International Civil Aviation Organization

ASBU Presentation By Seychelles

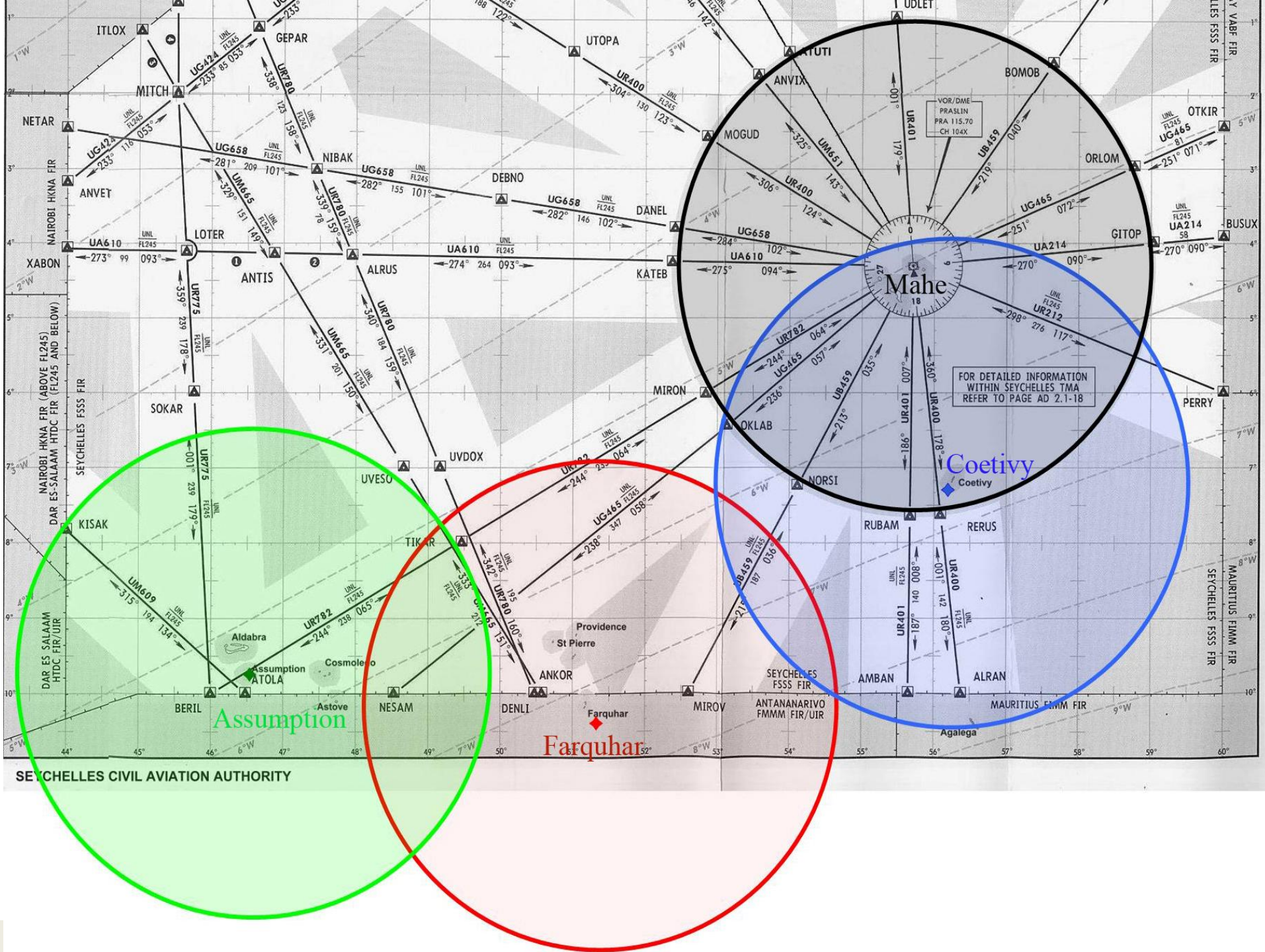
Workshop on preparations for ANConf/12 – ASBU methodology
(Nairobi, 13-17 August 2012)

SCAA
Seychelles Civil Aviation Authority

Seychelles Delegates

Name	Domain
Louise Mancienne	Air Traffic Management
Pitter Elizabeth	CNS Management

Seychelles Location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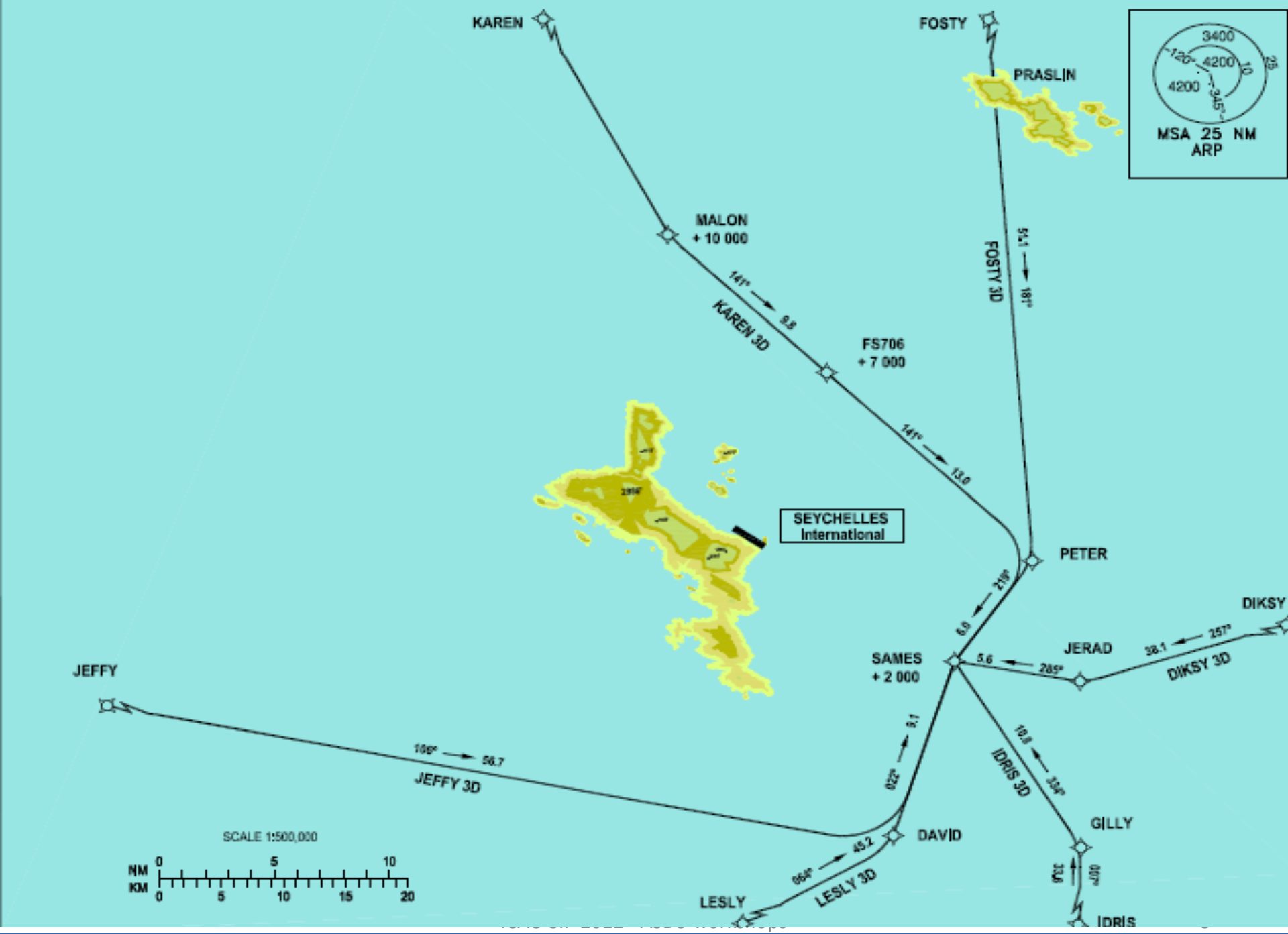
NAIROBI HKNA FIR
NAIROBI HKNA FIR (ABOVE FL245)
DAR ES-SALAAM HTDC FIR (FL245 AND BELOW)
SEYCHELLES FSSS FIR
DAR ES SALAAM
HTDC FIR/UIR
ANTANANARIVO
FMMM FIR/UIR
MAURITIUS FIMM FIR
SEYCHELLES CIVIL AVIATION AUTHORITY

Current Air Navigation infrastructure

- Single international airport
- Geographically remote
- Airspace (2.63m Km square)
- Oceanic Airspace

Current Air Navigation infrastructure (cont)

- Communication
  - VHF/HF
  - VSAT (NAFISAT)
  - CPDLC
- Navigation
  - DVORs
  - DMEs
  - ILS
- Surveillance
  - ADS-C
- ATM
  - FDPS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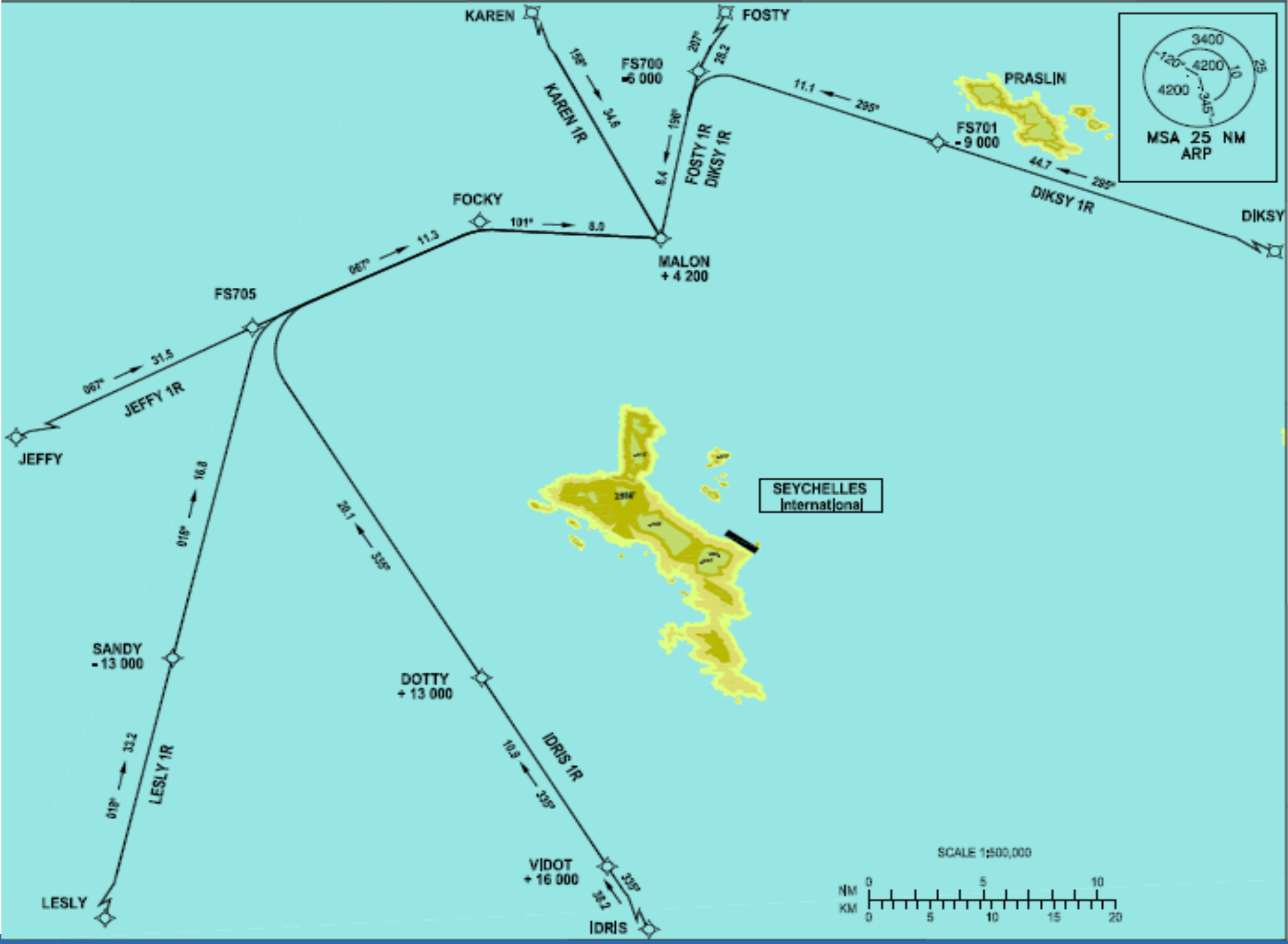
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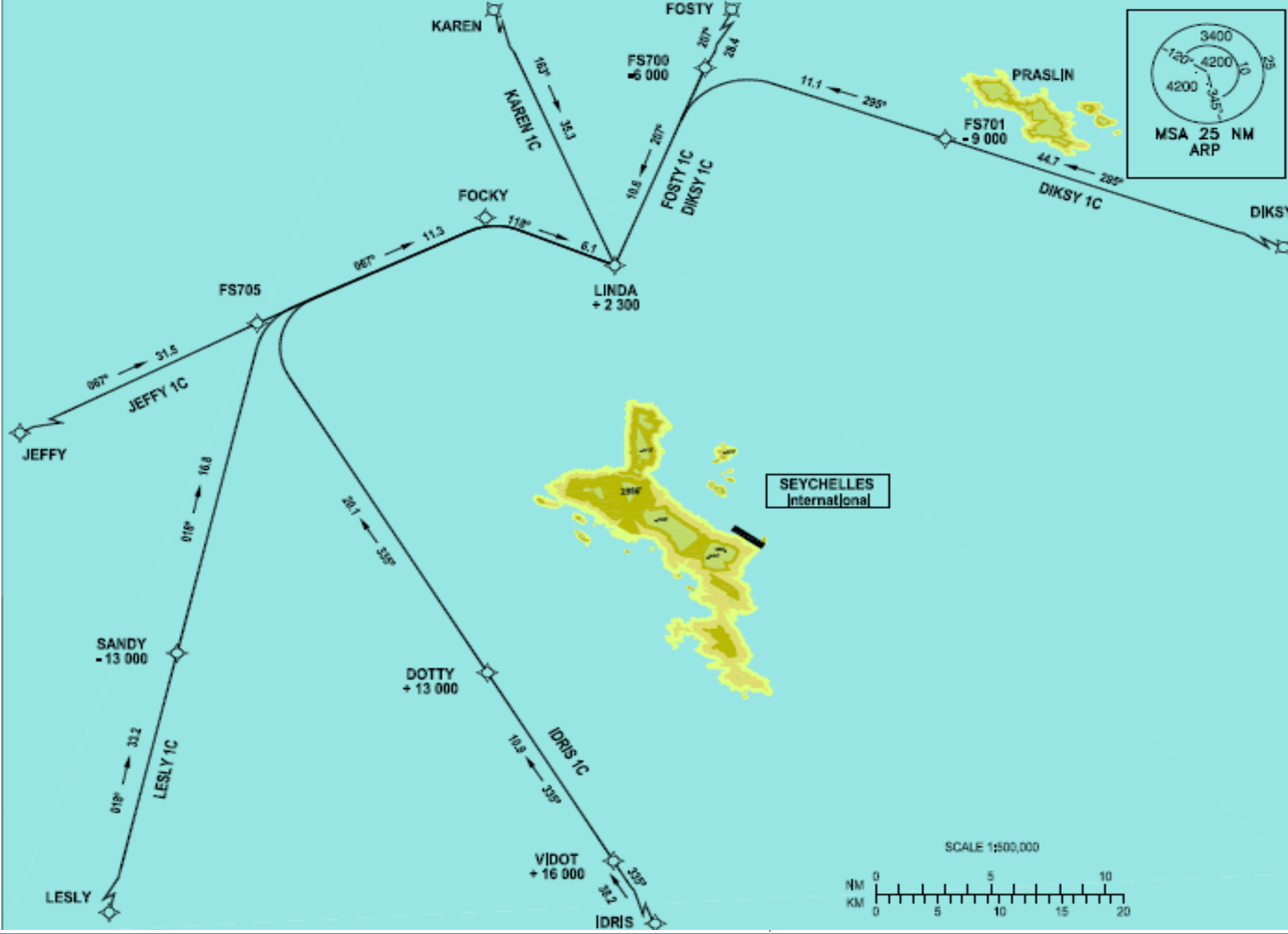
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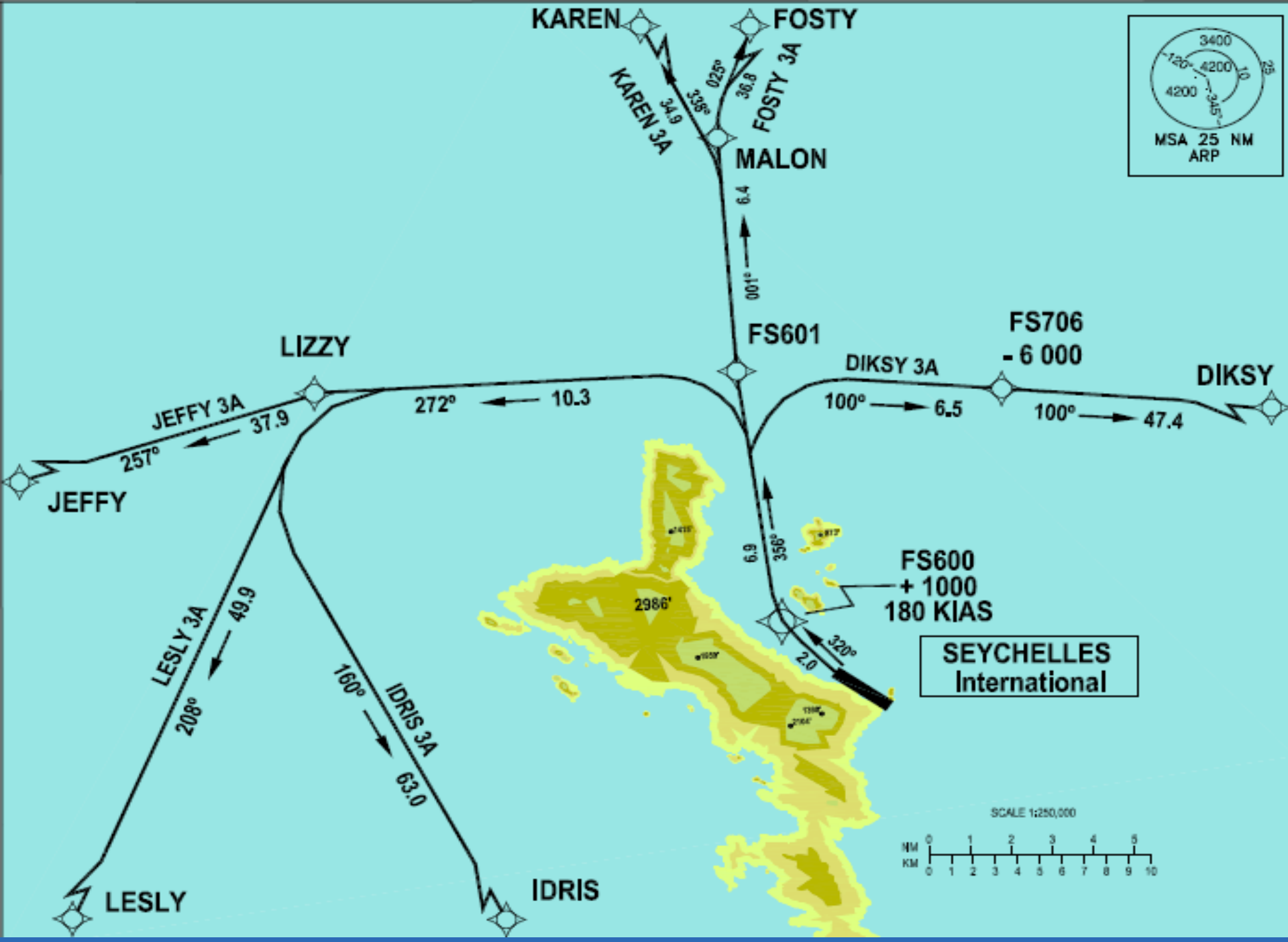
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Seychelles PIAs and applicability: 1

	Block	Module	Do we need?	Reasoning
Airport Operations	BO-65	Improved Airport Accessibility	Yes	PBN approaches are being implemented
	BO-70	Increased Runway Throughout through Wake Turbulence Separation	Yes	
	BO-15	Improved Runway Traffic Flow through Sequencing (AMAN/DMAN)	No	Low Traffic Density
	BO-75	Improved Runway Safety (A-SMGCS)	Yes	Will come with ADS-B project.
	BO-80	Improved Airport Operations through Airport CDM	Yes	

Seychelles PIAs and applicability : 2

	Block	Module	Do we need?	Reasoning
Globally Interoperable Systems and Data – Through SWIM	BO-25	Increased Interoperability, Efficient and Capacity through Ground-Ground Integration	Yes	
	B0-30	Service Improvement through Digital Aeronautical Information Management	Yes	
	B0-105	Meteorological Forecasts, Warnings and Alerts	Yes	

Seychelles PIAs and applicability : 3

	Block	Module	Do we need?	Reasoning
Optimum Capacity & Flexible Flights – Through Global Collaborative ATM	B0-10	Improved Operations through Enhanced En-route Trajectories	Yes	
	B0-35	Improved Flow Performance through Planning based on a Network-Wide view	Yes	
	B0-84	Initial Capability for Ground-Based Cooperative Surveillance	Yes	
	B0-85	Air Traffic Situational Awareness	Yes	
	B0-86	Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B	Yes	
	B0-101	ACAS Improvements	Yes	
	B0-102	Increased Effectiveness of Ground-based Safety Nets	Yes	Component included in the SCAA FDPS

Seychelles PIAs and applicability : 4

	Block	Module	Do we need?	Reasoning
Efficient Flight Path – Through Trajectory Based Operations	B0-05	Improved Flexibility and Efficiency in Descent Profiles (CDOs)	Yes	
	B0-40	Improved Safety and Efficiency through the initial application of Data Link En-route	Yes	
	B0-20	Improved Flexibility and Efficiency in Departure Profiles	Yes	

Air Navigation Report Form (ANRF) The three Seychelles Modules

- **Performance Improvement Area 1: Airport Operations**

  <u>Form 1</u>: ASBU B0-75: Improved Runway Safety (A-SMGCS)

  <u>Form 2</u>: ASBU BO-10: Improved Operations Through Enhanced En-Route Trajectories

- **Performance Improvement Area 3: Optimum Capacity and Flexible Flights – Through Global Collaborative ATM**

  <u>Form 3</u>: ASBU B0-84: Initial Capability for Ground Surveillance

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Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)

ASBU B0-75: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	Y	Y	Y	Y	Y

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Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)

ASBU B0-75: Implementation Progress	
Elements	Implementation Status (Ground and Air)
1. Surveillance	Planning phase is currently underway. Implementation date = 2014
2. Alerting	Not started.

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Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)

ASBU B0-75: Implementation Issues

Elements	Implementation Area			
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
1. Surveillance	All stakeholder vehicles on SIA to be installed with ADS-B transponders	NIL	NIL	To be developed
2. Alerting	All stakeholder vehicles on SIA to be installed with ADS-B transponders	NIL	NIL	To be developed

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Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)

ASBU B0-75: Performance Monitoring and Measurement (Infrastructure)

Infrastructure/Implementation referring to elements of the Module	Performance Metrics
1. Surveillance	Number of airside vehicles fitted with ADS-B OUT
2. Alerting	Number of airside vehicles fitted with ADS-B OUT

Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)

ASBU B0-75: Performance Monitoring and Measurement(KPAs)

Module benefits to Key Performance Areas	Performance Metrics
Access & Equity	1. Improves access to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft. 2. Sustains an improved aerodrome capacity during periods of reduced visibility 3. Ensures equity in ATC handling of surface traffic regardless of the traffic's position on the aerodrome. 4. The system provides traffic situational awareness to the controller in the form of surveillance information.
Capacity	1. Sustained levels of aerodrome capacity for visual conditions reduced to minima lower than would otherwise be the case. 2. Improves capacity for medium complexity aerodromes

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Seychelles Air Navigation Report Form No 1
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-75: Improved Runway Safety (A-SMGCS)
(cont)

ASBU B0-75: Performance Monitoring and Measurement(KPAs)

Module benefits to Key Performance Areas	Performance Metrics
Efficiency	1. Reduced taxi times through diminished requirements for intermediate holdings based on reliance on visual surveillance only. 2. Reduces taxi times by providing improved traffic situational awareness to controllers.
Environment	1. Reduced aircraft emissions stemming from improved efficiencies.
Safety	1. Reduced runway incursions. 2. Improved response to unsafe situations. 3. Improved situational awareness leading to reduced ATC workload.

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories

ASBU B0-10: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	Y	Y	Y	Y	N

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories

ASBU B0-10: Implementation Progress

Elements	Implementation Status (Ground and Air)
1. Airspace planning and application of CDM	Underway. Trials are being done in close collaboration with IATA. Suggestions of new routes are being taken into consideration.
2. Flexible Use of Airspace	Not affected. FSSS FIR is civilian.
3. Flexible Routing –Enroute PBN	Presently RNP 10 airspace. Future consideration for RNP 4.

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories

ASBU B0-10: Implementation Issues

Elements	Implementation Area			
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
1. Airspace planning and application of CDM	NIL	Not all aircraft are equipped	Procedures available. There is a lack of training of ATC, Ops, etc… on available procedures	Not all aircraft are certified by the state
2. Flexible Use of Airspace	NIL	Not all aircraft are equipped	NIL	NIL

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories (cont)

ASBU B0-10: Implementation Issues

Elements	Implementation Area			
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
3. Flexible Routing – Enroute PBN	NIL	Not all aircraft are equipped	• LOA needs to be reviewed. • Development of procedures to assist ATC in applying separation of flex route. • Training package for ATC is needed.	New ATM procedures require approval

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories

ASBU B0-10: Performance Monitoring and Measurement (Infrastructure)	
Infrastructure/Implementation referring to elements of the Module	Performance Metrics
1. Airspace planning and application of CDM	The number of congestion at cross points
2. Flexible Use of Airspace	Number of routine possibilities
3. Flexible Routing –Enroute PBN	The change in Flight Duration

Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories

ASBU B0-10: Performance Monitoring and Measurement(KPAs)

Module benefits to Key Performance Areas	Performance Metrics
Access & Equity	1. Better access to airspace by a reduction of the permanently segregated volumes.
Capacity	1. Reduce potential congestion on trunk routes and at busy crossing points. 2. Greater possibilities to separate flights horizontally 3. Reduce route spacing and aircraft separations 4. Reduce controller workload by flight

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Seychelles Air Navigation Report Form No 2
Performance Improvement Area 1:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-10: Improved Operations Through Enhanced En-Route Trajectories (cont)

ASBU B0-10: Performance Monitoring and Measurement(KPAs)

Module benefits to Key Performance Areas	Performance Metrics
Efficiency	1. Reduce constraints imposed by permanent design. 2. Reduce flight length and related fuel burn and emissions 3. Potential savings on ATC inefficiencies 4. Reduce the number of flight diversions and cancellations 5. Better allow avoidance of noise sensitive areas
Environment	1. Fuel burn and emissions will be reduced
Safety	NIL

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Seychelles Air Navigation Report Form No 3
Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-84: Initial Capability for Ground Surveillance

ASBU B0-84: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	N	Y	N	N	Y

Seychelles Air Navigation Report Form No 3
Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-84: Initial Capability for Ground Surveillance

ASBU B0-84: Implementation Progress

Elements	Implementation Status (Ground and Air)
1. ADS-B	Planning phase is currently underway. Collection of data through regional testing with La Reunion and Madagascar. Implementation date = 2014
2. Multi-Lateration	Same as above.

Seychelles Air Navigation Report Form No 3
Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-84: Initial Capability for Ground Surveillance

ASBU B0-84: Implementation Issues

Elements	Implementation Area			
	Ground system Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
1. ADS-B	Finding appropriate location for ADS-B antennas	Not all aircraft are equipped.	New procedures must be developed & relevant training required	ATCO must be licensed appropriately to provide relevant services
2. Multi-Lateration	Redundant communication link for each site	Not all aircraft are equipped with Mode S transponders	New procedures must be developed & relevant training required	• ATCO must be licensed appropriately to provide relevant services • Aircraft must be certified with appropriate transponder required for multi-lateration

Seychelles Air Navigation Report Form No 3
Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-84: Initial Capability for Ground Surveillance

ASBU B0-84: Performance Monitoring and Measurement (Infrastructure)

Infrastructure/Implementation referring to elements of the Module	Performance Metrics
1. ADS-B	• Percentage of ADS-B equipped aircraft craft operating in our airspace • Number of aerodrome that has ADS-B coverage
2. Multi-Lateration	• Percentage of aircraft equipped with Mode S Transponder operating in our airspace • Number of aerodrome that that has Multi-Lateration coverage

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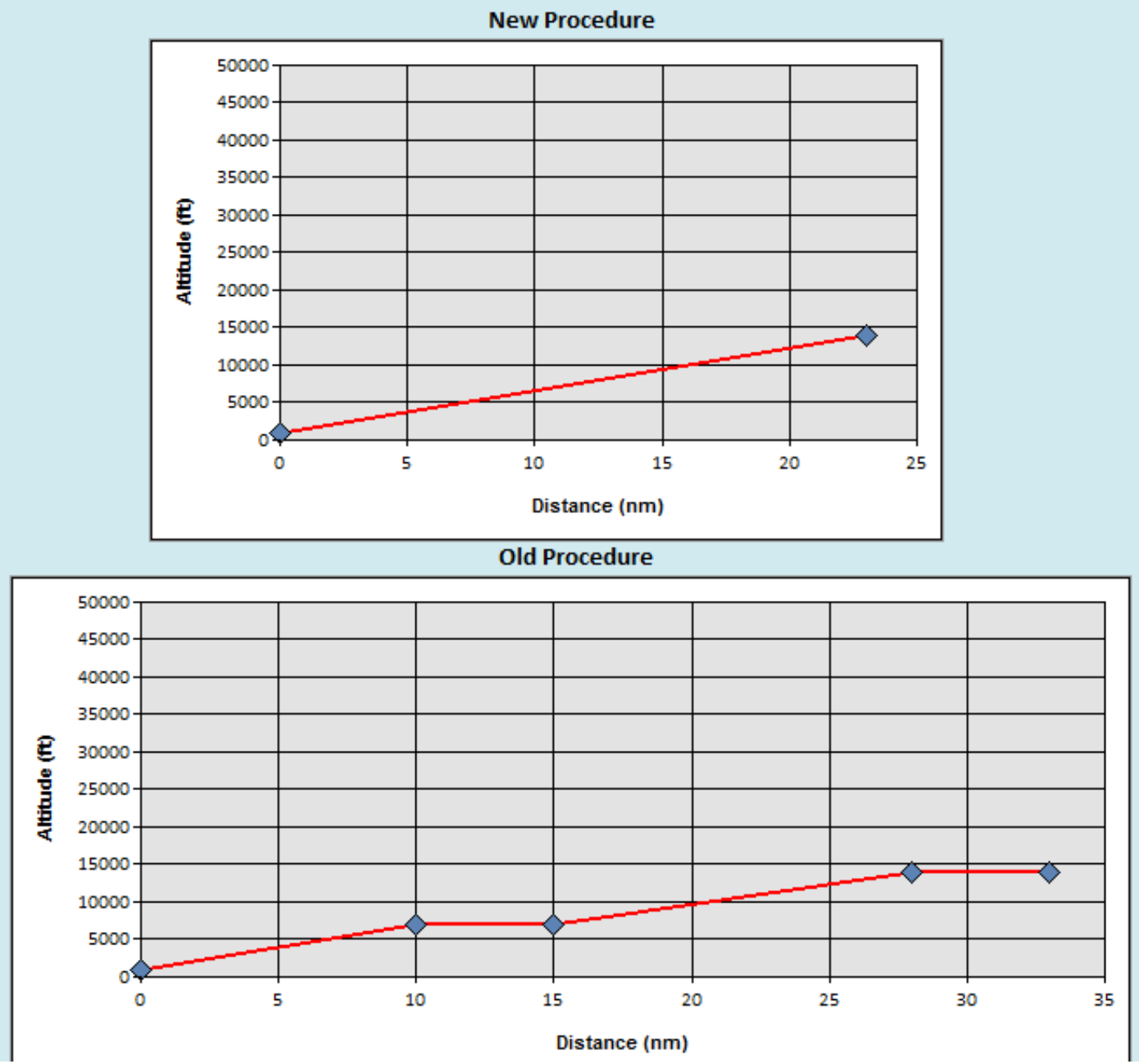
Seychelles Air Navigation Report Form No 3
Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM
ASBU B0-84: Initial Capability for Ground Surveillance

ASBU B0-84: Performance Monitoring and Measurement(KPAs)

Module benefits to Key Performance Areas	Performance Metrics
Access & Equity	NIL
Capacity	1. Separation minima are 3 NM or 5 NM enabling a significant increase in traffic density compared to procedural minima. 2. Improved ATC performance in both radar and non-radar environments. 3. Improved Terminal area surveillance performance
Efficiency	NIL
Environment	NIL
Safety	1. Reduction of the number of major incidents. 2. Provide support to search and rescue.

IFSET Operation 1

- Airport AAAA (ADEL 1000FT) is known by the restrictions to departures due to conflicting routes that impose restrictions to a continuous climb operation.
- At this airport, B737-800 is the dominant aircraft type with 400 **operations** daily, but E-195 also operates at a rate of 50 daily operations. CL60 operates at 30 movements daily and C560 at a rate of 20 movements a day. The other operations of small aircraft are not representative. All aircraft will benefit of the new departure procedure.
- The only SID in use is described as: From 1000FT, climb to 7000FT and maintain this altitude for 5NM. After that climb to 14000FT and maintain this altitude for 5 more miles, when the climb is unrestricted to the cruising flight level.
- The new envisaged procedure will allow the aircraft to climb from 1000FT to the cruising flight level without restrictions.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Distance (nm)

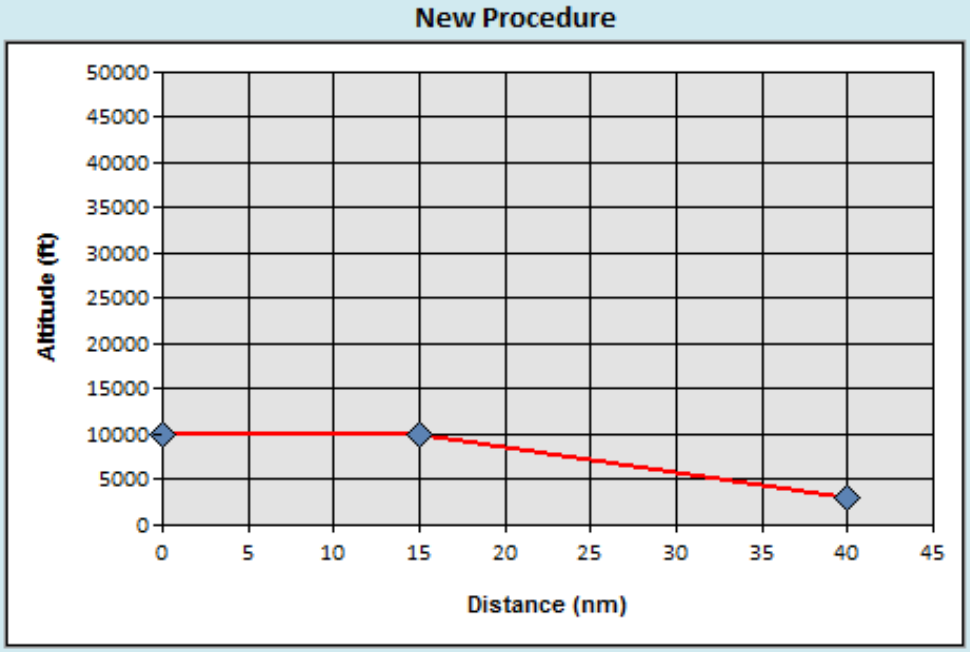
IFSET Operation 1 Results

- Fuel Savings: 16,800Kg, 13.2%

- CO_2 Reduction:
  - 16,800 X 3.157 = 53,037.6

IFSET Operation 2

- Airport BBBB (ADEL 3000FT) is known by the restrictions to approaches due to obstacles that impose restrictions to a continuous descend operation.
- At this airport, B767 is the dominant aircraft type with 100 **operations** daily, but A340 also operates at a rate of 40 daily operations. A380 and A330 operate at 10 movements daily each. The rest of the operations are composed by B737-800 at a rate of 80 movements a day. The other operations of small aircraft are not representative. All aircraft will benefit of the new approach procedure.
- To feed the runway dedicated to approach the single approach procedure is described as: **After levelling for 10NM**, descend from 10000FT to 7000FT, level for 5NM then descend from 7000FT to 3000FT.
- The new envisaged procedure will allow the aircraft to descend continuously from 10000FT to 3000FT after the 15NM levelling at 10000FT.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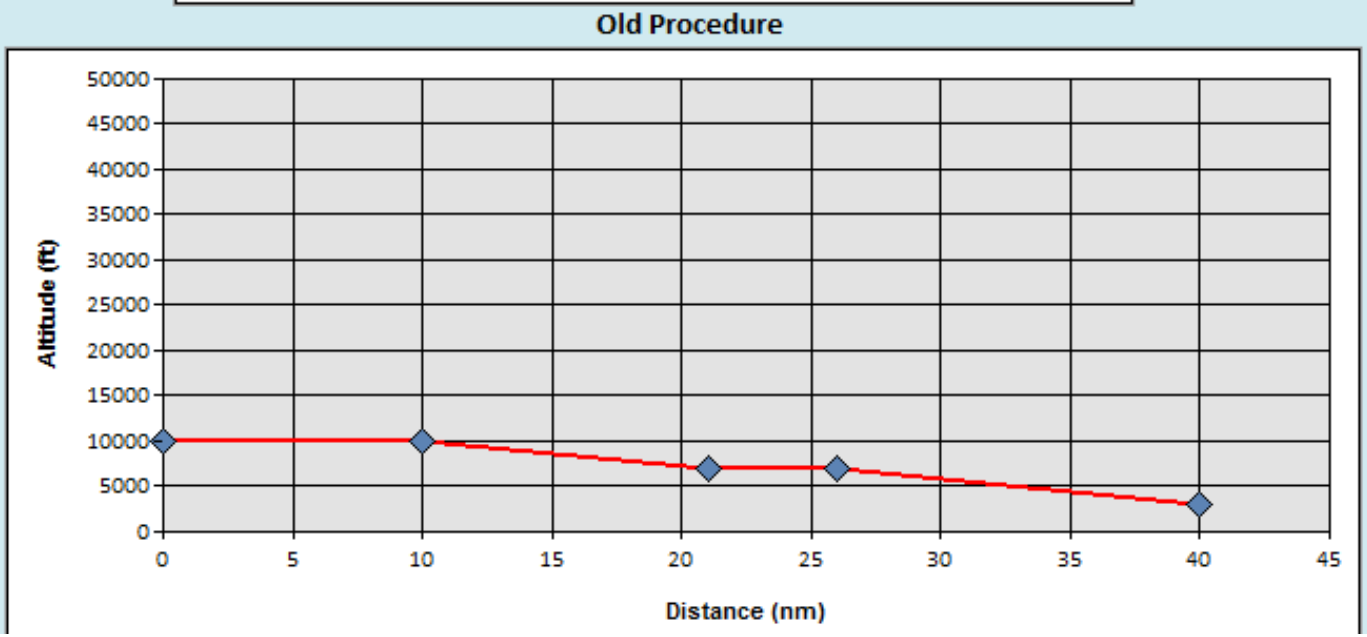
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Distance (nm)

IFSET Operation 2 Results

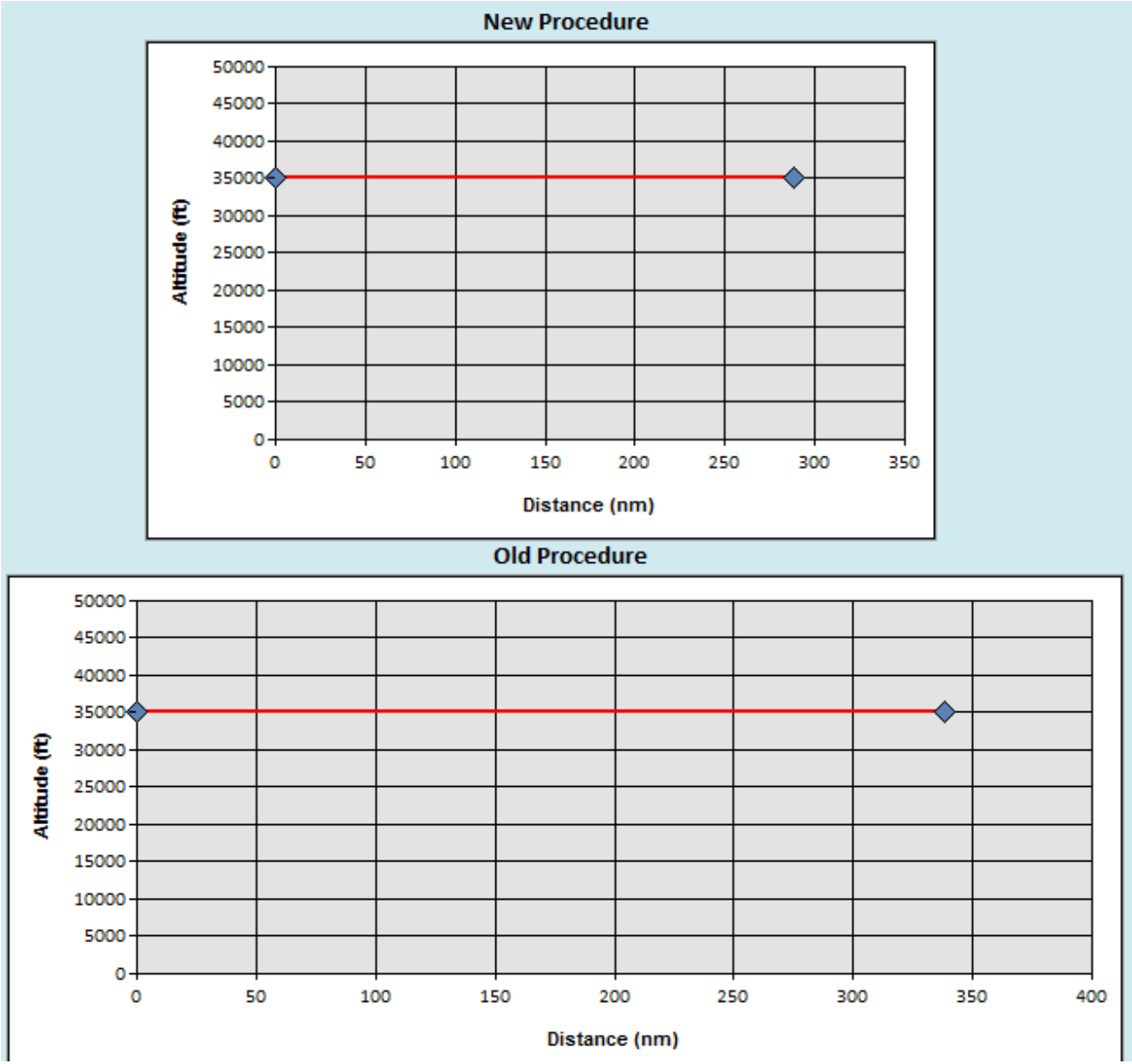
- Fuel Savings: No saving
- CO_2 Reduction: No reduction

IFSET Operation 3

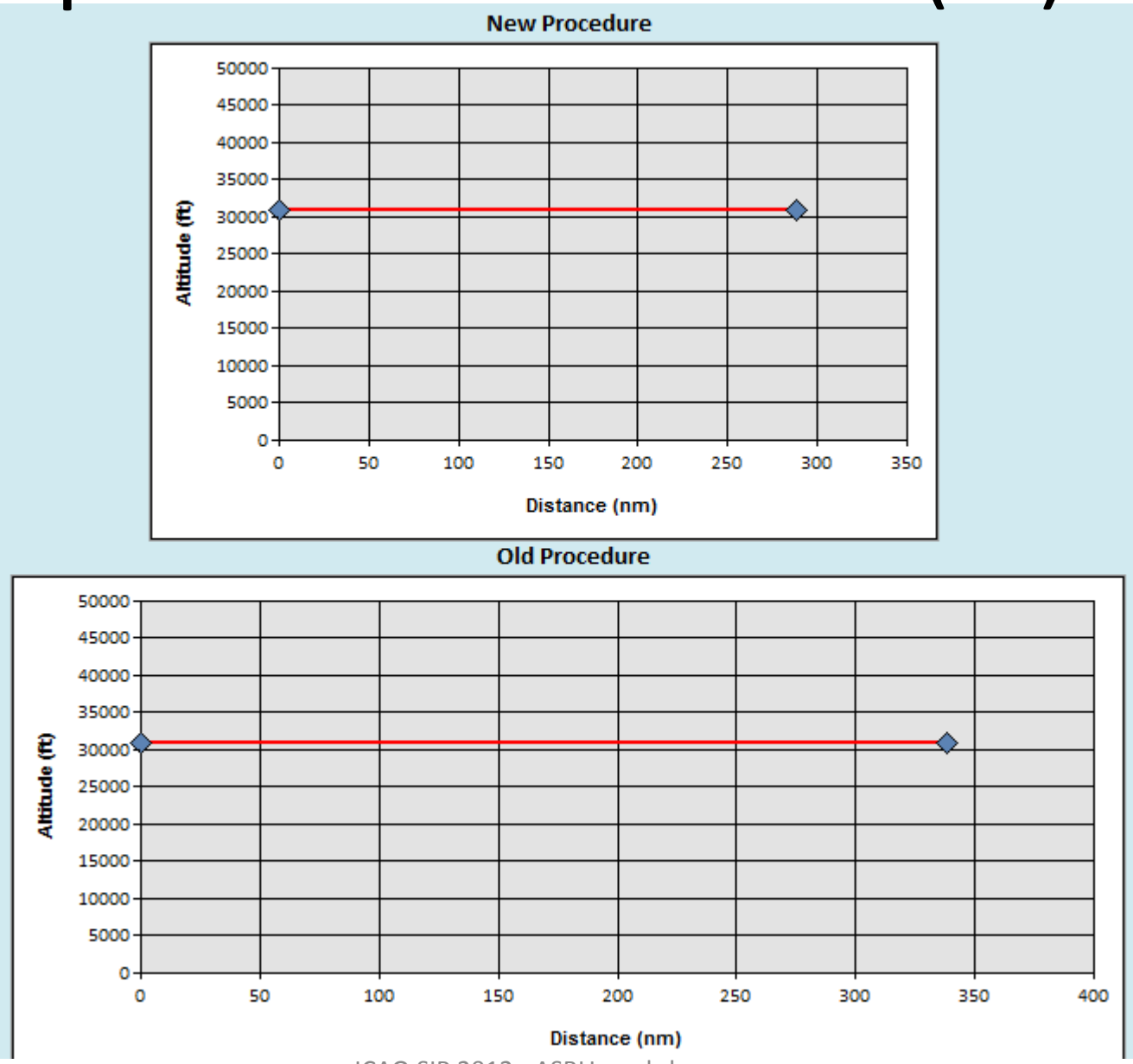
Operations 3

- The conventional route linking cities A and B has 338NM of extension. After restructuring the airspace through the implementation of RNAV routes between the two cities, the new route will be reduced to 288NM.
- At this route, B737-800 at a rate of 80 operations daily is the dominant aircraft, but E-195 also operates at a rate of 70 daily operations, B767 has 60 operations daily, A340 also operates at a rate of 30 daily operations. A330 operates at a rate of 20 daily movements. Small business jets, of different types respond for 15 operations on a daily basis and only 10 are RNAV approved. The other operations are not representative.
- Except for the regional jets, which have as optimum flight level 31000FT, the other aircraft types all compete for FL350.

Operation from A to B



Operation from A to B (RJ)



IFSET Operation 3 Results

- Regional
  - Fuel Savings: 13,000Kg, 14.9%
  - CO_2 Reduction: 13,000 X 3.157 = 41041

- Other Aircraft
  - Fuel Savings: 102,500Kg, 14.8%
  - CO_2 Reduction: 102,500 X 3.157 = 323592.5

Thank You!