1B non-instrumental aerodrome.**

*Source: ICAO (2018).*

## 2.4 Visual Aids

### 2.4.1 Indicators and signaling devices

- Wind direction indicator
  - At least one, located visible from aircraft in flight and free from air disturbances.
- Landing direction indicator
  - Located on a conspicuous place on the aerodrome

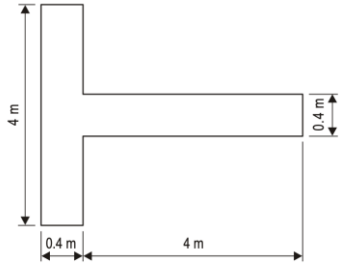



**Figure 4: Landing indicator.**

*Source: ICAO (2018).*

### 2.4.2 Markings

- Colour: runway markings-white; Taxiway / turn pad markings-yellow
  - Unpaved taxiway should be provided, so far as practicable, with the markings prescribed for paved taxiways.
- Runway designation marking
  - Location: at the thresholds of a paved runway and so far, as practicable at the thresholds of an unpaved runway.
  - The marking includes a two-digit number which is a whole number nearest to the one-tenth of the magnetic North when viewed from the direction of approach.

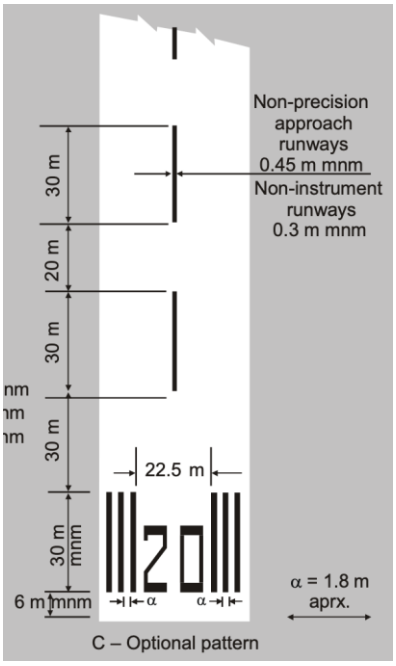



**Figure 5: Runway markings.**
*Source: ICAO (2018).*

- Runway center line marking
  - Provided on a paved runway
  - Length of line + gap = between 50-75 m
  - Width line: 0.30 m
- Threshold marking
  - Provided at the threshold of a paved instrument runway and is recommended so far as practicable at the thresholds of an unpaved runway. 6m distance from the threshold
  - Longitudinal stripes: 4x
- Runway side stripe marking
  - Applicable on paved runways if there is a lack of contrast between the runway edge and shoulders and surrounding terrain
  - Width line: ≥ 0.45 m
- Taxiway center line marking
  - Applicable on paved runways. Continuous center line.
  - Width line: ≥ 0.15 m
- Runway turn pad marking
  - Applicable on paved runways. Continuous center line.
  - Width line: ≥ 0.15 m

### 2.4.3 Lights

The following types of lights are recommended for poor visibility conditions and where physically practicable:

- Emergency lighting & aerodrome / beacons
- Approach lighting system
- Runway threshold lights
- Precision Approach Path Indicator (PAPI): wing bar of four sharp transition multi-lamp units equally spaced located on the left side of the runway unless physically impractical.
- Abbreviated Precision Approach Path Indicator (APAPI): wing bar of two sharp transition multi-lamp units equally spaced located on the left side of the runway unless physically impractical.
- Runway end lights
- Runway center line lights

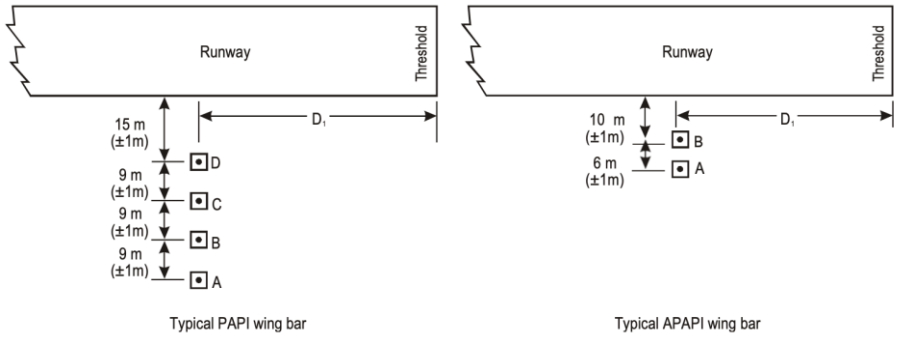



**Figure 6: PAPI and APAPI wing bar dimensions.**
*Source: ICAO (2018).*

### 2.4.4 Signs

Signs should be frangible at fixed heights and distance from the runway (3-10m).

### 2.4.5 Markers

Markers should be frangible and sufficiently low.

- Unpaved runway edge markers: flat rectangular surface (1m x 3m) parallel to runway
- Boundary markers: to be placed where landing area has no runway at ≤ 200 m intervals with contrasting colors from background.

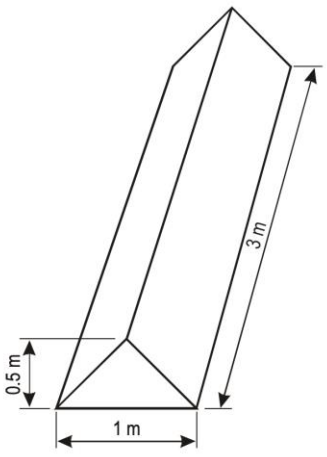



**Figure 7: Boundary Marker dimensions.**
*Source: ICAO (2018).*

## 2.5 Strength of pavement

The permitted bearing strength of aircraft on the pavement is indicated by a Pavement Classification Number (PCN). The PCN depends on the following:

- Pavement type (Rigid-R or Flexible-F),
- Subgrade strength category for R and F:
    - High strength: 150 MN/$m^3$ and >120 MN/$m^3$ (R); CBR=15 or CBR >13 (F)
    - Medium: 80 MN/$m^3$ and 60-120 MN/$m^3$ (R); CBR=10 or CBR 8-13 (F)
    - Low: 40 MN/$m^3$ and 25-60 MN/$m^3$ (R); CBR=6 or CBR 4-8 (F)
    - Ultra-low: 20 MN/$m^3$ and <25 MN/$m^3$ (R); CBR=3 or CBR <4 (F)
- Maximum allowable tire pressure category, and
- Evaluation method

# 3 AVIATION MANAGEMENT PROPOSAL FOR SUSTAINABLE INVESTMENTS

## 3.1 Context current domestic aviation operations

For multiple locations in the interior, air travel is the only mode of transportation into the capital. Indigenous and Maroon villages in the south-west are vulnerable for isolation as they solely rely on their flight connections. The purpose of flights to the overall of the interior varies in purposes from health, tourism, business, mining activities, community and infrastructure developments, etc.

The majority of the connections into the interior find their point of origin at the Paramaribo city airport, Zorg en Hoop. The main operators for scheduled and chartered flights are the privately-owned Gum Air and Blue Wing Airlines, and the NGO, MAF Suriname. In addition to these three, there are other privately owned companies that fly into the interior with fixed wing and rotor aircraft to service the need of air travel. To name a few: Aero Club Suriname, Eagle Air Services, Hi Jet Helicopter Services, Meindertsma Suriname, Pegasus Air Services, Stichting Vliegen in Suriname United Aviation Services, Vortex Air Services and more.

Gum Air

Gum Air is a commercial airline operator based at the Zorg en Hoop airport, with over 50 years of experience in flights related to tourism, mining, local villages, medical cases and government support. It has a fleet of 11 planes of three types, each with its capacity and airstrip limitation (Table 1). Gum Air provides almost daily scheduled flights towards the airstrips in the Lawa-Tapanahony area in the eastern part of the country (Table 2). Table 3 provides a sample of Gum Air flight movements between Jun 2021- Feb 2022.

**Table 1: Gum Air fleet.**

| Fleet | Capacity | Fleet size |
|---|---|---|
| Cessna 206 | 400kg/ 5p | 4 |
| Cessna C-208B Caravan | 1,000kg/ 12p | 5 |
| DHC-6 Twin Otter | 1,400kg/ 18p | 2 |

*Source: Gum Air*

**Table 2: Gum Air regular operations.**

| Destination | Weekly frequency |
|---|---|
| Tabiki | 6 |
| Antino | 6 |
| Sarakreek | 6 |
| Stoelmanseiland | 4 |
| Drietabbetje | 3 |
| Gakaba | 6 |
| Cottica | 6 |
| Lawa | 6 |
| Godoholo | 3 |

*Source: Gum Air*

**Table 3: Movements statistics, Zorg en Hoop, of Gum Air. Jun 21-Feb 22.**

| Month | Pax | Pax weight in kg | Cargo weight in kg |
|---|---|---|---|
| Jun-21 | 807 | 71,104 | 86,133 |
| Jul-21 | 947 | 71,365 | 66,205 |
| Aug-21 | 1,282 | 95,900 | 63,680 |
| Sep-21 | 1,256 | 101,483 | 80,957 |
| Oct-21 | 1,380 | 120,477 | 87,175 |
| Nov-21 | 795 | 720,30 | 78,842 |
| Dec-21 * | 37 | 2,996 | 3,116 |
| | | | |
| Jan-22 | 492 | 43,019 | 30,588 |
| Feb-22 | 1,001 | 7,713 | 93,647 |

**Data incomplete. Source: LVD (2023)*

Blue Wings Airlines

Blue Wings Airlines is a commercial air taxi company offering services in Suriname and the Caribbean related to tourism, mining, government projects, surveying, disaster relief, etc. It has a fleet of 8 planes of four types (Table 4). Daily scheduled flights are offered to various regions in the south and east of Sipaliwini (Table 5).

**Table 4: Blue Wings Airlines fleet.**

| Fleet | Capacity | Fleet size |
|---|---|---|
| Cessna 206 | 450kg/ 5p | 2 |
| Cessna C-208 | 1,100kg/ 14p | 3 |
| DHC-6 Twin Otter | 1,300kg/ 20p | 2 |
| F406 | 1,100kg/12p | 1 |

*Source: Blue Wings Airlines.*

**Table 5: Blue Wings Airlines line operations.**

| Destination | Weekly frequency |
|---|---|
| Alalapadu | 3 |
| Apetina | 3 |
| Drietabbetje | 3 |
| Godoholo | 3 |
| Kwamalasamutu | 3 |
| Lawa anapaike | 3 |
| Lawa antino | 7 |
| Lawa Tabiki | 7 |
| Lely | 3 |
| Palumeu | 3 |
| Poeketie | 7 |
| Sipaliwinie | 3 |
| Stoelmanseiland | 3 |
| Tepoe | 3 |

*Source: Blue Wings Airlines.*

MAF Suriname

Mission Aviation Fellowship Suriname (MAF Suriname) is a non-profit airline operator, operating since 1964 from Zorg en Hoop airport. MAF Suriname provides services related to Church and Mission, Medical help, Community aid and IOEP (Initial Operating Experience Program). A small portion of its operation is for commercial purposes.

MAF Suriname's fleet consists of three GA8 Airvan with a capacity of 500kg / 8 persons, a minimum landing distance of 370 m, and ability to take off to a height of more than 15 m within 500 m.

It provides almost daily flights towards the indigenous villages (Trio and Wayana tribes) in the south of Sipaliwini. Half of the flights are medical related. The other half are mostly transport for NGOs with some commercial flights.

International flights from Zorg & Hoop

In addition to the Domestic flights into the interior, Zorg en Hoop also facilitates international charter flights. The majority of flights to Guyana are primarily being operated by Gum Air and its partner Trans-Guyana Airways. To service an oil and gas company of French origin, a dedicated charter operator Zimex operates flights to French Guyana. The occasional charter is being operated by Blue Wings Airlines and to a less extent some other carriers. See Table 6 for stats.

**Table 6: Arrivals and Departures of International flights at Zorg & Hoop airport, Jan 2022- Nov 2022.**

| | | Arrivals | | Departures | |
|---|---|---|---|---|---|
| | **Airline** | **Flights** | **Pax** | **Flights** | **Pax** |
| 1 | Blue Wing Airlines | 36 | 153 | 32 | 149 |
| 2 | Gum Air | 303 | 2,620 | 306 | 2,337 |
| 3 | Trans - Guyana Airways | 293 | 2,442 | 303 | 2,492 |
| 4 | Pegasus | 1 | 2 | 0 | 0 |
| 5 | Era Helicopters | 1 | 4 | 3 | 16 |
| 6 | Roraima | | | 1 | 3 |
| 7 | Zimex | 141 | 692 | 137 | 694 |
| | Total | 775 | 5,913 | 782 | 5,691 |

*Source: LVD (2023)*

## 3.2 Current domestic aviation management structure

The Ministry of Transport, Communication and Tourism (TCT) is responsible for governing, policy development and the regulation of the aviation sector in the country. In the structure of the Ministry there is the Director of Transport, and the Deputy Director for Aviation Transport that manages the aviation policies and operations.

Most of the aviation infrastructure is publicly owned and operated. There are two departments responsible for the execution on an operational level:

1. The **Civil Aviation Department of Suriname** (LVD/ CADSUR)
   This department Luchtvaartdienst (LVD) serves as an aviation expert and working arm for the Ministry in policy making, aviation economic licensing and oversight.
   In addition to the support, this department is the operator of the Air Navigational Service Provider (ANSP), which provides Air Traffic Control (ATC) for the country as a whole, Aeronautical Information Services (AIS), Operations of Navigational instruments and related administrative tasks.
2. The **Aerodrome Department** (LVT)
   This department Luchtvaart Terreinen (LVT) is responsible for the operation and maintenance of the public aerodromes. Staffing at the airstrips includes a station chef (manager) and maintenance staff. The staff at airstrips located in villages consists of locals, however on remote airstrips technical staff of LVT are stationed for 3-month periods.

In addition to these government departments, the following authorities have been established in the 90's to elevate the level of safety on international standards:

1. The **Civil Aviation Authority Suriname** (CASAS)
   This authority serves as the Civil Aviation Authority which holds its responsibility established by law in the Aviation act of 2002, and is responsible for improving and ensuring safety and security in civil aviation in Suriname by implementing, applying and enforcing safety and security standards. The standards are determined by the International Civil Aviation Organization (ICAO) and are conditional for international aviation activities for the Republic of Suriname. As part of its multiple responsibilities, CASAS also conducts aerodrome safety inspections.
2. **Airport Management Ltd.** (AML)
   This is a fully state-owned company, N.V. Luchthavenbeheer (LHB), that is responsible for the operations of the main international airport, the Johan Adolf Pengel International Airport. In the articles of incorporation, this company was setup to be the airport authority to operate

multiple airports in Suriname. As of today, LHB only operates the main airport, and provides aviation security duties at the Zorg en Hoop airport.

In addition to the above-mentioned aviation related organizations, the state is also a sole shareholder of **Surinam Airways** (SLM), the national carrier that connects Suriname to Europe, USA, Brazil and the Caribbean. In the past this company used to be the main domestic airline to operate into the interior.

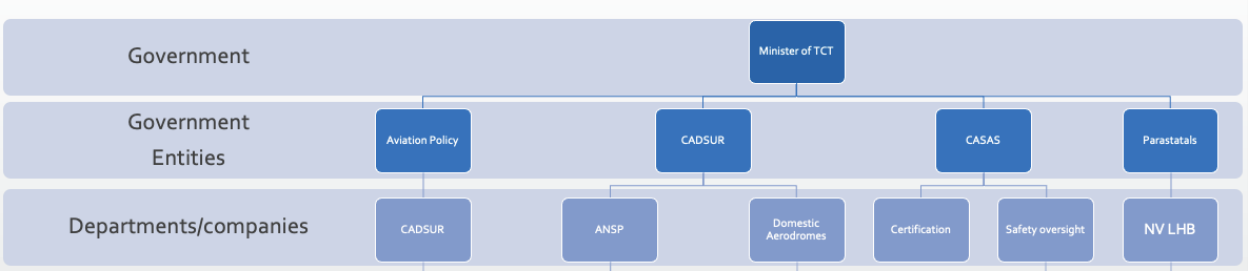



**Figure 8: Overview of the current aviation management structure.**

Besides some privately owned airstrips, the majority of all interior airstrips are publicly owned and operated by the Aerodrome Department (LVT). This department within the Ministry of TCT, is dependent on the bureaucratic government system, that based on the interviews, status of the infrastructure and organizational setup, does not seem to be a high priority of the Government.

As these airstrips are not paved, maintenance especially during the rainy season is key to guarantee safety. Transporting maintenance equipment and consumables into the rural areas due to irregular connections in some cases, is a challenge of itself.

Documentation for standardization of procedures, keeping track of statistics in movements as well as conditions as they are remote would be key for planning and development purposes. Having trained and qualified personnel would be essential.

With the lack of financial commitments, the above mentioned are all challenges.

## 3.3 Proposed management structure for Domestic Airstrip System

This study identified the shortcomings of the Aerodrome Department (LVT) as the operator of the airstrips, as there is no sustainable financial commitment of the government towards the operations of these airstrips. The development of the transport system into the rural areas will be a key element for development, as economic growth of the country and thus also the interior is inevitable in time. To accommodate the current needs, but more importantly to be able to facilitate the growth, it is essential to lay a foundation for a sustainable management system for the domestic airstrip system.

These domestic airstrips should be seen as a system, even though they are not all directly connected to each other, due to the size of operations. Continuation of centralized management is key to the success, as some have commercial potential but all have a social obligation. It is of utmost importance to include Zorg en Hoop Airport in this domestic airstrip system, as this is until now the only connecting point in the city which services all the domestic airstrips.

To improve the operations and sustainability of these domestic airstrips, action is needed. It all starts with the commitment of the government to improve and develop this system. This could be executed under own management or under management of an external party, that would operate this airstrips concession as a whole or in phases. As most of the facilities will need upgrading, investment is required. There are multiple ways of arranging such management contracts in the form of concessions, management contracts, Build-Operate- Transfer (BOT's), etc.

The identified options for management of this system are listed below and visualized in Figure 9:

1. Aerodrome Department – Government
    a. As-is government department
    b. Privatization in combination with the ANSP/Air Traffic Control
2. Government Organization/ Parastatal
    a. Airport Management Ltd. (AML/LHB)
    b. Surinam Airways (SLM)
    c. Tourism Authority
3. Public Private Partnership
    a. Foreign Airport Management Company
    b. Domestic Airlines
    c. Non-Aviation Domestic Company

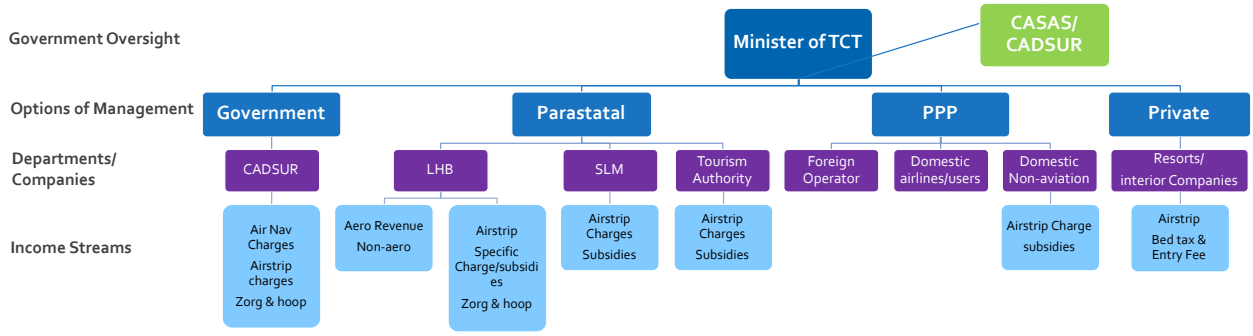



**Figure 9: Overview of options for management structures including possible income streams.**

### ad 1. Aerodrome Department

Continuation of this system as is would not bring any improvements. Allocation and dedication of resources and funds, in a sustainable matter are crucial. Privatization of the ANSP/ATC together with the Aerodrome department would create an independent body with its own income, that could be cross subsidizing the domestic airport system.

Pros: The advantage of this is no legal implications and arrangements with local communities required; still in government control; centralized strategic approach and development of the country.

Cons: Experience has taught that the budget funds are not being allocated; there is bureaucratic management and procuration; policies, strategic outlook and management change, when government change; low productivity civil servants; political loyalist above specialist in key positions.

### ad 2. Government Organization/ Parastatal

Transferring the management of the domestic aerodromes over to AML/LHB would be the easiest option, as it is already by law responsible for the operations of airports in Suriname, in its establishment. SLM has always been the favored aviation organization, so this could work as an advantage to develop the domestic system. The Tourism Authority is new, but would be an interesting organization to lead this, as the airstrips are crucial to the tourism development into the interior. This would be driven by the need to develop the other sector, and thus the need for a good working transportation system.

Pros: Using one of these entities, would avoid the bureaucratic systems of approval of funds; already established entities that know the aviation system; aviation expertise on board; bulk purchase of equipment; efficiency in writing of documentation; centralized management.

Cons: Cross subsidizing of the domestic operation out of current operations; loss of focus in core business; no knowledge of local community engagement; incompatibility and lack of knowledge of general aviation and domestic aviation (especially in the case of the Tourism Authority).

**ad 3. Public Private Partnership**

To get an international domestic aviation or non-aviation private party involved, the proposed business case should make financial sense. Unless private investors have other benefits, which would be a result of this operations, they will not engage. A challenge would be the small scale.

Pros: Experienced players in the market (domestic or foreign); capital to invest; no concerns for the government; efficiency in overall system; development of non-aviation business in the interior.

Cons: economies of scale; no direct control of the government; possible conflicts of interest if operated by one competing domestic airline; need to regulate monopoly; subsidies needed for social routes.

## 3.4 Conclusion

The decision for the domestic airstrip management system should be based on an economic and financial feasibility study. The overall strategic plan of the government regarding the economic development of the country and the interior, the main focus of pillars/industries for economic growth, national urban policies and plans are key to the need for development of the domestic airstrips.

In this study, the high-priority airstrip investments are quantified which could be used for further assessment of a capex and concession/BOT model with a private investor and/or a government project, possibly financed by the IDB.

Based on the resulting numbers, the Government can take a well-balanced consideration for the way forward, which may include taking an approach of phasing into privatization/concessions of the high-volume airstrips to get the private party familiarized with the business under strict KPI conditions of performance and inclusion of social airstrips in time.

# 4 PRIORITIZATION FRAMEWORK FOR AIRSTRIPS

## 4.1 Interventions framework

As resources are limited, the airstrips are to be prioritized for investment. The idea is to identify three categories of rural domestic airstrips based on their priority, as follows:

- Priority A: Strategic All-weather Airstrips (Prio. A)
- Priority B: Strategic Airstrips (Prio. B)
- Priority C: Basic Airstrip (Prio. C)

The Prio. A airstrips are strategically located, have high (potential) demand, nearby relevant social facilities and high production activities and are not prone to flooding. Prio. C airstrips are the least attractive for investment due to low scores on the abovementioned aspects, while Prio. B airstrips are those with decent scores and support the strategic network of Prio. A airstrips.

The required airstrip facilities for each priority category airstrip are discussed in Section 5.

## 4.2 Past efforts for airstrip prioritization

There are initiatives by TCT, CADSUR, IOS Partners et al. and NCCR to prioritize investments in airstrips. These are discussed in the following chapters.

### 4.2.1 TCT

The PS Transport at the Ministry of Transport, Communication and Tourism-TCT, mentioned in a stakeholder meeting held on the 7th of July 2023 that TCT is planning a study to identify maintenance needs of the following 4 airstrips of importance:

- Stoelmanseiland
- Kwamalasamoetoe
- Drietabbetje
- Moengo

The study includes a feasibility study for the development of a new airstrip at Atjoni. Figure 10 gives an overview of the abovementioned airstrips.

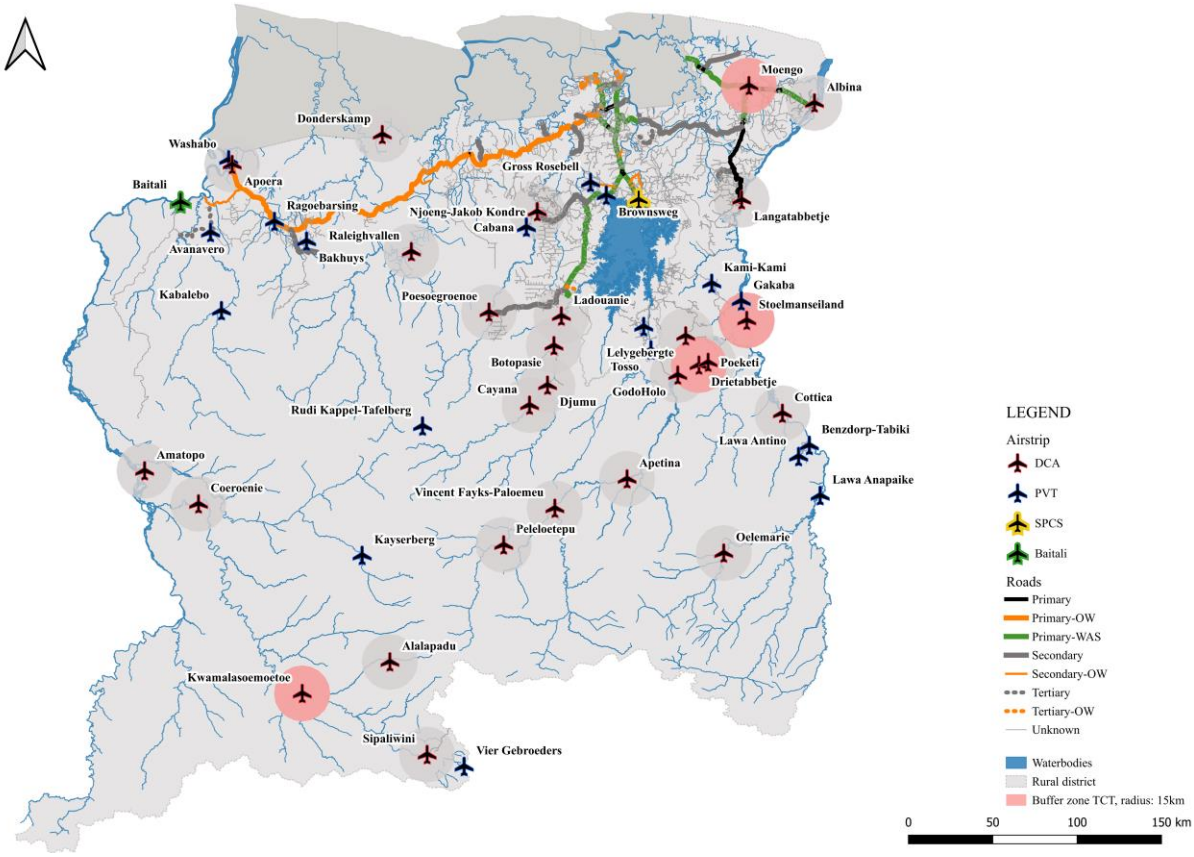



**Figure 10: Airstrip prioritization TCT based on indicative service areas with a radius of 15 km.**[2]
*Source: Own elaboration based on stakeholder's input.*

### 4.2.2 CADSUR

Mr. Goerdat (2023), on behalf of CADSUR, developed a prioritization of 13 airstrips to be paved based on yearly movements of 2017 & 2018 and geographical spread. The top 5 airstrips in bold (indicated with red circles in Figure 11) are proposed to be paved with asphalt, while the rest can be paved with other material (indicated with blue circles in Figure 11).

- **Cayana**
- **Benzdorp/ Tabiki**
- **Stoelmanseiland**
- **Kwamalasoemoetoe**
- **Kabalebo**
- Albina
- Gakaba
- GodoHolo
- Drietabbetje
- Lawa-Anapaike
- Vincent Fayks-Paloemeu
- Lawa-Anapaike
- Apetina

[2] The airstrip management is indicated as follows: Civil Aviation Department of Suriname (DCA), privately owned (PVT), Staatsolie Power Company Suriname (SPCS) and BAITALI Group (Baitali).

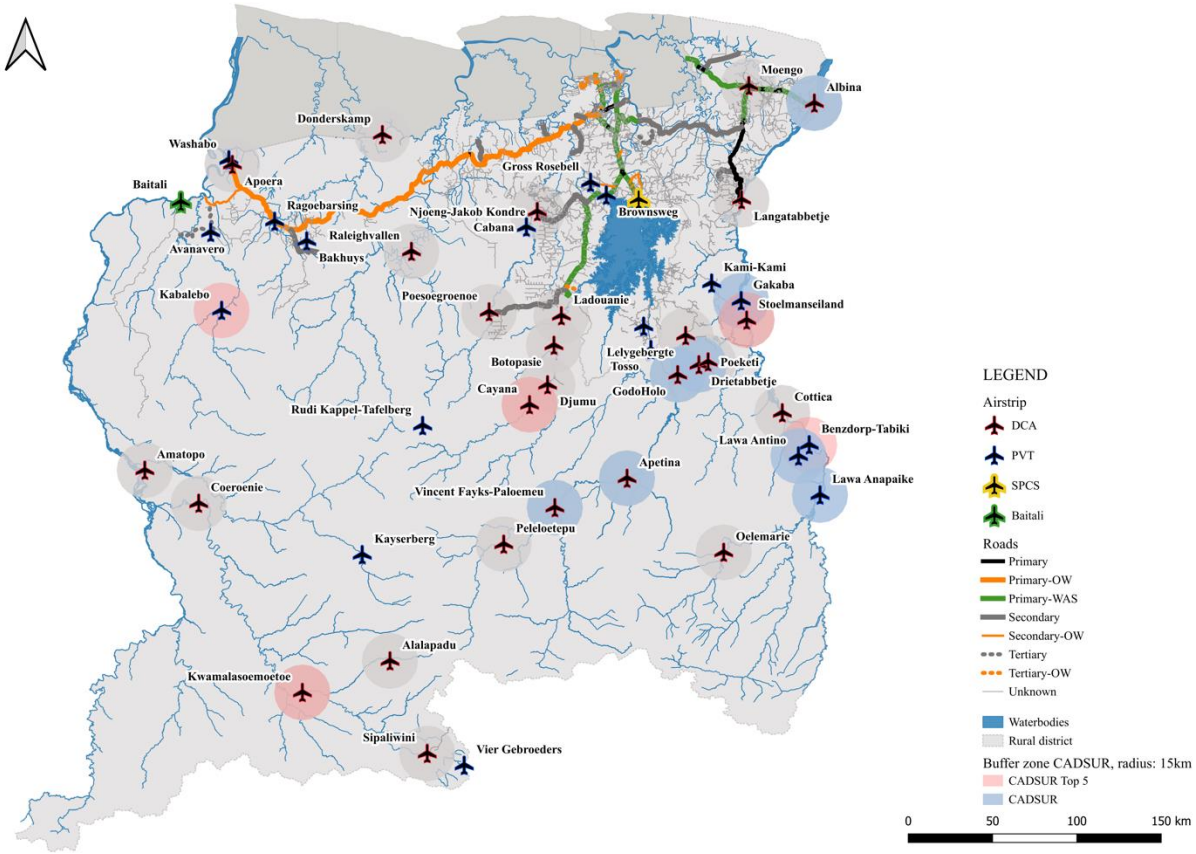



**Figure 11: Airstrip prioritization CADSUR based on indicative service areas with a radius of 15 km.**
*Source: Own elaboration based on stakeholder's input.*

The top 5 airstrips are well spread over the country; however the other airstrips (indicated in blue) are overlapping and are mostly concentrated along the eastern border and the Tapanahony river.

### 4.2.3 IOS Partners et. al (2012)

IOS Partners et. al (2012) developed an extensive prioritization framework based on villages, population, government institutions, industrial development, seasonal usage, employment potential and accessibility by other modes. The following airstrips (Figure 12) were indicated as most important to invest in:

- Stoelmanseiland
- Drietabetje
- Washabo
- Djoemo
- Botopasie
- Kwamalasamoetoe
- Langatabbetje

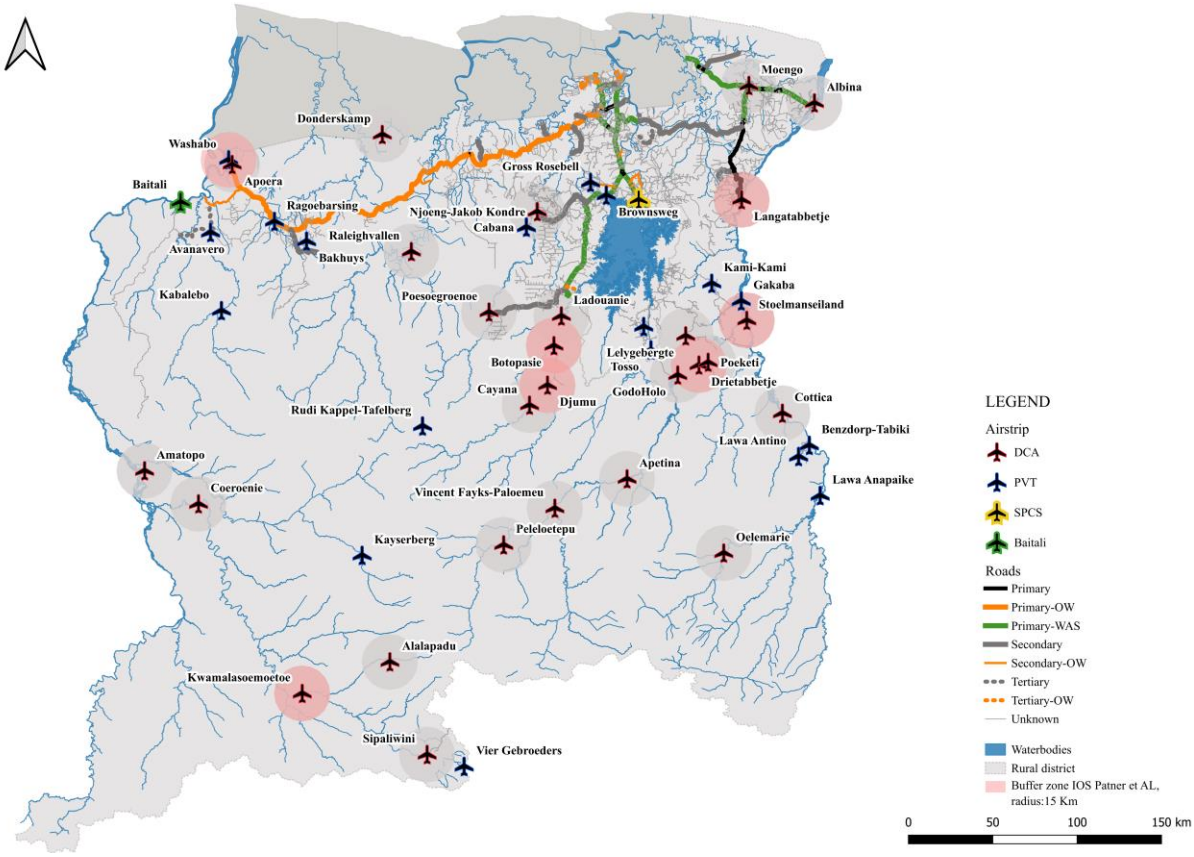



**Figure 12: Airstrip prioritization IOS Partners et al. (2012) based on indicative service areas with a radius of 15 km.**
*Source: Own elaboration based on stakeholder's input.*

There are several overlapping airstrips in the Bovens-Suriname as well as the Tapanahony river based on a service area with a radius of 15 km, especially when considering the private airstrips.

### 4.2.4 NCCR

During the stakeholder session held on 14th of Sep 2023, The coordinator of the National Coordination Center for Disaster Management Suriname -NCCR mentioned the following strategic hubs (Figure 13) for emergency response, relief efforts as well as storage of essential material and goods:

- Stoelmanseiland
- Djoemoe
- Poesoegroenoe
- Paloemeu
- Apoera
- Nickerie (out of scope for this project)

The prioritization is based on geographical spread, population density and airstrip elevation. The indicated service areas of the strategic airstrips are non-overlapping and well spread.

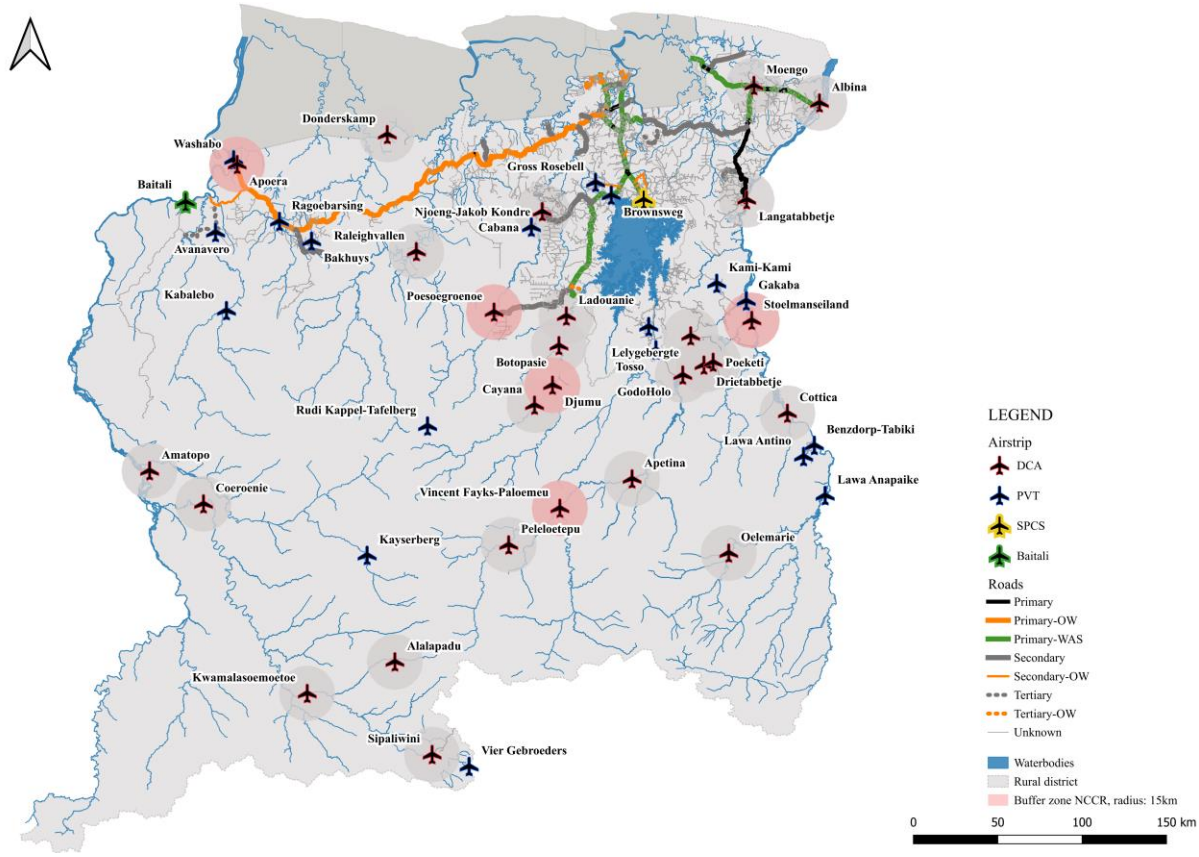



**Figure 13: Airstrip prioritization NCCR based on indicative service areas with a radius of 15 km.**
*Source: Own elaboration based on stakeholder's input.*

## 4.3 Airstrip Prioritization Methodology

In order to determine the strategic airstrips to invest in, a Multi Criteria Analysis framework was developed, in which the criteria are indicated in Table 7.

**Table 7: Overview of criteria including description and source.**

| Criteria | Description | Source | Impact |
|---|---|---|---|
| Flight Movements | The total number of registered landings and takeoffs on the airstrip in 2022. | LVD (2023) | + |
| Medical Facilities | Hospital or Medical Mission (Medische Zending) Primary Health Care facilities within a radius of 15km. | OpenStreetMap, Wikipedia (2023, Oct. 31) | + |
| Schools | Primary and secondary schools within a radius of 15km. | Gov Suriname (2022, Oct.) | + |
| Recreation/ Tourism | Art, bar, Outdoor attractions (camp site, Park, Picnic site, Playground, Viewpoints), Guesthouse, Hotels, Library, Monument, Museum, Pubs and Restaurants within a radius of 15km. | OpenStreetMap<br>Tour Operators Websites | + |
| Commercial and community center | Supermarket, petrol station as well as public buildings for meetings, socializing, educational activities, etc. within a radius of 15km. | OpenStreetMap | + |
| Granman Residence | The residence of an Indigenous or Maroon Head of clan in the village where the airstrip is located. | Wikipedia (2023, Jul. 21) | + |
| Number of inhabitants | Total number of inhabitants in the villages within a radius of 15km. | Genivar & ILACO (2011) | + |
| Flooding Vulnerability | Registered as flooded village in the period 2008-2022. | ABS Suriname (2023) | - |
| Travel Time Alternative Modes | Score based on travel time in hours by road and/ or by boat from Paramaribo as follows:<br>*Travel time (h)* / *Score*<br><5 / 0<br>5-10 / 0.25<br>10-20 / 0.50<br>20-30 / 0.75<br>>30 / 1.00 | Own elaboration | + |
| Gold mining | Surface area used for gold mining within a radius of 30 km. | Gonini | - |
| Protected area | Surface area of land registered as protected forest area within a radius of 30 km. | Gonini | + |

The corresponding weights are indicated in Table 8. The weights are valued on 4 levels from unimportant (1) to very important (4).

**Table 8: Overview of weights and reasoning per criterium.**

| Criteria | Weight | Reasoning |
|---|---|---|
| Flight Movements | **4** | Very important indicator, as it indicates the demand for flights. |
| Medical Facilities | **3** | Transport of medical supply, -staff and patients. Especially from and to other nearby remote villages. |
| Schools | **2** | Transport of teachers as well as their groceries and school stationary. |
| Recreation/ Tourism | **3** | Accessibility of touristic destinations and in case of emergency related to tourists. |
| Commercial & Community center | **2** | Transport of goods generally via boat/ road. |
| Granman Residence | **3** | Accessibility governmental officials and goods to be distributed by the Granman for his clan. |
| Number of inhabitants | **4** | Very important indicator, as it indirectly indicates the demand for flights. |
| Flooding Vulnerability | **3** | Airstrips prone to flooding will not be accessible in flooding periods and require much higher investments to upgrade. These are not considered strategic hubs for emergency response by the NCCR. |
| Travel Time Alternative Modes | **4** | Very important as the need for a proper airstrip is higher, the more remote the airstrip is located. |
| Gold mining | **1** | Enforcement (need) by the government of gold sector for monitoring etc. |
| Protected area | **1** | Enforcement by the government for forest protection. |

The impact of each criterion is indicated in Table 7 as either positive (+) or negative (-). The value $x_{ij}$ for each positive criterion $i$ and airstrip $j$ is normalized to a value $y_{ij}$ as follows:

$y_{ij} = \frac{x_{ij}}{\max(x_{iJ})}$, with $\max(x_{iJ})$ being the maximum value $x_{iJ}$ for criterion $i$ and all airstrips $J$.

The value $x_{ij}$ for each negative criterion $i$ and airstrip $j$ is normalized to a value $y_{ij}$ as follows:

$y_{ij} = \begin{cases} 1 - \frac{x_{ij}}{\max(x_{iJ})}, & x_{ij} > 0 \\ 1, & x_{ij} = 0 \end{cases}$, with $\max(x_{iJ})$ being the maximum value $x_{iJ}$ for criterion $i$ and all airstrips $J$.

The normalized value will result in a value $0 \leq y_{ij} \leq 1$. The total score $X_j$ for an airstrip $j$ is determined by taking the sum of the normalized value $y_{ij}$ for each criterion $i$ multiplied by its corresponding weight $w_i$ as follows: $X_j = \sum(y_{ij} \times w_i)$. A higher total score $X_j$ indicates a higher priority.

The airstrips are categorized based on their prioirity score as follows (it can be adapted based on the available budget):

- Prio. A >14
- Prio. B $10 < X_j \leq 14$
- Prio. C ≤10

Additional aspects are included as input for further discussions after the technical prioritizing of the airstrips.

**Table 9: Overview of additional criteria including description and source.**

| Criteria | Description | Source | Impact |
|---|---|---|---|
| Nearby Airstrips | Number of airstrips within a radius of 15km. Clusters of nearby airstrips are less attractive than airstrips in more remote villages. | OurAirports | - |
| Agriculture | Surface area used for agriculture within a radius of 30 km. Agriculture is generally done for own (local) provision. | Gonini | + |
| Other mining | Surface area used for other mining activities such as bauxite, laterite, gravel, sand, shells, etc. within a radius of 30 km. Bauxite, laterite, gravel, shells and sand mining related traffic, is mostly done on the road. | Gonini | + |
| Wood logging | Surface area of land registered as wood logging concessions within a radius of 30 km. | Gonini | + |
| Airstrip condition | Score based on condition of the runway (R), drainage (D), and station facility (S), with Poor= 0, Fair = 5 and Good = 10<br>Poorer conditioned airstrip requires higher investment. | Own elaboration based on LVT and Stakeholder's input | + |
| Priority previous studies | The number of times the airstrip is indicated as high priority/ strategic airstrip to invest in by TCT, CADSUR, IOS Partners et al. and NCCR.<br>The more times an airstrip is given priority in previous attempts, the more likely it is recommended for investment. | TCT, CADSUR, IOS Partners et al. and NCCR. | + |

## 4.4 Data

The data for each airstrip is provided in Append. C**.** The data for the airstrip at Stoelmanseiland is provided in Table 10 as an example.

**Table 10: Data airstrip Stoelmanseiland.**

| **Airstrip Stoelmanseiland** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 1082 | # |
| Hospital | - | 1 | # |
| Medical center | - | 2 | # |
| Schools | Primary school | 3 | # |
| Recreation/ Tourism | Bar | 1 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Gakaba/ Poeloegoedoe/ Wangfinga/ Benanoe/ Gransanti/ Abendanon of Tabbetje/ Doetabbikie moffo/ Acote/ Malobie/ Vandaki/ Tabiki/ Stoelmanseiland | 2892 | # |
| Nearby Airstrips | Gakaba | 1 | # |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Stoelmanseiland | 21 | hrs. |
| Agriculture | - | 28 | ha |
| Gold mining | - | 10715 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 647 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: poor, S: - | 0 | - |
| Priority previous studies | IOS Partners, Inc., CADSUR, NCCR, TCT | 4 | - |

## 4.5 Results

The results of the prioritization framework are given in Table 11. The Prio. A airstrips are highlighted in green, Prio. B in yellow and Prio. C are not highlighted. The Prio. A & Prio. B are discussed below and visualized in Figure 14 as well.

### *4.5.1 Airstrips Prio. A*

Drietabbetje, Godoholo and Stoelmanseiland are the busiest public airstrips and are situated in the eastern part of Suriname. Drietabbetje and Godoholo share similar scores for the different criteria as they are nearby each other. They top the list due to the high demand related to the dense population (2800+ inhabitants), gold mining activity and presence of medical facilities and school facilities. The Maroon granman is located at Drietabbetje. Stoelmanseiland has a hospital. These airstrips can also be reached by boat from Albina, taking approximately a day. These three airstrips have a low flooding risk as per the data of NCCR. Previous studies have prioritized Drietabbetje and Stoelmanseiland more often than Godoholo.

Meanwhile, the airstrips of Ladouani and Djumu are situated in the Boven-Suriname region and also have many similarities. Currently both have a low demand for flights as the accessibility by car and boat is great. The Boven-Suriname region is also densely populated, has a lot of touristic attractions,

medical facilities, schools and no gold mining activity. Djumu has been given priority many times in previous studies.

### 4.5.2 Airstrips Prio. B

Poeketi shares many similarities with Drietabbetje, as they are very close to each other. The same goes for Botopasi and Ladouani and Djumu.

Apetina and Vincent Fayks – Paloemeu are located in the southern part of the country and share a lot of similarities as they are from the same region. Vincent Fayks – Paloemeu is more of a touristic attraction, however in Apetina is where one of the Indigenous granmans seats. There are very little production activities within the area, other than tourism. The village has one medical center, one primary school and the location of the Indigenous granman. Apetina experienced fl ooding once during the past 15 years.

Near the airstrip of Albina there is a lot of production activities such as agriculture, gold, bauxite, laterite mining and building materials. The villages surrounding Albina have a total population of 2000 inhabitants, with 1 hospital, 2 medical centers, 6 schools (primary and secondary) and recreation/ tourism activities located in the area. Near the airstrip, there is also the protected area Wane kreek located. Albina and Moengo are less than 3 hours average away from Paramaribo by car, which is why the flight movements are on the low side.

Kwamalasoemoetoe is located in the southwest of the country and has quite a lot of flight movements despite there being little to no production activities in those areas other than tourism. Kwamalasemoetoe is only accessible by airplane. According to previous studies, Kwamalasemoetoe airstrips have a high priority score. The condition of the airstrips ranked from fair to poor, with Djumu and Kwamalasoemoetoe experiencing flooding twice during the past 15 years.

**Table 11: Airstrips ranked from highest to lowest priority with normalized values for each criterion.**

| Airstrip | Flight movements | Medical facilities | Schools | Recreation/ Tourism | Commercial | Granman presence | Number of inhabitants | Flooding vulnerability | Travel time alternative modes | Gold mining | Protected area (ha) | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Weight** | **4** | **3** | **2** | **3** | **2** | **3** | **4** | **3** | **4** | **1** | **1** | 30 | |
| **Impact** | + | + | + | + | + | + | + | - | + | - | + | | |
| | | | | | | | | | | | | | |
| Drietabbetje | 0.8 | 1.0 | 0.4 | 0.0 | 0.0 | 1.0 | 0.3 | 1.0 | 0.8 | 0.5 | 0.0 | 17.6 | Poeketi and Godo Holo nearby |
| GodoHolo | 0.7 | 0.5 | 0.3 | 0.0 | 0.0 | 1.0 | 0.4 | 1.0 | 0.8 | 0.6 | 0.0 | 15.7 | Drietabbetje nearby |
| Ladouanie | 0.0 | 1.0 | 1.0 | 1.0 | 0.6 | 0.0 | 0.9 | 0.5 | 0.0 | 1.0 | 0.0 | 15.5 | |
| Djumu | 0.1 | 0.7 | 0.5 | 1.0 | 0.4 | 1.0 | 0.8 | 0.0 | 0.3 | 1.0 | 0.0 | 15.3 | Nearby Botopasi |
| Stoelmanseiland | 1.0 | 0.5 | 0.3 | 0.2 | 0.0 | 0.0 | 0.3 | 1.0 | 0.8 | 0.5 | 0.0 | 14.4 | Hospital, high priority previous studies |
| Poeketi | 0.0 | 0.8 | 0.3 | 0.0 | 0.0 | 1.0 | 0.3 | 1.0 | 0.8 | 0.5 | 0.0 | 13.8 | Very nearby Drietabbetje |
| Botopasie | 0.1 | 0.5 | 0.6 | 1.0 | 0.0 | 0.0 | 1.0 | 0.5 | 0.3 | 1.0 | 0.0 | 13.6 | Nearby Djumu |
| Vincent Fayks-Paloemeu | 0.3 | 0.2 | 0.1 | 1.0 | 0.0 | 0.0 | 0.1 | 1.0 | 1.0 | 1.0 | 0.0 | 12.9 | Nearby Apetina |
| Albina | 0.0 | 0.5 | 0.5 | 0.6 | 1.0 | 0.0 | 0.2 | 1.0 | 0.0 | 1.0 | 0.3 | 11.7 | Hospital. Nearby Moengo, well accessible by car |
| Apetina | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 1.0 | 0.0 | 0.5 | 1.0 | 1.0 | 0.0 | 11.3 | Nearby Paloemeu |
| Moengo | 0.0 | 0.2 | 0.9 | 0.6 | 0.2 | 0.0 | 0.4 | 1.0 | 0.0 | 1.0 | 0.4 | 10.6 | Nearby Albina, well accessible by car |
| Kwamalasoemoetoe | 0.5 | 0.2 | 0.1 | 0.6 | 0.0 | 0.0 | 0.1 | 0.0 | 1.0 | 1.0 | 0.0 | 10.2 | |
| Raleighvallen | 0.0 | 0.2 | 0.1 | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.3 | 1.0 | 1.0 | 9.7 | |
| Alalapadu | 0.2 | 0.2 | 0.1 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 9.4 | |
| Cottica | 0.4 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 1.0 | 0.8 | 0.0 | 9.0 | |
| Peleloetepu | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 0.0 | 8.5 | |
| Cayana | 0.0 | 0.3 | 0.2 | 0.8 | 0.0 | 0.0 | 0.3 | 0.5 | 0.3 | 1.0 | 0.0 | 8.5 | |
| Oelemarie | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 1.0 | 0.0 | 8.4 | |
| Apoera | 0.1 | 0.3 | 0.3 | 0.6 | 0.0 | 0.0 | 0.2 | 0.5 | 0.3 | 1.0 | 0.0 | 8.2 | |
| Lelygebergte | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 0.0 | 8.1 | |
| Coeroenie | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 1.0 | 0.0 | 7.1 | |
| Poesoegroenoe | 0.1 | 0.2 | 0.2 | 0.0 | 0.6 | 1.0 | 0.1 | 0.0 | 0.0 | 1.0 | 0.5 | 7.1 | |
| Sipaliwini | 0.1 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.5 | 6.6 | |
| Langatabbetje | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 1.0 | 0.1 | 0.5 | 0.0 | 0.4 | 0.0 | 6.4 | |
| Amatopo | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 6.1 | |
| Donderskamp | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | 1.0 | 0.0 | 4.4 | |
| Njoeng-Jakob Kondre | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 2.1 | |

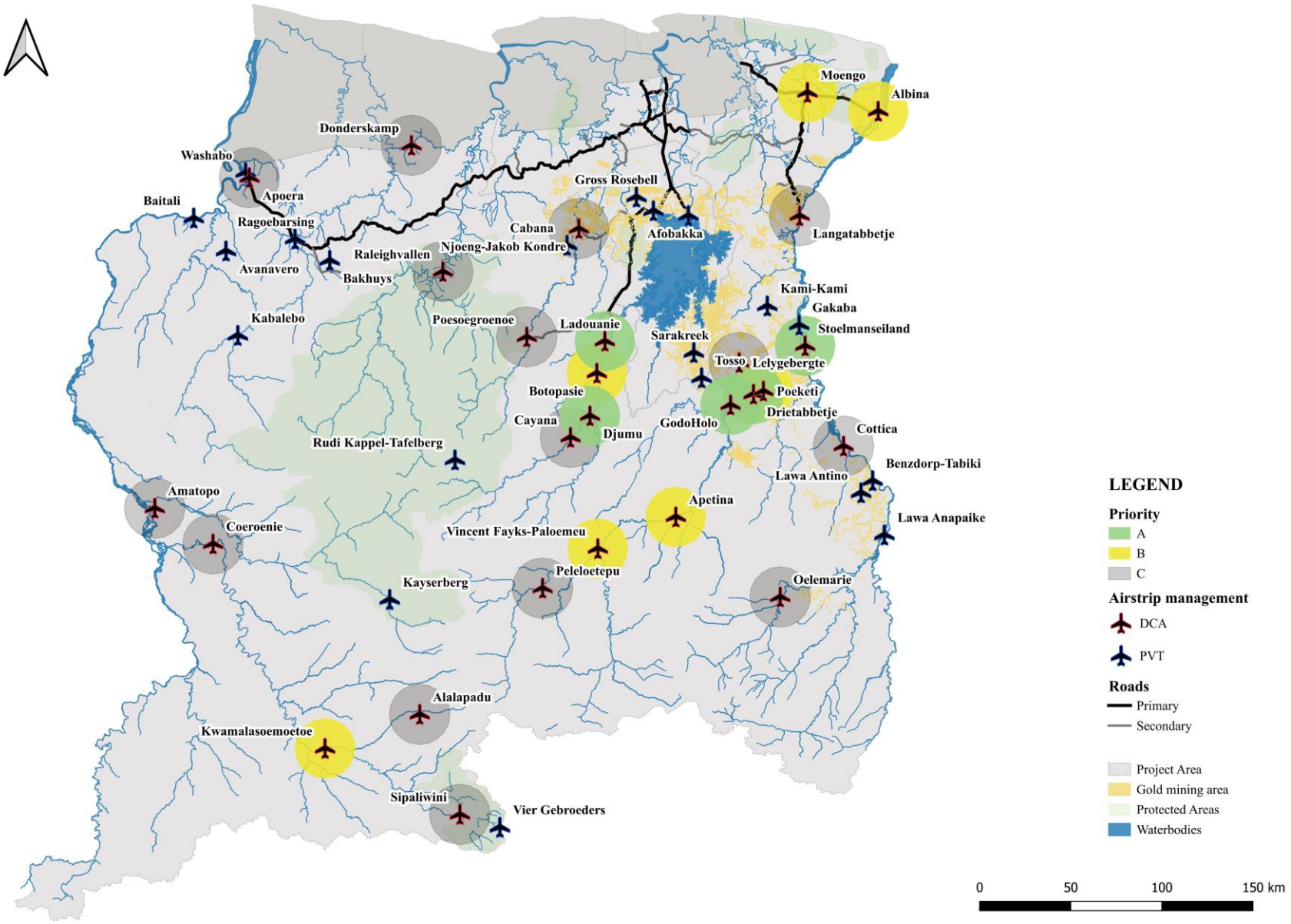



**Figure 14: Resulting categorized airstrips.**

# 5 INTERVENTIONS

The required interventions for each priority category of airstrip are indicated in Table 12. The proposal includes that all public airstrips will receive investments in terms of basic facilities and tools, while the airstrips with Prio. B will receive higher investments and Prio. A the highest.

The Prio. A airstrips are strategically located, have high demand and are to be upgraded to paved airstrips which are mostly in line with the standards set by CASAS (as indicated in Section 2) and thus require most investments. These airstrips are to be upgraded to all-weather airstrips by reprofiling- and paving the runway, adding an apron, turnaround pads, station building, fencing and lights.

The Prio. B airstrips are to be upgraded as reprofiled, unpaved airstrips and require substantial investments. The Prio. C require only basic interventions such as mowing the runway, clearing vegetation within the obstacle restricted zone and the basic facilities & tools.

**Table 12: Overview of proposed required facilities for the different categories of airstrips.**

| Item | Prio. A | Prio. B | Prio. C |
|---|---|---|---|
| **Runway** | | | |
| Paved surface | x | | |
| Re-profiling | x | x | |
| Mowing | | x | x |
| **Airstrip** | | | |
| Apron (aircraft parking) | x | | |
| Turn pad | x | x | |
| Clearance of vegetation | x | x | x |
| **Basic Facilities & Tools** | | | |
| Windsock & Pole | x | x | x |
| Radio | x | x | x |
| Rain Gauge | x | x | x |
| Scale | x | x | x |
| Fire extinguisher | x | x | x |
| First Aid kit | x | x | x |
| Map of Suriname | x | x | x |
| Airstrip diagram | x | x | x |
| Mower | x | x | x |
| Supply of maintenance tools | x | x | x |
| **Additional Facilities** | | | |
| Storage room | x | x | x |
| Station building | x | x | |
| Water tank & tower | x | x | |
| Fence | x | | |
| Solar Panel & Battery | x | x | |
| Emergency Generator | | | |
| Airstrip lights | x | | |
| Runway marking | x | | |
| Markers | | x | x |

The interventions, their costs and required studies are discussed in this section.

## 5.1 Specification of interventions

Each item of the interventions is discussed in the following subsections. A basic layout of a Prio. A airstrip is provided in Figure 15, which includes the dimensions of the different facilities based on the ICAO Annex 14 - Aerodromes standard (ICAO, 2018) as discussed in Section 2. The airstrips are classified as Category 1B airstrip as per the ICAO standards. The proposed runway should have a width of 18 m and a length of 650 m, based the maximum takeoff distance of 624 m required by the representative airplane, Cessna 208B. The chosen runway strip width is 30 m at each side of the runway centre line, with an extension of 30 m at the end of the runway. Taxiways are not included due to the relatively low number of flights expected.

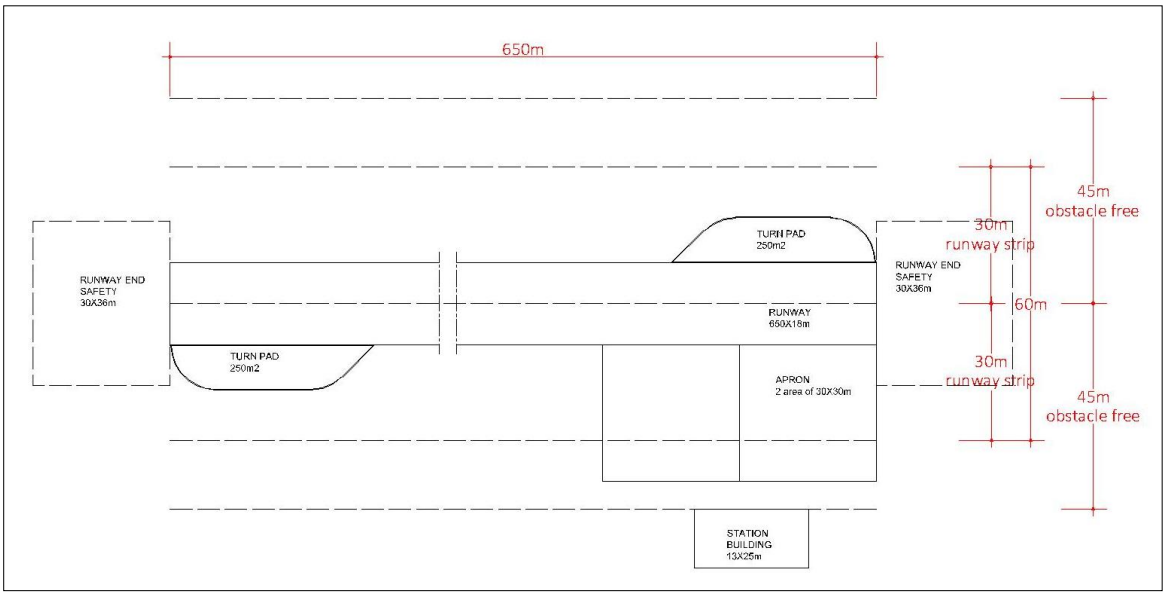



**Figure 15: Layout of a Prio. A airstrip.**
*Source: Own elaboration.*

### 5.1.1 Runway mowing, re-profiling & pavement

The basic intervention for the airstrip includes mowing the grass on the existing runway strip (650 m × 60 m).

The Prio. A and B airstrips require the runway strip (650 m × 60 m) to be reprofiled with a transverse slope of 2% for proper drainage. The longitudinal slope is to be minimized below 2%.

The runway on the Prio. A airstrips are to be paved. The conventional method of paving the runway with asphalt will require a substantial investment- and maintenance costs due to the high transport costs involved in transporting materials and heavy equipment towards these rural airstrips. None of the Prio. A airstrips is accessible by road. Alternative pavement methods are explored which maximize usage of local material and require minimal heavy equipment.

The proposed pavement method includes the application of a Geoweb base with a paved top layer. Geoweb, also known as Geocells or cellular confinement systems, is a type of material used for stabilizing surfaces including runways (Figure 16).

Here are some pros (+) and cons (-) of using a Geoweb base with a paved top layer for rural airstrips:

+ Easier maintenance: due to the structural reinforcement the load is more evenly distributed and the risk of rutting, erosion, or deformation is reduced. Repair would not require heavy equipment.
+ Cost effectiveness: even though the Geoweb itself raises the investment costs, it can be used with stabilize local soil material instead of having to transport material from elsewhere.

+ Installation equipment: Geoweb with a paved top layer requires less heavy equipment than conventional asphalt pavement. Geoweb itself is lightweight and standard construction equipment can be used.
+ Versatility: Geoweb systems can be customized to accommodate various soil conditions and site-specific requirements.
- Complexity: requires specialized knowledge and possibly extending construction time, especially with regards to the surface finish of the top layer.
- Long-term performance uncertainty: long-term performance may not be fully understood, leading to potential uncertainties regarding durability and longevity.


**Figure 16: Impression of Geoweb installation.**
*Source: Presto GeoSystems.*

The following two pavement alternatives are proposed, which can be chosen based on the locally available material:

1. Geoweb filled with laterite, savanna sand or paver sand (layer thickness: 0.15 m). Wear surface (top layer) made up of a 0.07 m laterite or savanna sand sealed with a bitumen emulsion. See Figure 17.
2. Geoweb filled with river sand. Wear surface (top layer) made up of a 0.07 m fiber concrete layer (C20/25) using a gravel and river sand mixture. See Figure 18.

Alternatively crushed stones from nearby mining activities can be used as filling material for the Geoweb system.

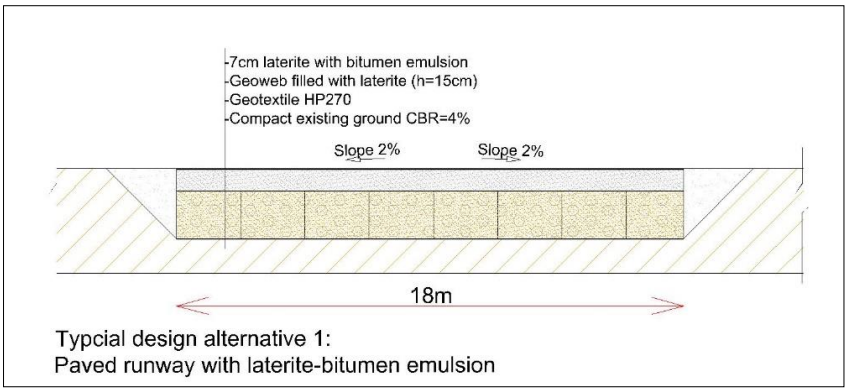



**Figure 17: Typical design paved runway, Alternative 1.**
*Source: Own elaboration*

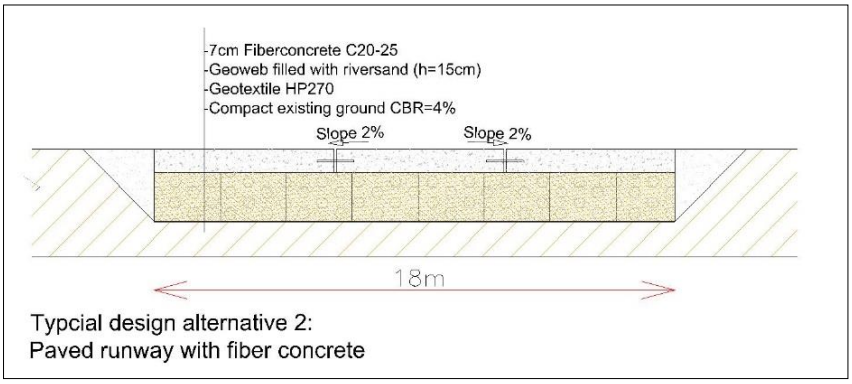



**Figure 18: Typical design paved runway, Alternative 2.**
*Source: Own elaboration*

The wear surface/ top layer in alternative 2 includes segmented fiber 6m x 6m fiber concrete plates connected with dowels and bitumen sealant joints. The segmentation should prevent cracking of the wear surface due to heat expansion. The fiber added to the concrete should increase the strength and reduce the risk of cracking.

A technical evaluation of the proposed Geoweb systems is included in Annex. A. This includes the following assumptions:

- Strength: withstanding Twin Otter DHC-6
- Geotextile HP270
- Filling material of the Geoweb with available material:
    - If existing ground is Savanna sand or laterite this can be used as filling material.
    - If existing ground is clay or weathered mountain material than filling material will be river sand
- Wear surface material:
    - For 3A: mix bitumen emulsion and laterite or savanna sand
    - For 3B: 0.07 m fiber concrete (fiber cement, gravel and sand) C25/30. 6x6 surfaces with a thickness of 0.07 m and expansion joint seams (bitumen sealant and dowels) in-between to prevent cracking due to heat expansion. The fibers to be added are BarChip 48 for which the specifications are indicated in Table 13.

**Table 13: Specification of BarChip fiber.**

| | BarChip 48 | |
|---|---|---|
| Length | 48mm | |
| Tensile Strength | 640 Mpa | |
| Elastic modulus | 12000 Mpa | |
| Strength @CMOD-0.5mm | C25/30 | 1.90 MPa |
| | C30/37 | 1.95 Mpa |
| | C35/45 | 2.05 Mpa |
| | C40/45 | 2.05 MPa |
| Strength @CMOD-3.5mm | C25/30 | 2.05 MPa |
| | C30/37 | 2.15 MPa |
| | C35/45 | 2.25 MPa |
| | C40/45 | 2.40 MPa |
| Standard | EN 14889 - 2 | |

### 5.1.2 Apron

On the Prio. A airstrips a paved apron for 2 aircrafts is included, with the following technical specifications:

- The surface should have a slope of 1%.
- A clearance from the aircrafts to objects and buildings of at least 3m.
- 2 aircrafts for which each 30 m x 30 m (based on Twin Otter DH-6) space is reserved for parallel parking along the runway, without them having to conduct reverse movements.
- The pavement construction is the same as that of the runway.

On the Prio. B and C airstrips can park, unload and load on an unpaved designated space along the runway strip.

### 5.1.3 Turn pad

On the Prio. A airstrips paved turn pads allowing for 180-degree turns are included on both ends of the runway, with the following technical specifications:

- An additional paved surface with a width of 10 m over a length of approximately 25 m is added on one side at the end of the runway. This should allow for the minimum clearance of 1.5m from the wheel of the representative aircraft (Twin Otter DH-6) and the edge of turn pad.
- A transverse slope of 2% for proper drainage.
- The pavement construction is the same as that of the runway.

### 5.1.4 Clearance of vegetation

Due to the lack of information on the current heights of vegetation around the airstrips, an assumption for the average area of clearance needs is made. This includes topping and/ or removing trees, bushes and obstacles of the following areas:

- Along each side of the runway strip (5 m x 650 m)
- At each extend of the runway for take-off and landing (60 m x 10 m)

### 5.1.5 Basic Facilities

The following basic facilities, equipment and tools are to be provided for each airstrip:

- 2x Windsocks (wind direction indicator) and 2x 6 meter hinged poles
- 1x Radio (see Table 14C)
- 1x Rain Gauge (see Table 14B)
- 2x Scale (see Table 14A)
- 3x Fire extinguisher

- 2x First Aid kit
- 1x Map of Suriname: A0 laminated map
- 1x Airstrip diagram: A0 laminated map
- 2x Grass mower
- Supply of maintenance tools including spades, rakes, hammers, wheelbarrows, etc.
- Storage room of which is incorporated in the station building for Prio. A and B airstrips and for Prio. C airstrips a new basic wooden shed (3 m x 5 m) is built.

**Table 14: Specifications of Scale (A), Rain Gauge (B) and Radio System (C).**

**A.**

Baggage scale

- 24 inch x 24 inch weighing platform
- Heavy Duty steel construction
- 36 inchhigh column with handles
- Four 3 inch diameter locking swivel casters
- Controls include: units, gros/net, tare, zero, print (on/off)
- Available with optional battery powered indicator.
- NTEP approved Legal for Trade

**B.**


Heated Tipping Bucket Precipitation Gauge

- Size: 18 cm dia. x 30 cm high, (39 cm high with mounting base)
- Tipping Bucket Rain Gauge Catchment Area: 200 cm2
- Resolution: 0.1 mm per tip
- Accuracy: 2% up to 25mm/hr3% up to 50 mm/hr
- Output: Magnetic reed switch (N.O.), rating 24VAC/DC 500mA
- Operating Temperature: -20 C to +50 C (heated)
- Power: 18 Watts for heater only
- Mounting: Clamp for l in (1.34 in dia.) iron pipe or 3 bolts on 160mm diameter circle
- Other: Leveling adjustment, Thermostatic control for heater, and Intake screen

**C.**


Icom A220B AirBand Radio - Base Station

- 20 regular memory channels with a 6-character channel name
- 50 group memory channels (10 Ch x 5 groups) with a channel tag
- Automatic weather channel scanning and receive (USA version only)
- Dualwatch and priority watch functions
- One-touch access to 121.5 MHz emergency frequency
- Side tone function for monitoring your voice with headset
- ANL (Automatic Noise Limiter) function reduces pulse type noise

- Remote control capability
- PC programming capability
- Dial lock and panel lock
- Time-out timer
- D-Sub 25-pin industry standard connector for easy installation
- Slim 1.34inch (34mm) height can be installed in a limited panel space
- Two types of menu mode: settings menu and configuration menu

### 5.1.6 Station

The Prio. A & Prio. B airstrips will get a station building including departure- and arrival halls, check in facilities, storage rooms and toilets. Based on the indicative floorplan developed by IOS Partners et al. (2012) given in Figure 19, a single level concrete building with a surface area of 300 $m^2$ for Prio. A airstrips and 150 $m^2$ for Prio. B airstrips is proposed. The design and specific facilities are yet to be defined.

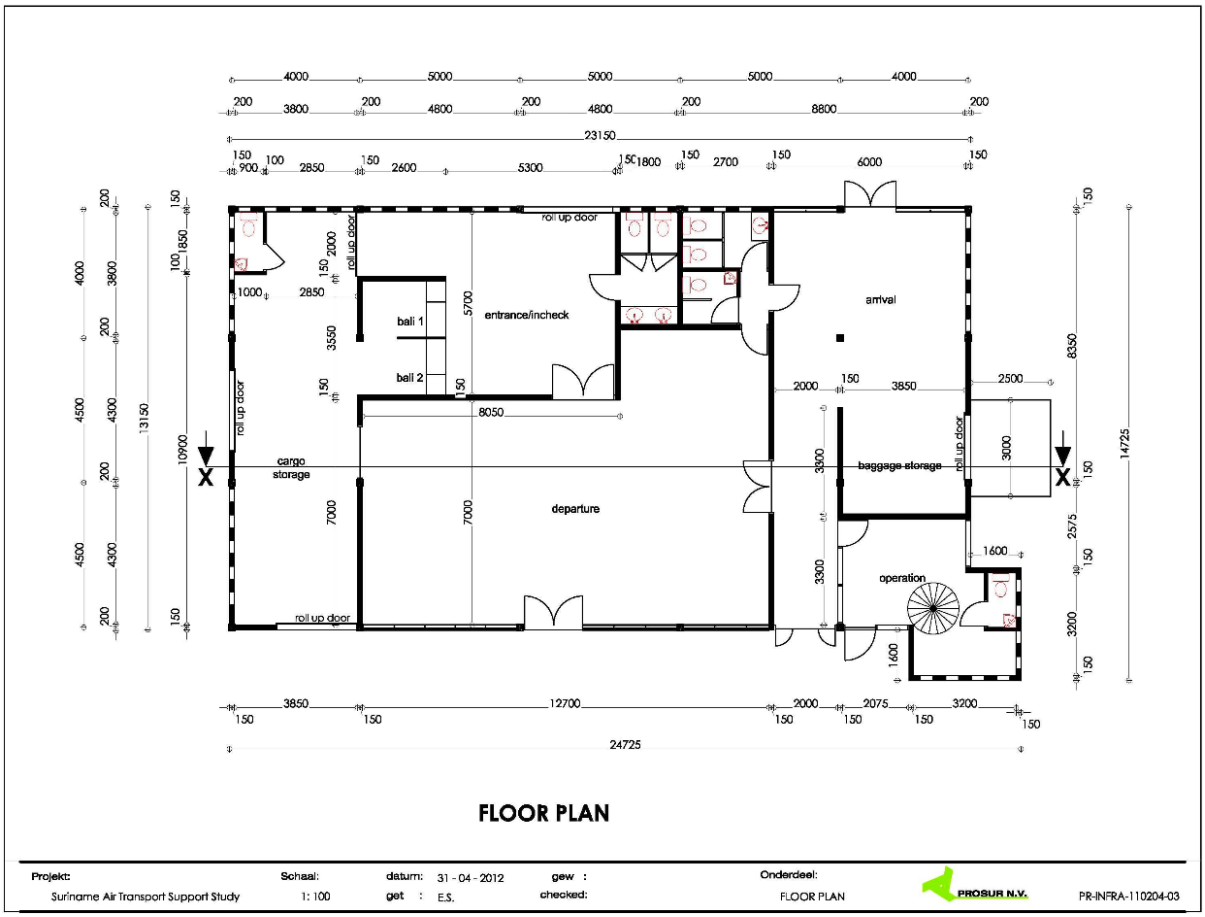



**Figure 19: Indicative floor plan for a station building.**
*Source: IOS Partners et al. (2012)*

### 5.1.7 Water tank

The Prio. A & Prio. B airstrips require a water tank system for operations at the station including water 450-gallon plastic water tank, pipes, taps and wooden tower made from local material.

### 5.1.8 Fence

Around the Prio. A airstrips a wire mesh fence is proposed to restrict wildlife entering the runway with the following specifications: height=1.5 m, length= 1500 m. The fence should be modular, light weight, quick and easy to install and repair and maintenance free.

**Figure 20: Wire mesh fencing.**

### 5.1.9 Lights

The Prio. A airstrips are to be equipped with lights for safe night operations. This includes:

- An APAPI light system (two sharp transition multi lamps) on the left side of the runway, enabling the approach procedure to be performed with accuracy and safety by providing the pilot with visual information.
- Runway edge lights along both sides of the runway with a distance of 100 m in-between the lights.

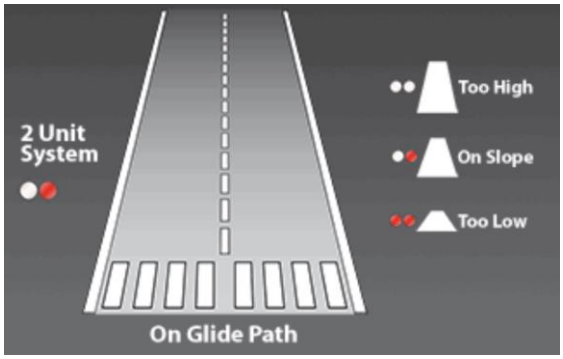



**Figure 21: APAPI lights system.**

### 5.1.10 Solar PV system and Emergency generator

In order to provide electricity for the station building and the lighting system, the Prio. A & Prio. B airstrips are to be equipped with a solar PV system including batteries (Table 15A). The Prio. A are to be equipped with a 800W system and the Prio. B with 400W. In case of failure of the solar PV system a backup gasoline powered generator is included for these airstrips (Table 15B).

**Table 15: Specifications of solar panel system (A) and emergency power generator (B).**

| | |
|---|---|
| **A.**  <br>MAPPS 800W 24VDC 530Ahr Pole-Mounted Battery Enclosure Solar System<br>• Model Number MAPPS-760-530-24-POLE<br>• Nominal System Voltage 24 VDC<br>• Solar PV Module 4XSES 4200J24 Vdc 200 Watts ea.<br>• Solar Module Certifications UL 1703, Class 1 Division 2, Group A, B, C, D, Class C Fire Rating | **B.**  <br>Ford Generator 4650w<br>• Peak Wattage 4650 watts, rated output 3600 watts<br>• Engine: 208cc with 7 HP<br>• 4.2 gallon tank with 11 hour run time<br>• Outlets: 2/120V, 1/120TL, 1/12VDC<br>• Maintenance free battery |

### 5.1.11 Marking

The paved runways of the Prio. A airstrips are to be equipped with thermoplastic markings as follows:

- Runway designation marking
- Runway center line marking: width 0.30m, line length 50m with gaps of 30m
- Threshold marking: 4x longitudinal stripes at 6 m distance form threshold.
- Runway turn pad marking: Continuous center line with width= 0.15m and length=70m

### 5.1.12 Markers

The unpaved runways of the Prio. B and Prio. C airstrips are equipped with the following markers:

- Boundary markers with contrasting colors alongside the runway at intervals of 100 m.
- Runway edge markers: flat rectangular concrete surface 1x3 $m^2$ and height 0.05 m at 100m intervals

**Figure 22: Boundary- and runway edge markers.**
*Source: www.delta-box.com*

### 5.1.13 Construction equipment

The minimal construction equipment required are listed below:

- Wheel backhoe or a Skidsteer including grader and compactor add-on.
- Plate compactor machine
- Submersible pump
- Portable concrete mixer (150 L)
- Metal tank and heater (1300 L) for heating of the bitumen emulsion

**Table 16: Specification of the heavy equipment.**

| | |
|---|---|
|  Wheel backhoe |  Compactor adjustable to wheel backhoe |

Compactor adjustable to wheel backhoe


Plate compactor machine

Portable concrete mixer

Metaltank and heater

### 5.1.14 Transport

Most material and equipment are to be transported by plane and in some cases by road (Albina, Moengo, Njoeng-Jakob Kondre and Langatabbetje). Local material such as laterite and river sand can be transported by boat. Based on charter flight prices of Gumair and distance by road, conservative transport tariffs are determined as follows:

- $1/kg for Albina and Moengo,
- $2/kg for Njoeng-Jakob Kondre and Langatabbetje,
- $6/kg for Vincent Fayks-Paloemeu, Apetina, Peleloetepu, Apoera,
- $8/kg for Kwamalasamoetoe, Sipaliwini, Coeroenie and Alalapadu,
- $4/kg for all other airstrips.

The weights of all materials and equipment are estimated for the determination of the transport costs.

## 5.2 Cost estimation

A summary of the costs for the Prio. A, B and C airstrips is presented in Table 17 to Table 19. This includes the costs for works, transport and additional overhead. A detailed breakdown of the cost estimation for the works per intervention item for each airstrip category is included in Append. B. The additional overhead costs are estimated as 10% of the works- and transport costs.

Physical contingency costs are to be assumed 10% and include unforeseen costs. Survey, detail design and supervision costs are assumed to be 10% after adding physical contingency costs.

The total investment cost for the physical investments in all public airstrips are estimated at $18.2M.

**Table 17: Cost estimation for Prio. A airstrips.**

| No. | Airstrips | Works costs | Transport rate USD/kg | Transport cost | Additional overhead cost | Sub total |
|---|---|---|---|---|---|---|
| 1 | Drietabbetje | $ 1,751,554 | $ 4 | $ 242,002 | $ 199,356 | $ 2,192,911 |
| 2 | Godoholo | $ 1,751,554 | $ 4 | $ 242,002 | $ 199,356 | $ 2,192,911 |
| 3 | Ladouanie | $ 1,751,554 | $ 4 | $ 242,002 | $ 199,356 | $ 2,192,911 |
| 4 | Djumu | $ 1,751,554 | $ 4 | $ 242,002 | $ 199,356 | $ 2,192,911 |
| 5 | Stoelmanseiland | $ 1,751,554 | $ 4 | $ 242,002 | $ 199,356 | $ 2,192,911 |
| | | | | | Total SUM | **$ 10,964,556** |

| | | |
|---|---|---|
| Physical Contingency Cost | 10% | $ 1,096,456 |
| Subtotal | | $ 12,061,011 |
| Surveys, detail design & Supervision | 10% | $ 1,206,101 |
| **Grand Total** | | **$ 13,267,113** |

**Table 18: Cost estimation for Prio. B airstrips.**

| No. | Airstrips | Works costs | Transport rate USD/kg | Transport cost | Additional overhead cost | Sub total |
|---|---|---|---|---|---|---|
| 1 | Poeketi | $ 263,150 | $ 4 | $ 50,532 | $ 31,368 | $ 345,050 |
| 2 | Botopasie | $ 263,150 | $ 4 | $ 50,532 | $ 31,368 | $ 345,050 |
| 3 | Vincent Fayks-Paloemeu | $ 263,150 | $ 6 | $ 75,797 | $ 33,895 | $ 372,842 |
| 4 | Albina | $ 263,150 | $ 1 | $ 12,633 | $ 27,578 | $ 303,361 |
| 5 | Apetina | $ 263,150 | $ 6 | $ 75,797 | $ 33,895 | $ 372,842 |
| 6 | Moengo | $ 263,150 | $ 1 | $ 12,633 | $ 27,578 | $ 303,361 |
| 7 | Kwamalasoemoetoe | $ 263,150 | $ 8 | $ 101,063 | $ 36,421 | $ 400,635 |
| | | | | | Total SUM | $ 2,443,141 |

| | | |
|---|---|---|
| Physical Contingency Cost | 10% | $ 244,314 |
| Subtotal | | $ 2,687,455 |
| Surveys, detail design & Supervision | 10% | $ 268,745 |
| **Grand Total** | | **$ 2,956,200** |

**Table 19: Cost estimation for Prio. C airstrips.**

| No. | Airstrips | Works costs | Transport rate USD/kg | Transport cost | Additional overhead cost | Sub total |
|---|---|---|---|---|---|---|
| 1 | Raleighvallen | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 2 | Alalapadu | $ 87,500 | $ 8 | $ 19,703 | $ 10,720 | $ 117,924 |
| 3 | Cottica | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 4 | Peleloetepu | $ 87,500 | $ 6 | $ 14,777 | $ 10,228 | $ 112,505 |
| 5 | Cayana | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 6 | Oelemarie | $ 87,500 | $ 6 | $ 14,777 | $ 10,228 | $ 112,505 |
| 7 | Apoera | $ 87,500 | $ 6 | $ 14,777 | $ 10,228 | $ 112,505 |
| 8 | Lelygebergte | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 9 | Coeroenie | $ 87,500 | $ 8 | $ 19,703 | $ 10,720 | $ 117,924 |
| 10 | Poesoegroenoe | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 11 | Sipaliwini | $ 87,500 | $ 8 | $ 19,703 | $ 10,720 | $ 117,924 |
| 12 | Langatabbetje | $ 87,500 | $ 2 | $ 4,926 | $ 9,243 | $ 101,668 |
| 13 | Amatopo | $ 87,500 | $ 8 | $ 19,703 | $ 10,720 | $ 117,924 |
| 14 | Donderskamp | $ 87,500 | $ 4 | $ 9,852 | $ 9,735 | $ 107,087 |
| 15 | Njoeng-Jakob Kondre | $ 87,500 | $ 2 | $ 4,926 | $ 9,243 | $ 101,668 |
| | | | | | Total SUM | $ 1,655,067 |

| | | | |
|---|---|---|---|
| Physical Contingency Cost | 10% | $ | 165,507 |
| Subtotal | | $ | 1,820,574 |
| Surveys, detail design & Supervision | 10% | $ | 182,057 |
| **Grand Total** | | **$** | **2,002,631** |

## 5.3 Non-physical interventions

In addition to the physical interventions, the following interventions are proposed:

- Develop practical ‘Bush Flying’ aerodrome safety standards with CASAS.
- Develop policy regarding compilation, sharing and analyzing of flight manifest data. Digitalization of communication logbook of LVT, such that the info can be further analyzed.
- Having trained qualified personnel at the various aerodromes is essential for the successful maintenance and operation.
- Assess options for Public Private Partnerships for Operation and Maintenance of airstrips.
- Develop airstrip diagrams (a map of the location of different facilities with a reference grid) for each airstrip.
- Conduct soil investigations, topography surveys and clearance inspections for the Prio. A and Prio. B airstrips. Further research on the type of soil and mechanical properties are advised to conduct to determine the material to be used for the construction of the airstrip.
- Some airstrips are short, assess the possibility of extending.
- Typical designs of airstrips and station buildings are yet to be made.

# 6 CONCLUSIONS

A prioritization for investments in the public domestic airstrips is made based on the current demand socioeconomic- and accessibility criteria. The proposal is based on the principle that all public domestic airstrips receive investments, while some with higher priority get a bigger investment. The proposed investments have been specified and quantified, while adhering to the local and international airstrip standards and considering high costs for transport and ease of maintenance.

In order to make the investments sustainable, a change is required in the management system. Based on the resulting numbers, the Government can take a well-balanced consideration for the way forward, which may include taking an approach of phasing into privatization/concessions of the high-volume airstrips to get the private party familiarized with the business under strict KPI conditions of performance and inclusion of social airstrips in time. The results can be used for setting up an economic and financial feasibility study to further assess the various management options discussed in this report

The overall strategic plan of the government regarding the economic development of the country and the interior, the main focus of pillars/industries for economic growth, national urban policies and plans are key to the need for development of the domestic airstrips. This plan needs to stimulate sustainable sectors, in order to maximize chances of attracting investments.

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## COLOPHON


| | | |
|---|---|---|
| Client | : | Inter-American Development Bank |
| Project | : | Identification of required maintenance and repair actions on grasshopper airstrips |
| Subject | : | Final report |
| File | : | IS-440 |
| Author | : | S. Kishoen Misier |
| Contributions | : | M. Blenman, T. Mendonça |
| Approved | : | Ravindra Patandin |
| Date | : | 12 April 2024 |

# APPENDICES

## Appendix A: Geoweb System Technical Evaluation Presto Geosystems

## Appendix B: Cost Breakdown

| Item 1: Runway | | | | Prio. A | | Prio. B | | Prio. C | |
|---|---|---|---|---|---|---|---|---|---|
| **Nr.** | **Works** | **Unit price USD** | **Unit** | **Quantities Prio A** | **Total USD** | **Quantities Prio B** | **Total USD** | **Quantities Prio C** | **Total USD** |
| **1.1** | Supply and install of geoweb system including re-profiling, earthworks, geotextile and wear surface | 46.00 | $m^2$ | 11,700 | | | | | |
| | | 92.00 | $m^2$ | 11,700 | 1,076,400 | | - | | - |
| **1.2** | Re-profiling of this area | 1.40 | $m^2$ | 27,300 | 38,220 | 39,000 | 54,600 | | - |
| **1.3** | Mowing and disposal of grass of this area | 0.50 | $m^2$ | 39,000 | | 39,000 | 19,500 | 39,000 | 19,500.00 |
| | | | **Sub Total price Item 1** | | 1,114,620 | | 74,100 | | 19,500 |

| Item 2: Airstrips | | | | Prio. A | | Prio. B | | Prio. C | |
|---|---|---|---|---|---|---|---|---|---|
| **Nr.** | **Works** | **Unit price USD** | **Unit** | **Quantities Prio A** | **Total USD** | **Quantities Prio B** | **Total USD** | **Quantities Prio C** | **Total USD** |
| **2.1** | Supply and construct an Apron (aircraft parking) of geoweb system including re-profiling, earthworks, geotextile and wear surface | 92.00 | $m^2$ | 1,800 | 165,600 | | - | | |
| **2.2** | Supply and construct a Turn pad | 92.00 | $m^2$ | 250 | 23,000 | | - | | |
| **2.3** | Clearance of vegetation (trees, obstacles) | 6.50 | $m^2$ | 7,100 | 46,150 | 7,100 | 46,150 | 7,100 | 46,150.00 |
| | | | **Sub Total price Item 2** | | 234,750 | | 46,150 | | 46,150 |

| Item 3: Basic facilities and Tools | | | | Prio. A | | Prio. B | | Prio. C | |
|---|---|---|---|---|---|---|---|---|---|
| **Nr.** | **Tools** | **Unit price USD** | **Unit** | **Quantities Prio A** | **Total USD** | **Quantities Prio B** | **Total USD** | **Quantities Prio C** | **Total USD** |
| **3.1** | Windsock (wind direction indicator) + pole | 150.00 | pc | 2 | 300 | 2 | 300 | 2 | 300.00 |
| **3.2** | Radio | 3,500.00 | pc | 1 | 3,500 | 1 | 3,500 | 1 | 3,500.00 |
| **3.3** | Rain Gauge | 980.00 | pc | 1 | 980 | 1 | 980 | 1 | 980.00 |
| **3.4** | Scale | 1,890.00 | pc | 2 | 3,780 | 2 | 3,780 | 2 | 3,780.00 |
| **3.5** | Fire extinguisher | 160.00 | pc | 3 | 480 | 3 | 480 | 3 | 480.00 |
| **3.6** | First Aid kit | 95.00 | pc | 2 | 190 | 2 | 190 | 2 | 190.00 |
| **3.7** | Map of Suriname | 100.00 | pc | 1 | 100 | 1 | 100 | 1 | 100.00 |
| **3.8** | Airstrip diagram | 100.00 | pc | 1 | 100 | 1 | 100 | 1 | 100.00 |
| **3.9** | Mower | 1,100.00 | pc | 2 | 2,200 | 2 | 2,200 | 2 | 2,200.00 |
| **3.10** | Supply of maintenance tools | 500.00 | post | 1 | 500 | 1 | 500 | 1 | 500.00 |
| | | | **Sub Total price Item 3** | | 12,130 | | 12,130 | | 12,130 |

## Appendix C: Airstrip data

| Airstrip Alalapadu | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 179 | # |
| Hospital | - | 0 | # |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Tiriyó granman (Indigenous granman) | 1 | # |
| Number of inhabitants | Alalapadu | 80 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Nickerie - Alalapadu | 340 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | Sipaliwini Savanna Nature Preserve | 11147 | ha |
| Airstrip condition | R: good, D: fair, S: - | 15 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Albina | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 9 | # |
| Hospital | - | 1 | # |
| Medical center | - | 2 | # |
| Schools | Primary and secondary schools | 6 | # |
| Recreation/ Tourism | Moiwana, Playground, Pub | 3 | # |
| Commercial & Community center | - | 5 | # |
| Granman Residence | - | 0 | - |
| Number of inhabitants | George kondre/ Prassara kondre/ Passikondre/ Bamboesi/ St. Laurent/ Papatamkondre/ Manjaboomkondre/ Akroikondre/ Eduardkondre/ Wijngaardekondre/ St. Jean/ Portal/ Bigiston/ Tapahoekoe/ Erowarte/ Alfonsdorp/ Negerkreek | 2256 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo-Albina | 3 | hrs. |
| Agriculture | - | 509 | ha |
| Gold mining | - | 12 | ha |
| Other mining | Bauxite, Laterite, Building Material | 449 | ha |
| Wood logging | - | 0 | ha |

| Airstrip Albina | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Protected area | Wane kreek | 76673 | ha |
| Airstrip condition | - | 0 | - |
| Priority previous studies | CADSUR | 1 | - |

| Airstrip Amatopo | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 284 | # |
| Hospital | - | 0 | - |
| Medical center | - | 0 | - |
| Schools | - | 0 | - |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Amatopo | 35 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Nickerie - Amatopo | 124 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: good, D: fair, S: - | 15 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Apetina | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 276 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Wayana granman (Indigenous granman) | 1 | # |
| Number of inhabitants | Apetina | 259 | # |
| Nearby Airstrips | - | 0 | # |

| Airstrip Apetina | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flooding Vulnerability | 2022 | 1 | times |
| Travel Time Alternative Modes | Paramaribo - Albina - Apetina | 39 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: good, D: good, S: poor | 20 | - |
| Priority previous studies | CADSUR | 1 | - |

| Airstrip Apoera | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 151 | # |
| Hospital | - | 0 | - |
| Medical center | - | 2 | # |
| Schools | Primary and secondary schools | 3 | # |
| Recreation/ Tourism | Road to Marapi, Entrance terrain Hanger (Memorial), Terrain Hanger | 3 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Wasjabo/ Apoera/ Fransman landing/ Section/ Wakai | 1799 | # |
| Nearby Airstrips | Washabo | 1 | # |
| Flooding Vulnerability | 2022 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Apoera | 6 | hrs. |
| Agriculture | - | 8 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 76069 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: poor, S: - | 0 | - |
| Priority previous studies | NCCR | 1 | - |

| Airstrip Botopasie | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 89 | # |
| Hospital | - | 0 | - |

| Airstrip Botopasie | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Medical center | - | 3 | # |
| Schools | Primary school | 7 | # |
| Recreation/ Tourism | Menimi Eco Resort, Saamaka Miseum, Jungle Hotel Boto Pasi, Playground, Danpaati River Lodge | 5 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Goejaba/ Dang/ Pikien Pada/ Malobbi/ Marechalkriki/ Hekoenoe/ Toemaripa/ Pikien Slee/ Futunakaba/ Bottopassie/ Debike/ Djindjinston/ Grantatai/ Bendikwai/ Kambalua Koonoo/ Masiakriki | 9127 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2017 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Atjoni - Botopasie | 6 | hrs. |
| Agriculture | - | 39 | ha |
| Gold mining | - | 1 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 4843 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: -, S: poor | 0 | - |
| Priority previous studies | IOS Partners, Inc. | 1 | - |

| Airstrip Cayana | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 54 | # |
| Hospital | - | 0 | - |
| Medical center | - | 2 | # |
| Schools | Primary school | 2 | # |
| Recreation/ Tourism | Kosindo River Lodge, Attraction: Moitori, Ligolio, Bëgöön | 4 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Poigron/ Cajana/ Godowatra/ Stonehoekoe/ Dan Gogo II/ Paloeloe Basoe/ Dan Gogo I/ Akisiaman Kampoe/ Debo/ Bendiwata/ Ligolio/ Begron/ Makkakondre | 2296 | # |

ILACO

| Airstrip Cayana | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Nearby Airstrips | Djumu | 1 | # |
| Flooding Vulnerability | 2017 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Atjoni - Cayana | 10 | hrs. |
| Agriculture | - | 25 | ha |
| Gold mining | - | 2 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | Central Suriname Nature Reserve | 1057 | ha |
| Airstrip condition | R: poor, D: good, S: poor | 10 | - |
| Priority previous studies | CADSUR | 1 | - |

| Airstrip Coeroenie | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 158 | # |
| Hospital | - | 0 | - |
| Medical center | - | 0 | - |
| Schools | - | 0 | - |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Coeroenie | 50 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Nickerie - Coeroenie | 148 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: good, D: good, S: fair | 25 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Cottica | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 445 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Cottica dorp/ Boniville/ Assici/ Coermotibo/ Loka Loka/ Cottica-Lawa | 723 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Albina - Cottica | 230 | hrs. |
| Agriculture | - | 13 | ha |
| Gold mining | - | 3366 | ha |
| Other mining | - | 0 | ha |

| | | | |
|---|---|---|---|
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: fair, D: good, S: - | 15 | - |
| Priority previous studies | - | 0 | - |

ILACO

| Airstrip Djumu | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 108 | # |
| Hospital | - | 0 | - |
| Medical center | - | 4 | # |
| Schools | Primary school | 6 | # |
| Recreation/ Tourism | Kosindo River Lodge, Attraction: Moitori, Ligolio, Bëgöön | 4 | # |
| Commercial & Community center | - | 2 | # |
| Granman Residence | Saramaka granman (Maroon granman) | 1 | # |
| Number of inhabitants | Marechalkriki/ Hekoenoe/ Toemaripa/ Semoisie/ Pempe/ Dahomey/ Solan/ Goddo/ Poigron/ Cajana/ Godowatra/ Stonehoekoe/ Dan Gogo II/ Akwankondre/ Boffokoele/ Paloeloe Basoe/ Dan Gogo I/ Gran/ Slee/ Akisiaman/ Djoemoe/ Asaubasoe/ Bendekondre/ Granmankondre (Asidonhopo)/ Kampoe/ Debo/ Bendiwata/ Ligolio/ Begron | 6850 | # |
| Nearby Airstrips | Botopasie/ Cayana | 2 | # |
| Flooding Vulnerability | 2008, 2017 | 2 | time |
| Travel Time Alternative Modes | Paramaribo - Atjoni - Djumu | 8 | hrs. |
| Agriculture | - | 33 | ha |
| Gold mining | - | 2 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: -, D: -, S: poor | 0 | - |
| Priority previous studies | IOS Partners, Inc., NCCR | 2 | - |

| Airstrip Donderskamp | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 14 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |

| Airstrip Donderskamp | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Number of inhabitants | Arakoniekondre, Donderskamp | 409 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2022 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Boskamp | 10 | hrs. |
| Agriculture | - | 1 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 121034 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | - | 0 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Drietabbetje | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 859 | # |
| Hospital | - | 0 | - |
| Medical center | - | 6 | # |
| Schools | Primary school | 4 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Ndyuka granman (Maroon granman) | 1 | # |
| Number of inhabitants | Karmel/ Tjon-Tjon/ Lowabie/ Poeketie/ Saje/ Monpoesoe/ Clementie/ Mooi Takie/ Mansi/ Pikienkondre of Miranda/ Affivisitie/ Pipakondre/ Pikienkondre/ Kisai/ Ajitikondre/ Atjaw/ Tokaba/ Drietabbetje/ Sanbendoemie/ Sondai/ Pipa | 2875 | # |
| Nearby Airstrips | GodoHolo/ Poeketi | 2 | # |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Drietabbetje | 27 | hrs. |
| Agriculture | - | 19 | ha |
| Gold mining | - | 11289 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 2371 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: very poor, D: good, S: - | 10 | - |

| | | | |
|---|---|---|---|
| Priority previous studies | IOS Partners, Inc., CADSUR, TCT | 3 | - |

| **Airstrip GodoHolo** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 721 | # |
| Hospital | - | 0 | - |
| Medical center | - | 3 | # |
| Schools | Primary school | 3 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Ndyuka granman (Maroon granman) | 1 | # |
| Number of inhabitants | Atipakondre/ Sonnakampoe/ Ajokojokondre/ Abetwakondre/ Sanikie/ Lowabie/ Mansi/ Pikienkondre of Miranda/ Affivisitie/ Pipakondre/ Pikienkondre/ Kisai/ Ajitikondre/ Atjaw/ Tokaba/ Drietabbetje/ Sanbendoemie/ Sondai/ Pipa/ Godoholo | 3207 | - |
| Nearby Airstrips | Drietabbetje | 1 | # |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - GodoHolo | 27 | hrs. |
| Agriculture | - | 7 | ha |
| Gold mining | - | 9860 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 2371 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: very poor, D: fair, S: - | 5 | - |
| Priority previous studies | CADSUR | 1 | - |

| **Airstrip Kwamalasoemoetoe** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 571 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |

| | | | |
|---|---|---|---|
| Number of inhabitants | Kwamalasoemoetoe | 1308 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Nickerie - Kwamalasoemoetoe | 340 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: fair, D: good, S: poor | 15 | - |
| Priority previous studies | IOS Partners, Inc., CADSUR, TCT | 3 | - |

| Airstrip Ladouanie | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 29 | # |
| Hospital | - | 0 | - |
| Medical center | - | 6 | # |
| Schools | Primary and secondary schools | 11 | # |
| Recreation/ Tourism | Isadou, Anaula Nature Resort, Menimi Eco Resort, Playground, Saamaka Museum | 5 | # |
| Commercial & Community center | - | 3 | # |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Pokigron/ Abenaston/ Nw. Aurora/ Goejaba/ Pikien Slee/ Futunakaba/ Debike/ Adawai/ Laduani/ Tjaikondre/ Djindjinston/ Grantatai/ Bendikwai/ Lespansi 1/ Lespansi 2/ Goensi/ Pamboko/ Amakakondre/ Salubanga/ Atjoni/ Kajapaati | 8425 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2017 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Atjoni - Ladouanie | 5 | hrs. |
| Agriculture | - | 74 | ha |
| Gold mining | - | 11 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 45705 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: very poor, D: poor, S: poor | 0 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Langatabbetje | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 19 | # |
| Hospital | - | 0 | - |
| Medical center | - | 2 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Paramaka granman (Maroon granman) | 1 | # |
| Number of inhabitants | Badatabbetje/ Langatabbetje | 517 | # |
| Nearby Airstrips | - | 0 | - |

| Airstrip Langatabbetje | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flooding Vulnerability | 2022 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Albina - Langatabbetje | 4 | hrs. |
| Agriculture | - | 83 | ha |
| Gold mining | - | 13528 | ha |
| Other mining | Building Material | 3 | ha |
| Wood logging | - | 73160 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: -, D: -, S: poor | 0 | - |
| Priority previous studies | IOS Partners, Inc. | 1 | - |

| Airstrip Lelygebergte | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 157 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | - | 0 | - |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | - | 0 | - |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Poeketi - Lelygebergte (trail) | 51 | hrs. |
| Agriculture | - | 7 | ha |
| Gold mining | - | 21914 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 30961 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: good, S: poor | 10 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Moengo | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 41 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |

| Airstrip Moengo | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Schools | Primary and secondary schools | 10 | # |
| Recreation/ Tourism | Art, Outdoor activities | 3 | # |
| Commercial & Community center | - | 1 | # |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Oposei-langahoekoe/ Oplanie/ Toekoppie/ Wonoredjo/ Akalikondre/ Masonkondre/ Moela kondre/ Ricanau Petoondro/ Adjoemakondre/ Dam Tapoe/ Ricanau moffo/ Ovilon hollo/ Cassaba ondro/ Moengo Tapu | 3476 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Moengo | 2 | hrs. |
| Agriculture | - | 514 | ha |
| Gold mining | - | 4 | ha |
| Other mining | Bauxite, Building Material, Laterite | 580 | ha |
| Wood logging | - | 31451 | ha |
| Protected area | Wane kreek | 104355 | ha |
| Airstrip condition | - | 0 | - |
| Priority previous studies | TCT | 1 | - |

| Airstrip Njoeng-Jakob Kondre | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 60 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | Camp site | 1 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Jacobkondre/ Oema kondre/ Misalibie/ Baling/ Kwattahede/ Njoen Jacobkondre | 347 | # |
| Nearby Airstrips | Cabana | 1 | # |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Njoeng-Jakob Kondre | 4 | hrs. |
| Agriculture | - | 59 | ha |

| | | | |
|---|---|---|---|
| Gold mining | - | 15767 | ha |
| Other mining | Building Material | 107 | ha |
| Wood logging | - | 215225 | ha |
| Protected area | Brownsberg | 30082 | ha |
| Airstrip condition | R: fair, D: poor, S: poor | 5 | - |
| Priority previous studies | - | 0 | - |

| **Airstrip Oelemarie** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 124 | # |
| Hospital | - | 0 | - |
| Medical center | - | 0 | - |
| Schools | - | 0 | - |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | - | 0 | - |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Oelemarie | 147 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 842 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: -, S: poor | 0 | - |
| Priority previous studies | - | 0 | - |

| **Airstrip Peleloetepu** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 328 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Peleloetepoe | 321 | # |

| | | | |
|---|---|---|---|
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2022 | 1 | time |
| Travel Time Alternative Modes | Paramaribo - Albina - Peleloetepu | 147 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: poor, S: fair | 5 | - |
| Priority previous studies | - | 0 | - |

| **Airstrip Poeketi** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 50 | # |
| Hospital | - | 0 | - |
| Medical center | - | 5 | # |
| Schools | Primary school | 3 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | Ndyuka granman (Maroon granman) | 1 | # |
| Number of inhabitants | Karmel/ Tjon-Tjon/ Poeketie/ Krijorokampoe/ Saje/ Monpoesoe/ Clementie/ Mooi Takie/ Mansi/ Pipakondre/ Pikienkondre/ Kisai/Ajitikondre/ Atjaw/ Tokaba/ Drietabbetje/ Sanbendoemie/ Sondai/ Pipa | 2450 | # |
| Nearby Airstrips | - | 1 | # |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Poeketi | 27 | hrs. |
| Agriculture | - | 19 | ha |
| Gold mining | - | 11220 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 2371 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | - | 0 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Poesoegroenoe | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 66 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 2 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 3 | # |
| Granman Residence | Matawai granman (Maroon granman) | 1 | # |
| Number of inhabitants | Bethel/ Padua/ Pniel/ Atereboto/ Poesoegroenoe (Granmankondre)/ oslanti/ Wanhatti/ Vertrouwen/ Jakoppumau/ Koppowanhanoe/ Tevredu/ Sukiba/ Pijietie | 539 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Poesoegroenoe | 5 | hrs. |
| Agriculture | - | 2 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 62723 | ha |
| Protected area | Central Suriname Nature Reserve | 129577 | ha |
| Airstrip condition | R: poor, D: good, S: fair | 10 | - |
| Priority previous studies | NCCR | 1 | - |

| Airstrip Raleighvallen | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 12 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | Foengoe Island Resort, Camp site: Lolopasi, Moederval, Voltzberg | 5 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | - | 0 | - |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |

| | | | |
|---|---|---|---|
| Travel Time Alternative Modes | Paramaribo - Witagron - Raleighvallen | 7 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 2 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 95212 | ha |
| Protected area | Central Suriname Nature Reserve | 243478 | ha |
| Airstrip condition | R: very poor, D: -, S: - | 0 | - |
| Priority previous studies | - | 0 | - |

| **Airstrip Sipaliwini** | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 117 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | - | 0 | - |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | - | 0 | - |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | 2008, 2022 | 2 | times |
| Travel Time Alternative Modes | Paramaribo - Nickerie - Sipaliwini | 340 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | Sipaliwini Savanna Nature Preserve | 127140 | ha |
| Airstrip condition | R:  poor, D: poor, S: poor | 0 | - |
| Priority previous studies | - | 0 | - |

| Airstrip Stoelmanseiland | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 1082 | # |
| Hospital | - | 1 | # |
| Medical center | - | 2 | # |
| Schools | Primary school | 3 | # |
| Recreation/ Tourism | Bar | 1 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Gakaba/ Poeloegoedoe/ Wangfinga/ Benanoe/ Gransanti/ Abendanon of Tabbetje/ Doetabbikie moffo/ Acote/ Malobie/ Vandaki/ Tabiki/ Stoelmanseiland | 2892 | # |
| Nearby Airstrips | Gakaba | 1 | # |
| Flooding Vulnerability | - | 0 | - |
| Travel Time Alternative Modes | Paramaribo - Albina - Stoelmanseiland | 21 | hrs. |
| Agriculture | - | 28 | ha |
| Gold mining | - | 10715 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 647 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: poor, D: poor, S: - | 0 | - |
| Priority previous studies | IOS Partners, Inc., CADSUR, NCCR, TCT | 4 | - |

| Airstrip Vincent Fayks-Paloemeu | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Flight Movements | - | 276 | # |
| Hospital | - | 0 | - |
| Medical center | - | 1 | # |
| Schools | Primary school | 1 | # |
| Recreation/ Tourism | Viewpoint Palumeu Village | 1 | # |
| Commercial & Community center | - | 0 | - |
| Granman Residence | - | 0 | - |
| Number of inhabitants | Kontina of Pikumi/ Koemaroe kondre/ Pisori (Trio)/ Pontoetoe/ Alopi | 500 | # |
| Nearby Airstrips | - | 0 | - |
| Flooding Vulnerability | - | 0 | - |

| Airstrip Vincent Fayks-Paloemeu | | | |
|---|---|---|---|
| **Criteria** | **Remark** | **Value** | **Unit** |
| Travel Time Alternative Modes | Paramaribo - Albina - Paloemeu | 123 | hrs. |
| Agriculture | - | 0 | ha |
| Gold mining | - | 0 | ha |
| Other mining | - | 0 | ha |
| Wood logging | - | 0 | ha |
| Protected area | - | 0 | ha |
| Airstrip condition | R: fair, D: good, S: poor | 15 | - |
| Priority previous studies | CADSUR, NCCR | 2 | - |