



BELIZE PBN ROADMAP ADVANCE

**ICAO/CANSO – Regional Workshop on Airspace Concept
Redesign and Operational Approval of Performance-
Based Navigation (PBN)**

Mexico City, Mexico, 25 to 29 November 2013

**By: Gilberto Torres, Deputy Director of Civil Aviation -
Belize**

INTRODUCTION

DCA BELIZE PBN IMPLEMENTATION ROADMAP



07/12/2012

DCA BELIZE PBN IMPLEMENTATION ROADMAP

2013-2016

DRAFT VERSION December 7th, 2012



INTRODUCTION

- Based on the actual situation in Belize, this Roadmap specifies the policies and overall work plan of the Belize Department of Civil Aviation (BDCA) on PBN implementation for period 2013 – 2016.
- It aims to provide guidance to the stakeholders involved and facilitates regional and worldwide harmonization of aviation standards and international cooperation.
- The BDCA encourages comments from all participants in the national air transportation system in order to update and improve the BDCA PBN Roadmap during its implementation in order to keep pace with the actual requirements of the development of civil aviation in Belize.



OBJECTIVES OF THE BELIZE PBN ROADMAP

- ICAO has reached a consensus with all Contracting States and other international organizations with recommendations that PBN represents the main trend of future global navigation technology.
- The BDCA provides this PBN Roadmap to ensure consistency between RNAV and RNP operations in Belize and the concept of PBN.
- The BDCA provides guidance on PBN implementation for the regulatory authorities, aircraft operators, air navigation service providers, and airports.
- The BDCA provides planning for future air navigation development for the entire industry. and
- Provides assistance to the aviation stakeholders in formulating their transition plans and investment strategies.



RECENT ADVANCES IN PBN

- Where are we now?
- The following slides show us the different steps to design, evaluate and suggest some new approaches to the Philip S. W. Goldson International Airport of Belize.
- It also includes the conventional SID procedures but most importantly, the new RNAV GNSS for RWY 07.



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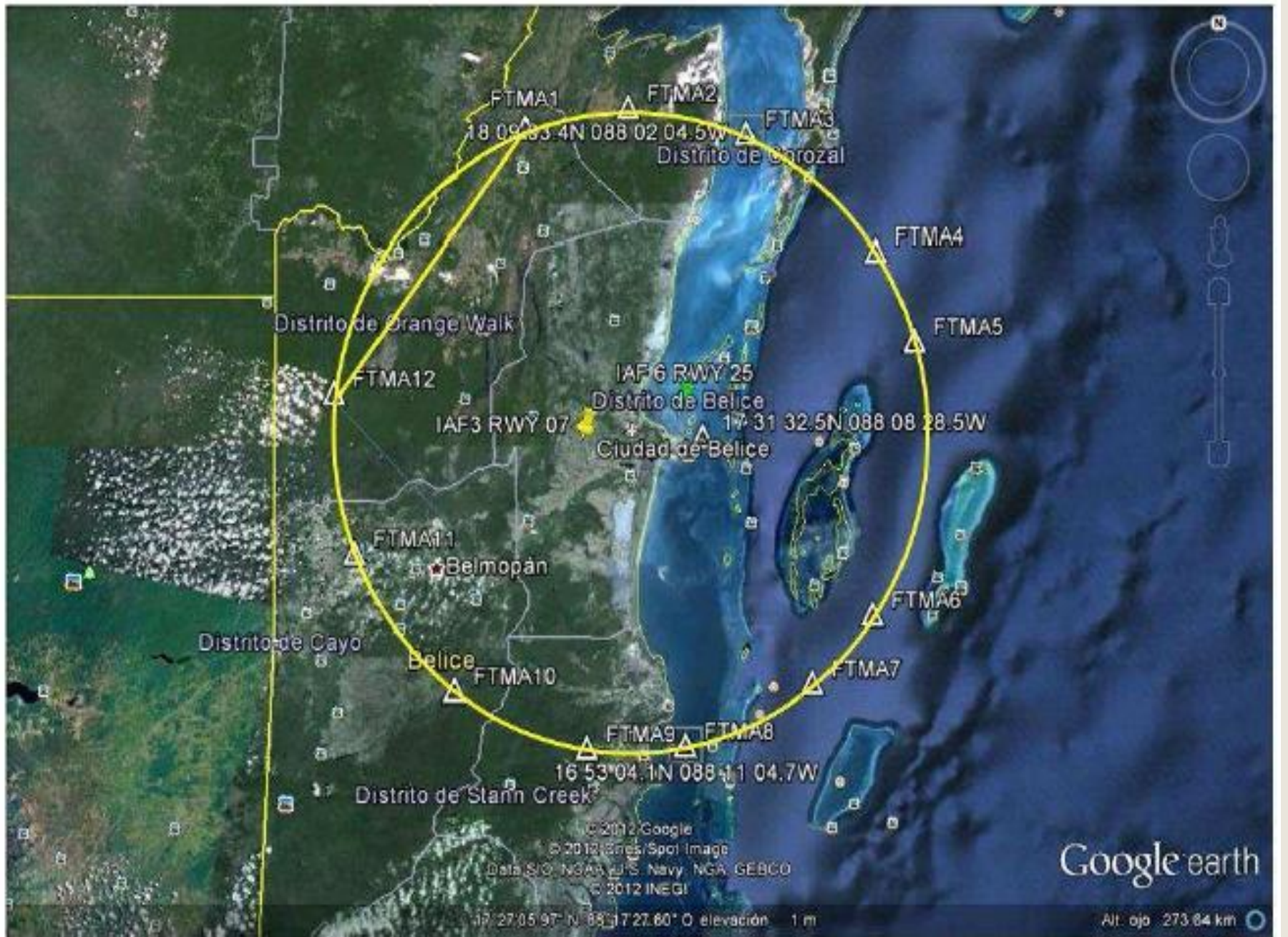
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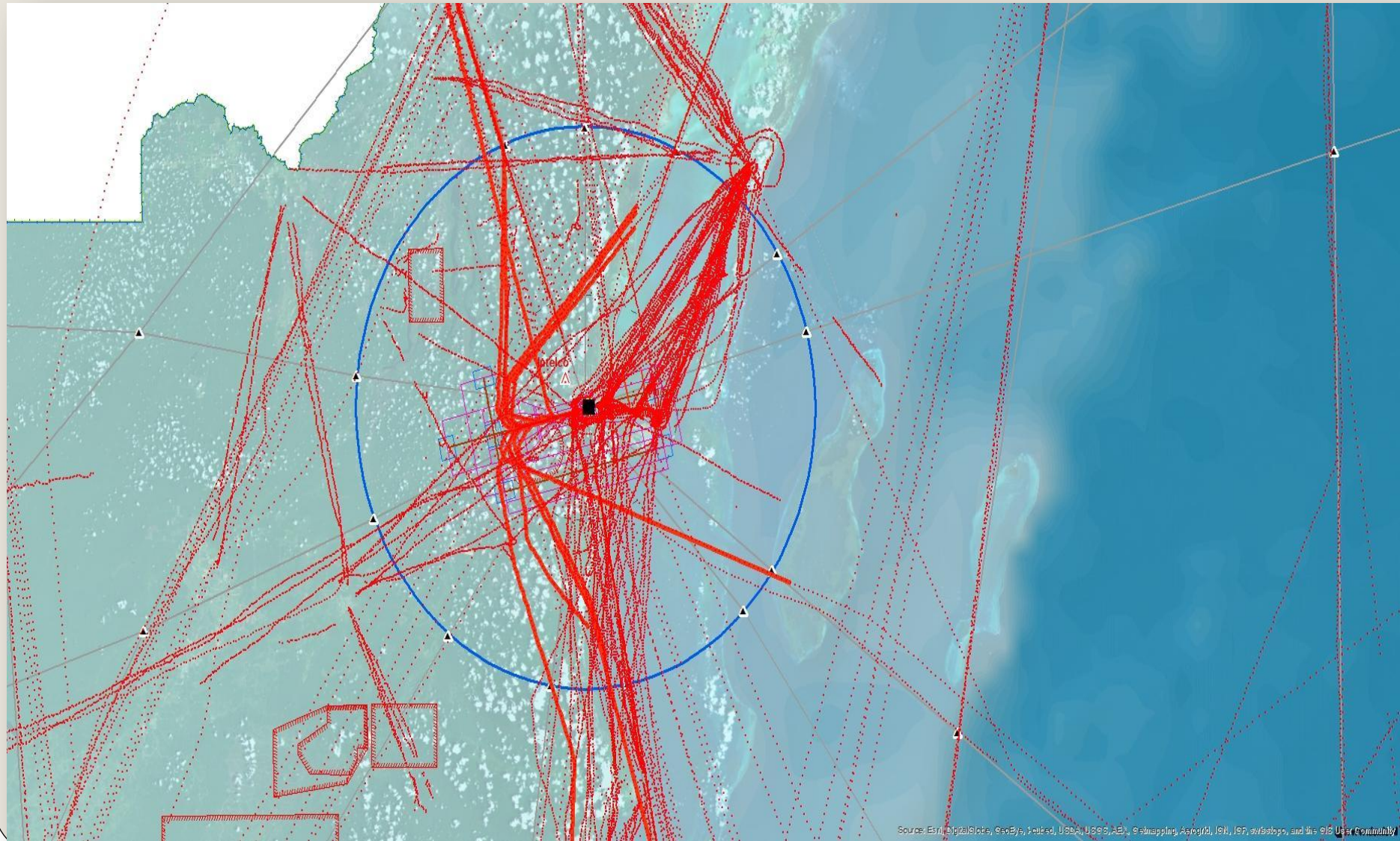


NEW COORDINATES FOR BZE TMA 40 NM PROJECT

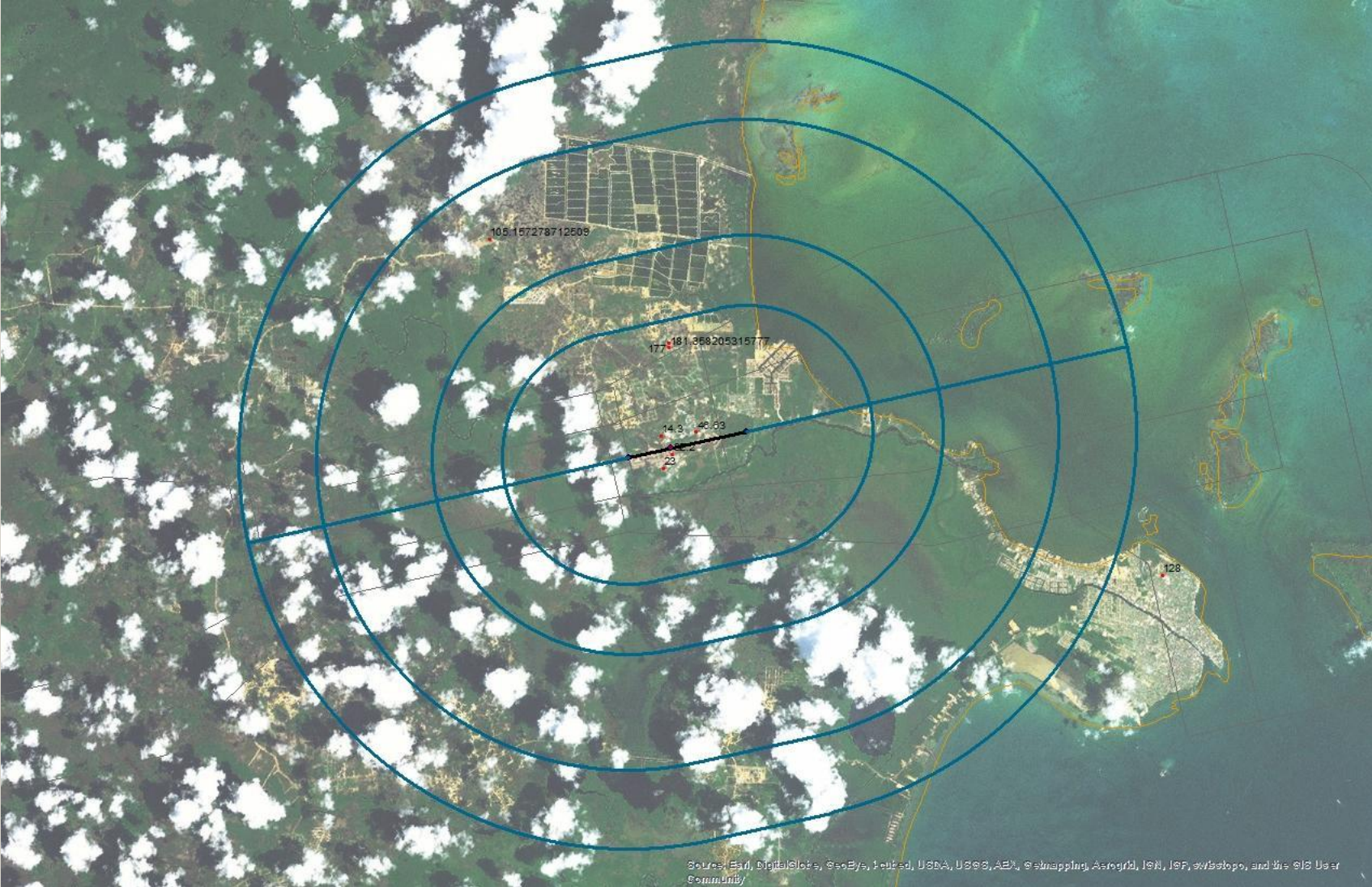
AIRWAYS	COORD VOR	COORD VOR	TC°	RTC°	DIST NM	COORD FIX 40 NM
B/UB753 BZE-MID	173222.6N 0881850.3W	2056.3N 08939.4W	339.76244	159.3198	217.64147	180953.9N 0883324.1W
R/UR899 BZE-CTM	173222.6N 0881850.3W	183033.47N 0882001.15W	358.93223	178.92532	58.190357	181222.2N 0881850.3W
B/UB764 BZE-CZM	173222.6N 0881850.3W	2031.3N 08655.8W	23.466184	203.91763	195.38129	180903.4N 0880204.5W
R/UR630 BZE-UCL	173222.6N 0881850.3W	2136.3N 08132.0W	56.428459	238.70373	454.24325	175426.7N 0874348.8W
G/UG633 BZE-GCM	173222.6N 0881850.3W	1917.4N 08122.3W	74.038187	256.23389	408.88221	174318.5N 0873827.8W
R/UR899 BZE-ROA	173222.6N 0881850.3W	161859.56810N 0863118.36440W	125.23829	305.76019	126.36086	170914.9N 0874438.8W
A/UA754 BZE-BTO	173222.6N 0881850.3W	154412.09211N 0865151.01132.W	142.17665	322.59184	136.55625	170045.2N 0875311.1W
B/UB753 BZE-LMS	173222.6N 0881850.3W	152811.384912N 0875430.671064W	169.3054	349.42059	126.35754	165304.1N 0881104.7W
B/UB764 BZE-IOS	173222.6N 0881850.3W	154412.35N 0883519.74W	188.34857	8.2701363	109.31714	165247.9N 0882454.6W
R/UR630 BZE-AUR	173222.6N 0881850.3W	143527.84N 0903134.50W	216.10388	35.491402	218.09002	170002.0N 0884329.2W
B/UB518 BZE-TIK	173222.6N 0881850.3W	165508.54N 0895235.5W	247.65344	67.191546	96.979029	171706.3N 0885735.1W
G/UG633 BZE-VSA	173222.6N 0881850.3W	1759.9N 09249.1W	276.78857	95.413277	258.82899	173701.9N 0890030.8W



EXAMPLE OF RADAR TRACKS IN BELIZE

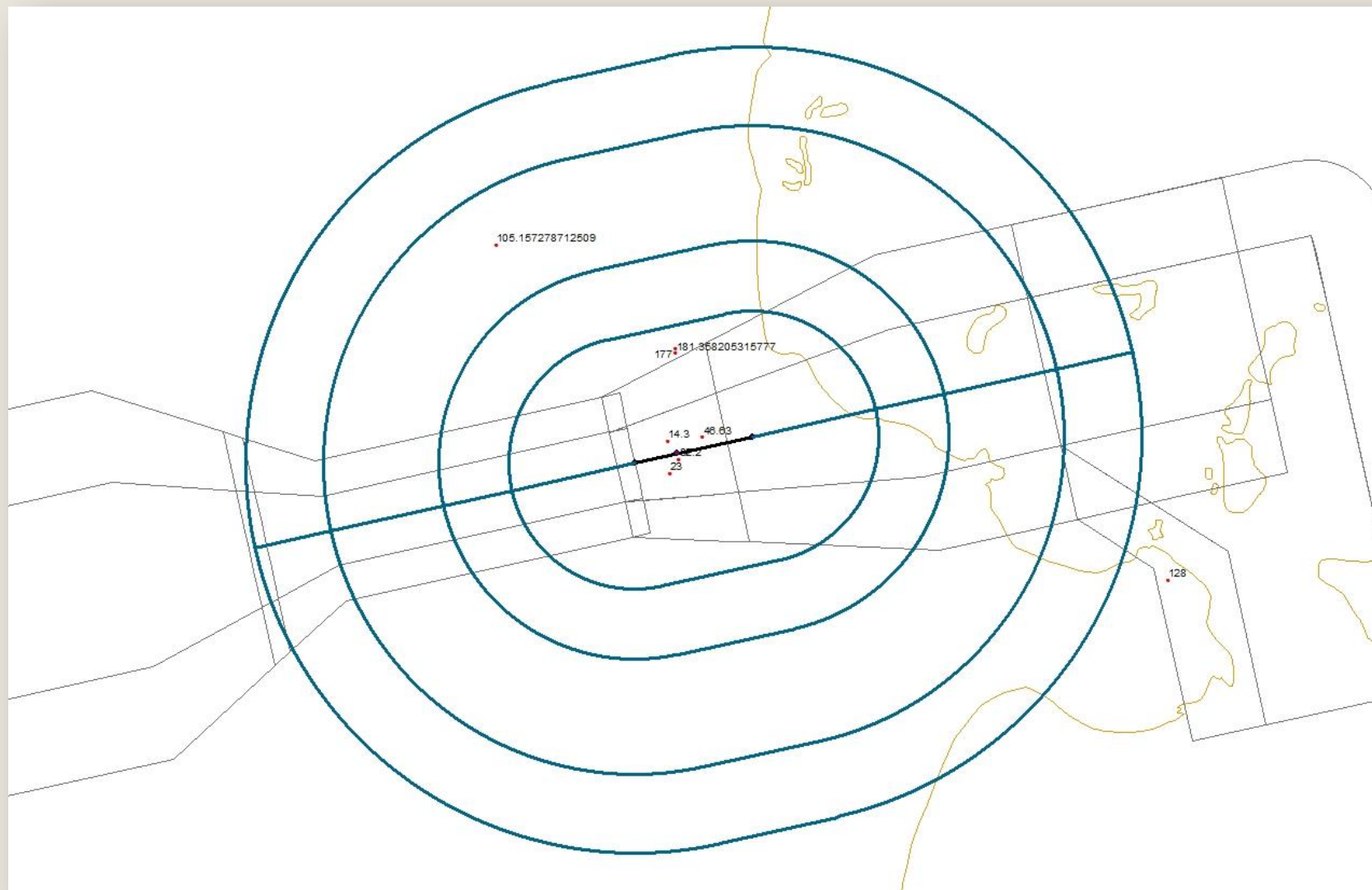


MZBZ VISUAL MANOUVERING FULL AREA



Source: Esri, DigitalGlobe, GeoEye, Earthstar (United States), USDA, USGS, AeroGRID, IGN, ISF, Swire, and the GIS User Community

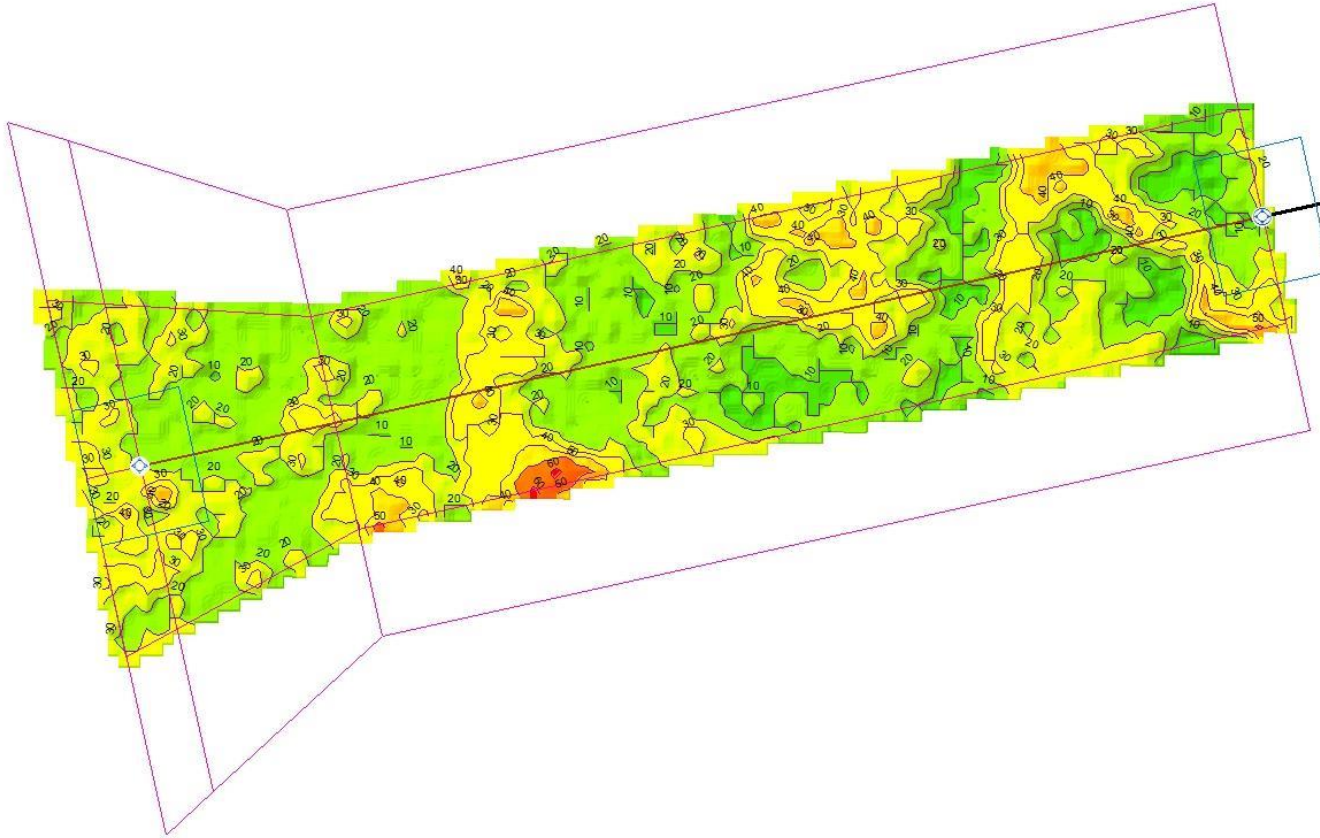
MZBZ VISUAL MANOUVERING FULL AREA TERRAIN FILTER 100FT



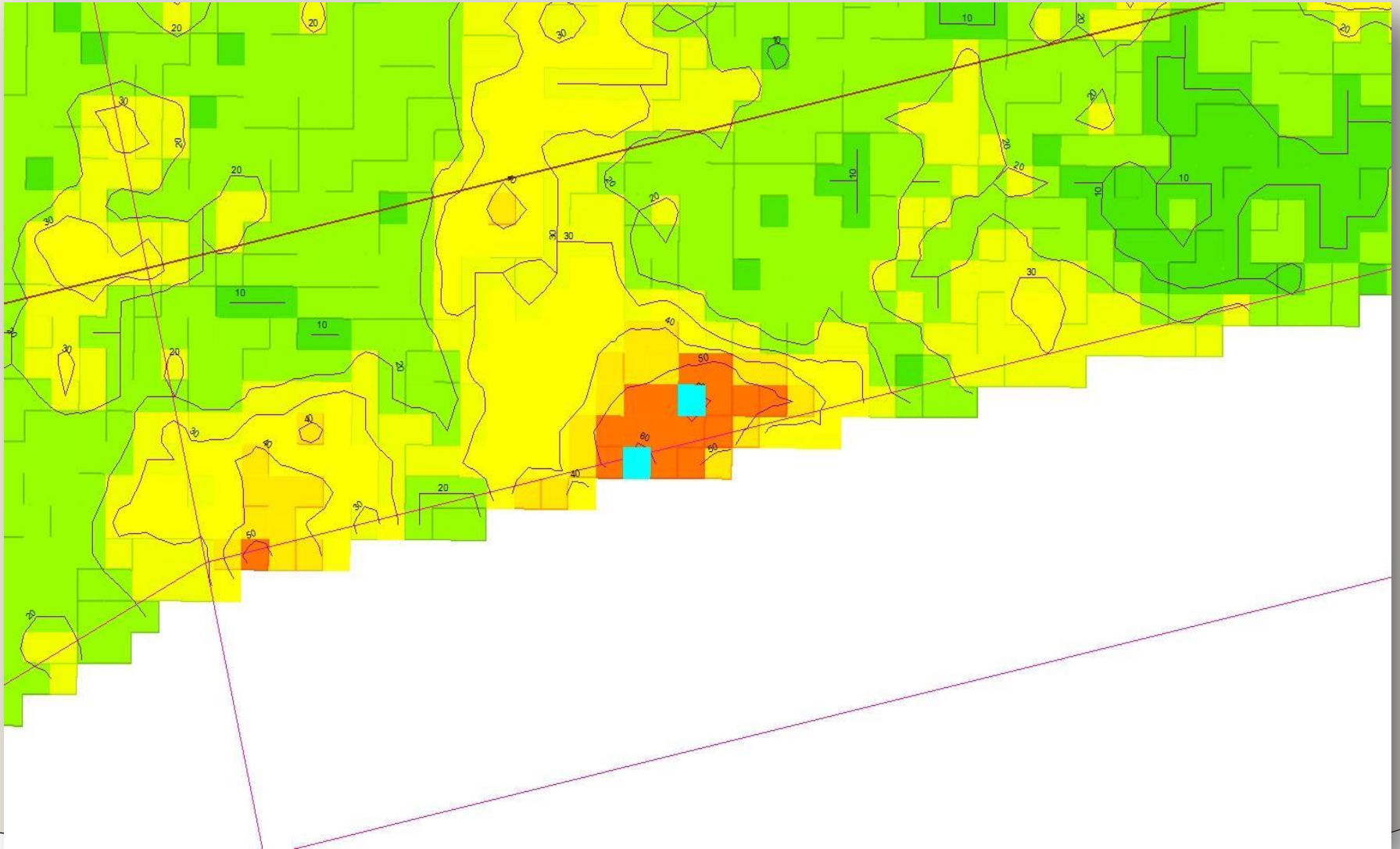
MZBZ VISUAL MANOUVERING RNAV GNSS RESTRICTED NORTH



FAS (Final Approach Segment) PRIMARY AREA SRTM DATA 10 ft.



FINAL APPROACH SEGMENT (FAS) PRIMARY AREA SRTM DATA 10 ft. CONTROL TERRAIN



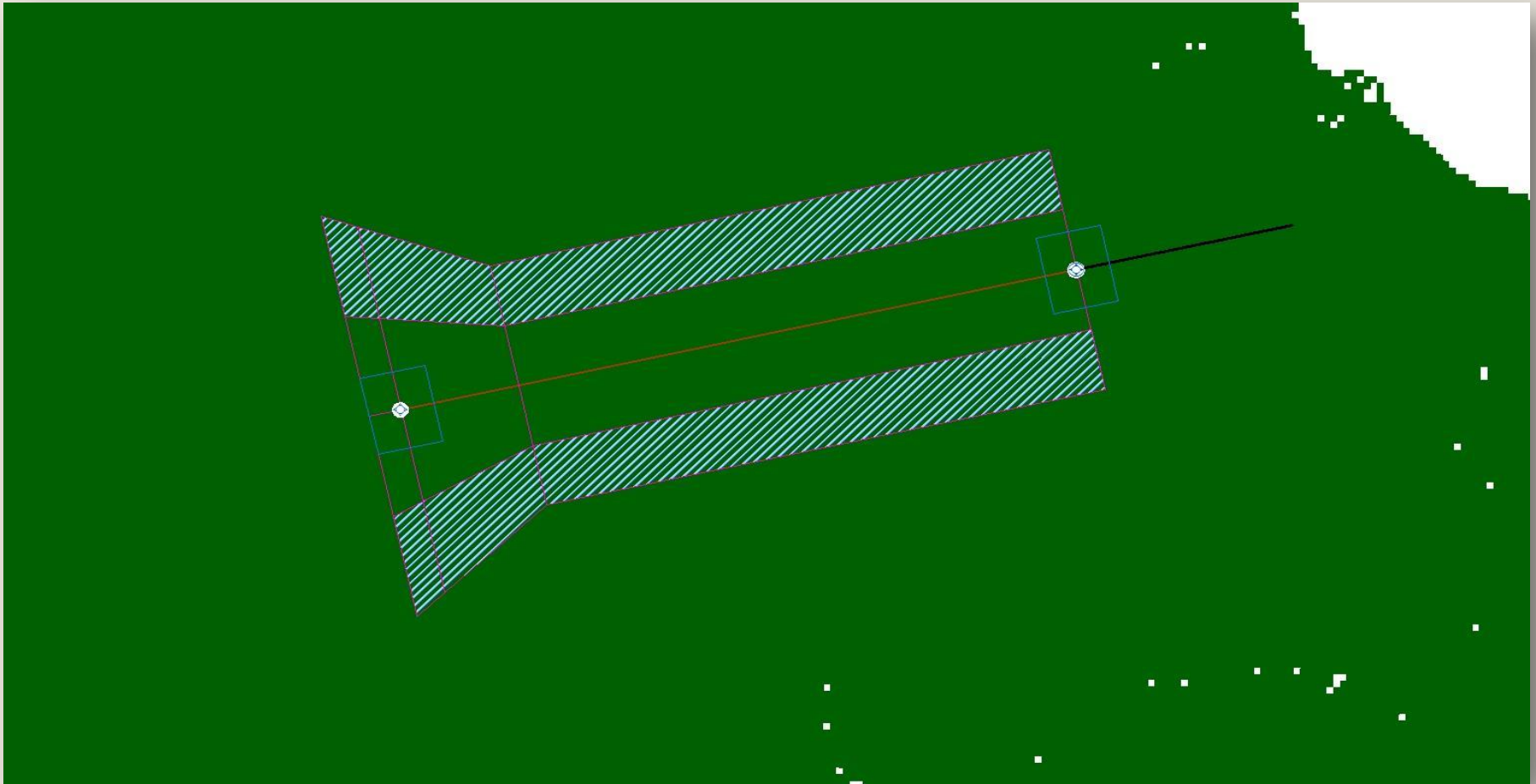
FINAL APPROACH (FAS) SECONDARY AREAS



FINAL APPROACH SECONDARY AREAS

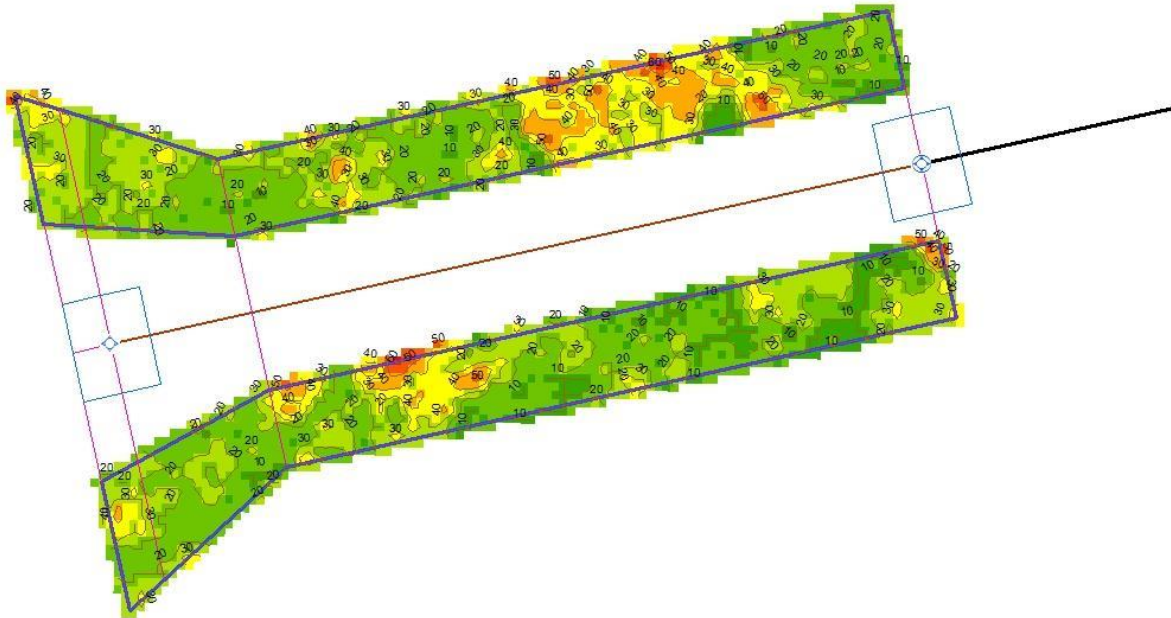
SRTM

(Shuttle Radar Topographic Mission) DATA

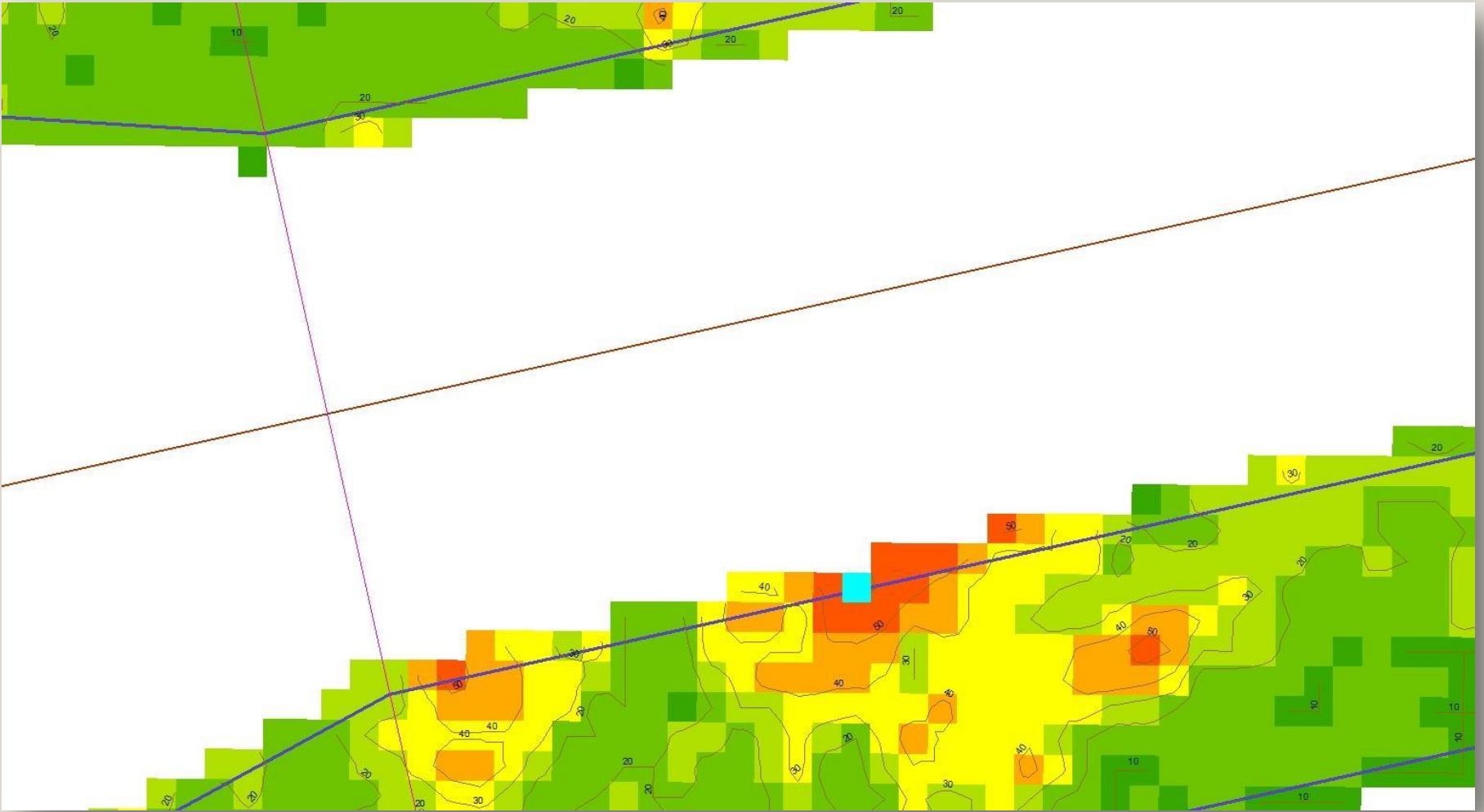


FINAL APPROACH SECONDARY AREAS

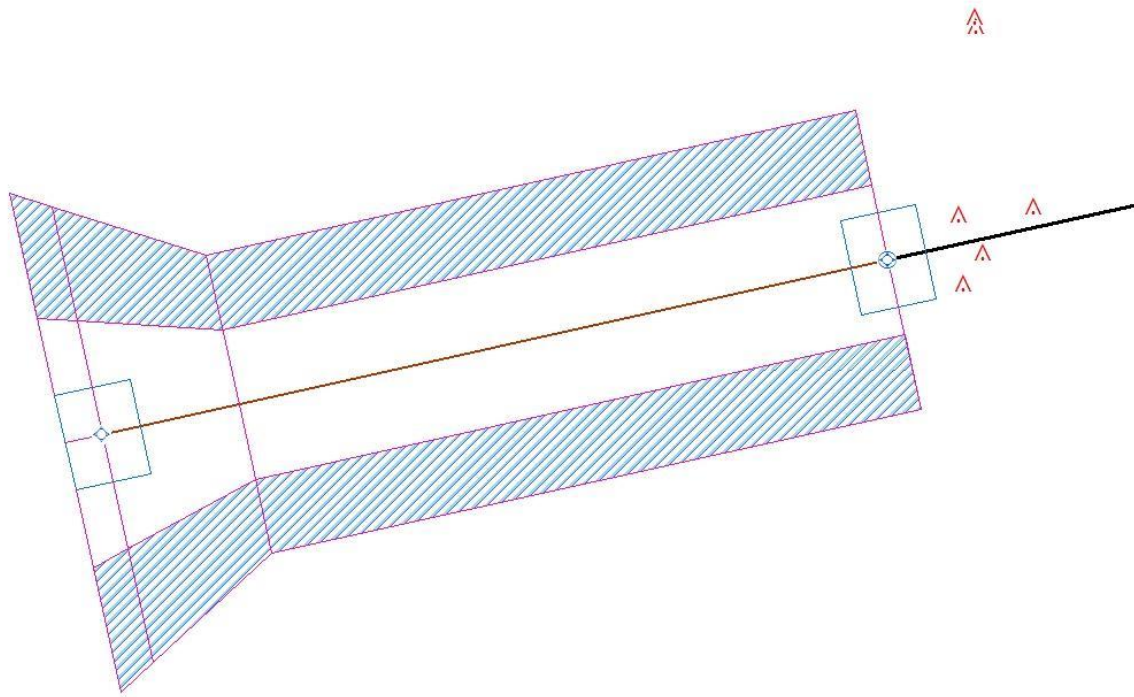
SRTM DATA 10FT



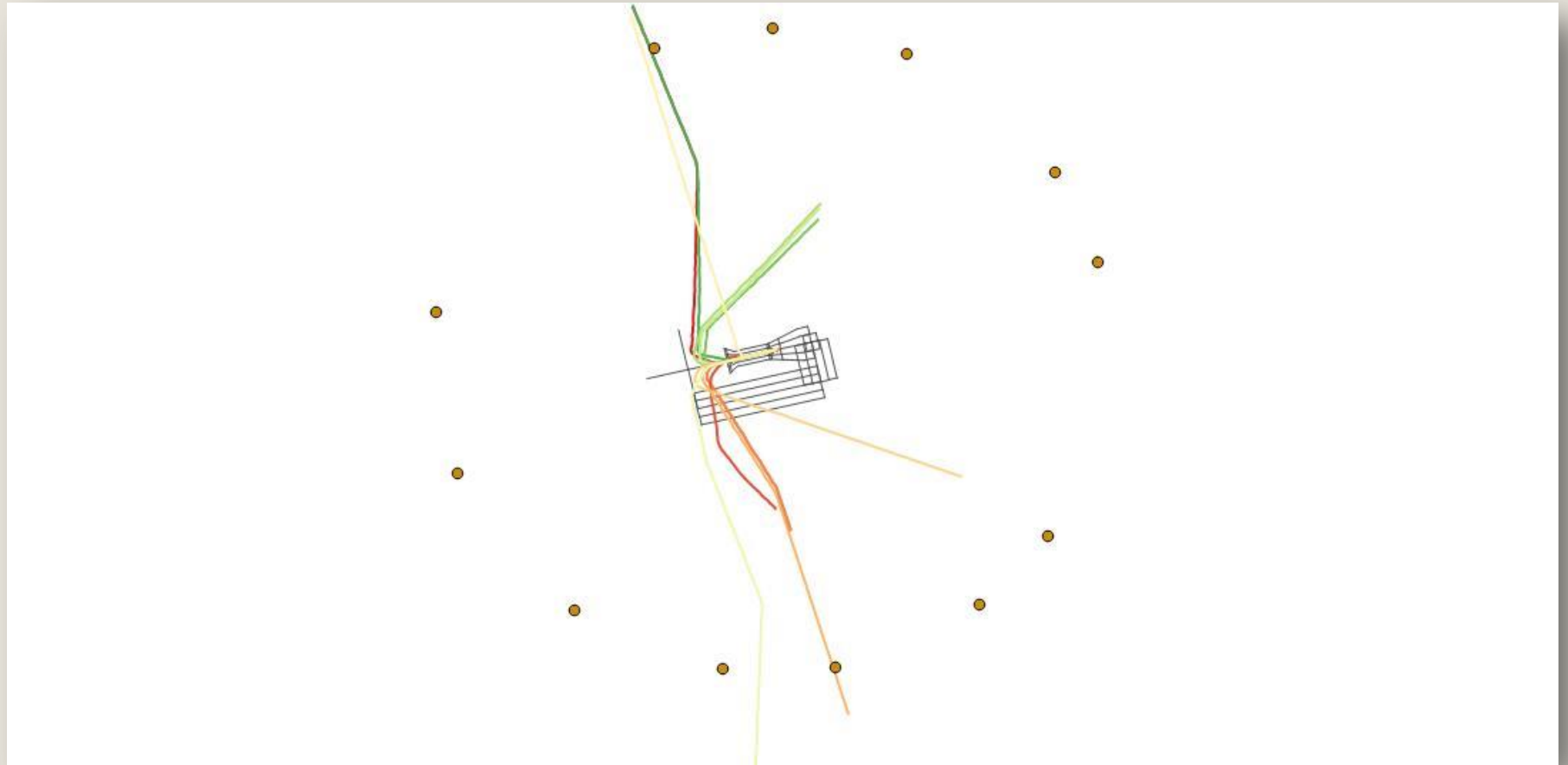
FAS SECONDARY AREAS SRTM DATA 10FT CONTROL TERRAIN



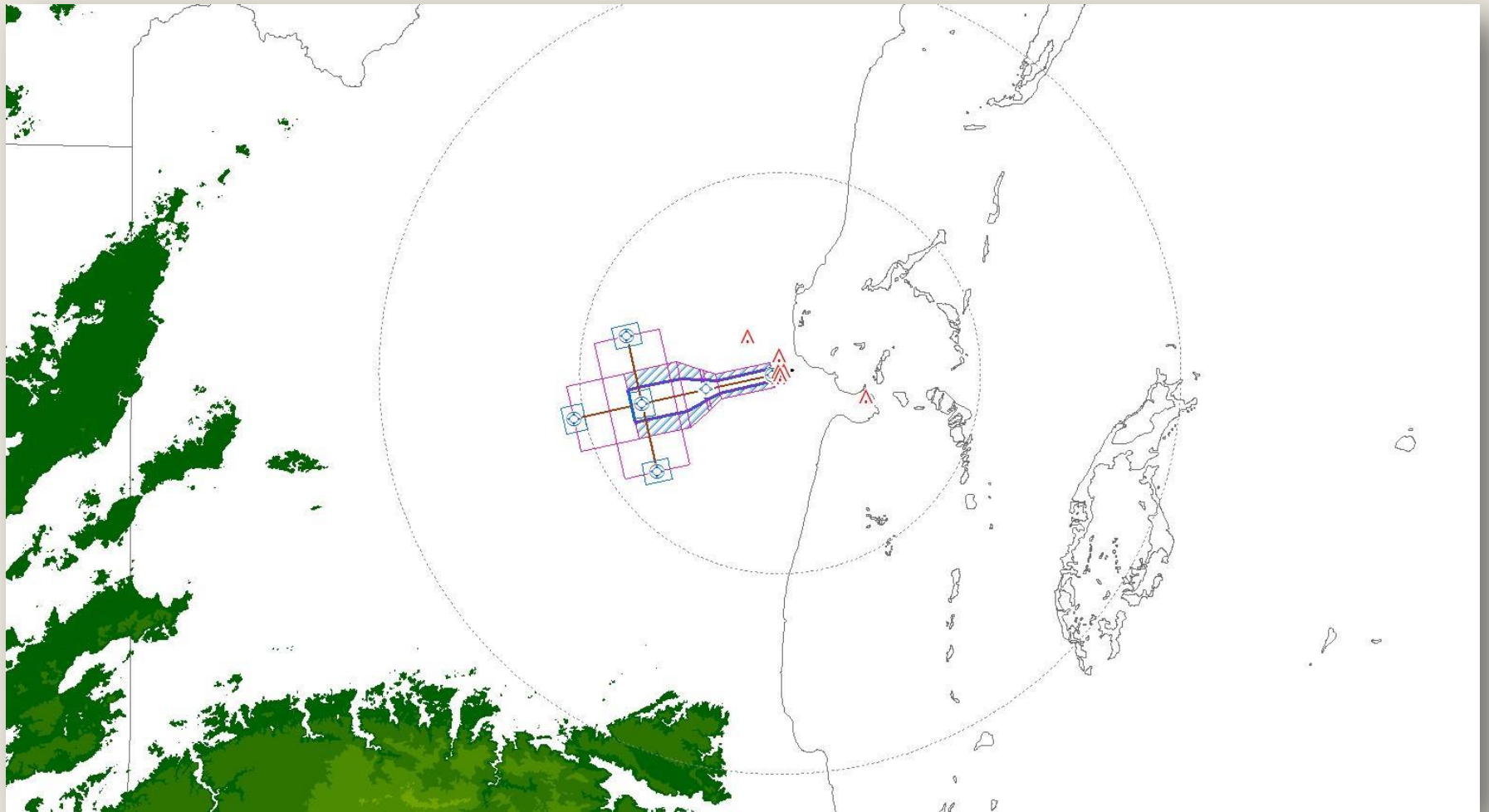
FAS SECONDARY AREA SURVEY OBSTACLES



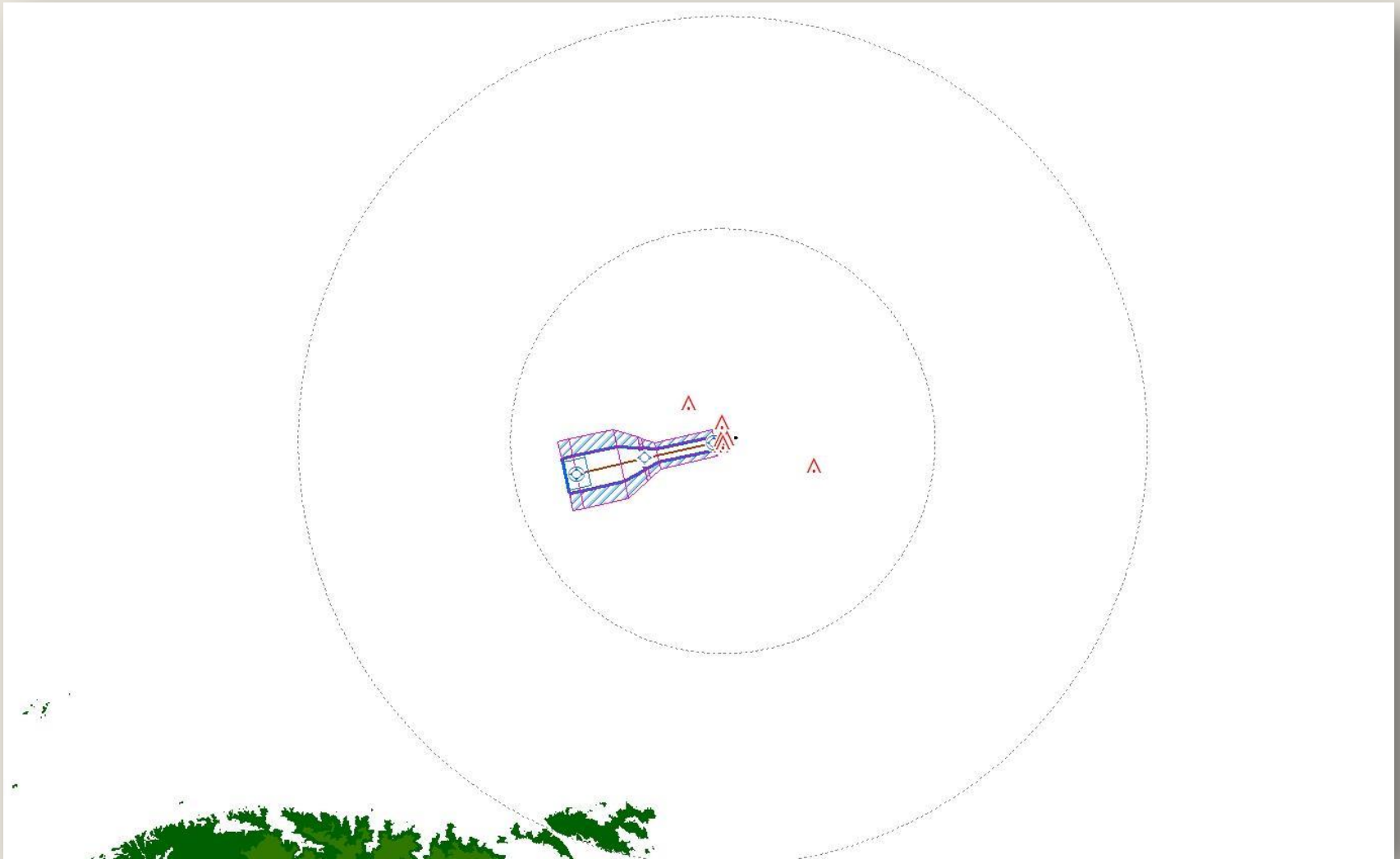
FLIGHT TRACK VALIDATION



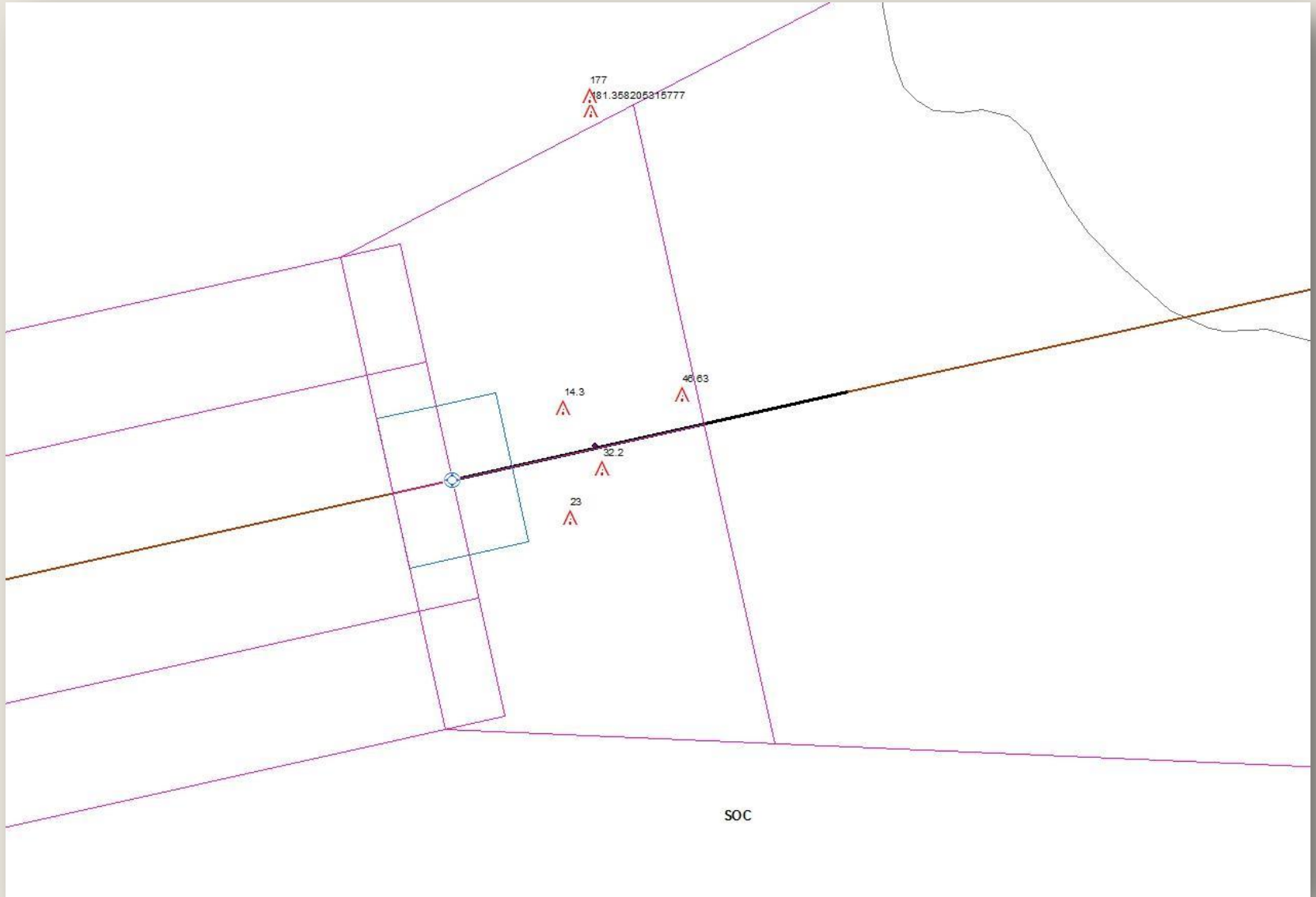
INITIAL APPROACH SEGMENT SRTM 663 ft. FILTER



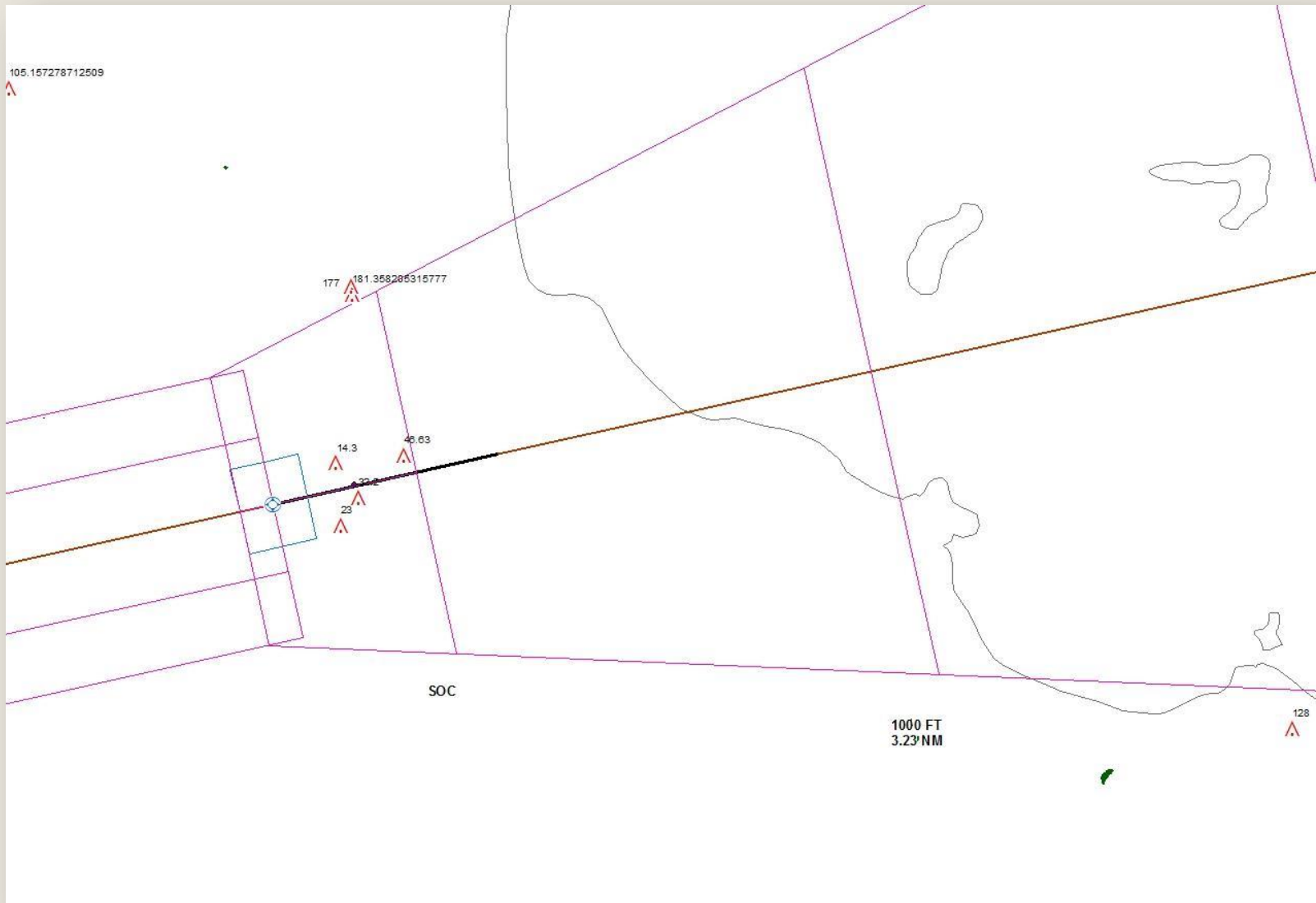
INTERMEDIATE SEGMENT SRTM FILTER



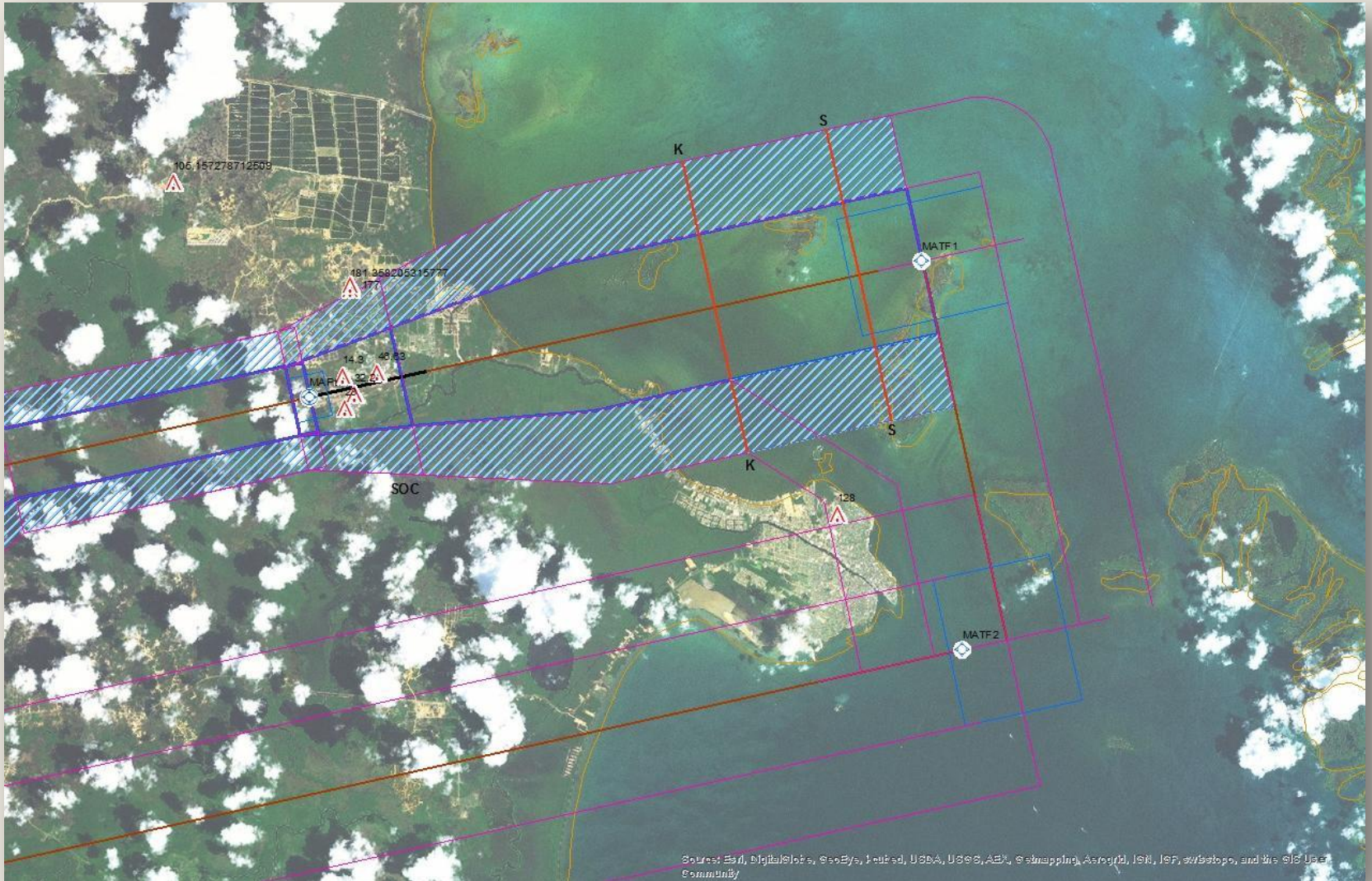
INITIAL AREA MISSED APPROACH



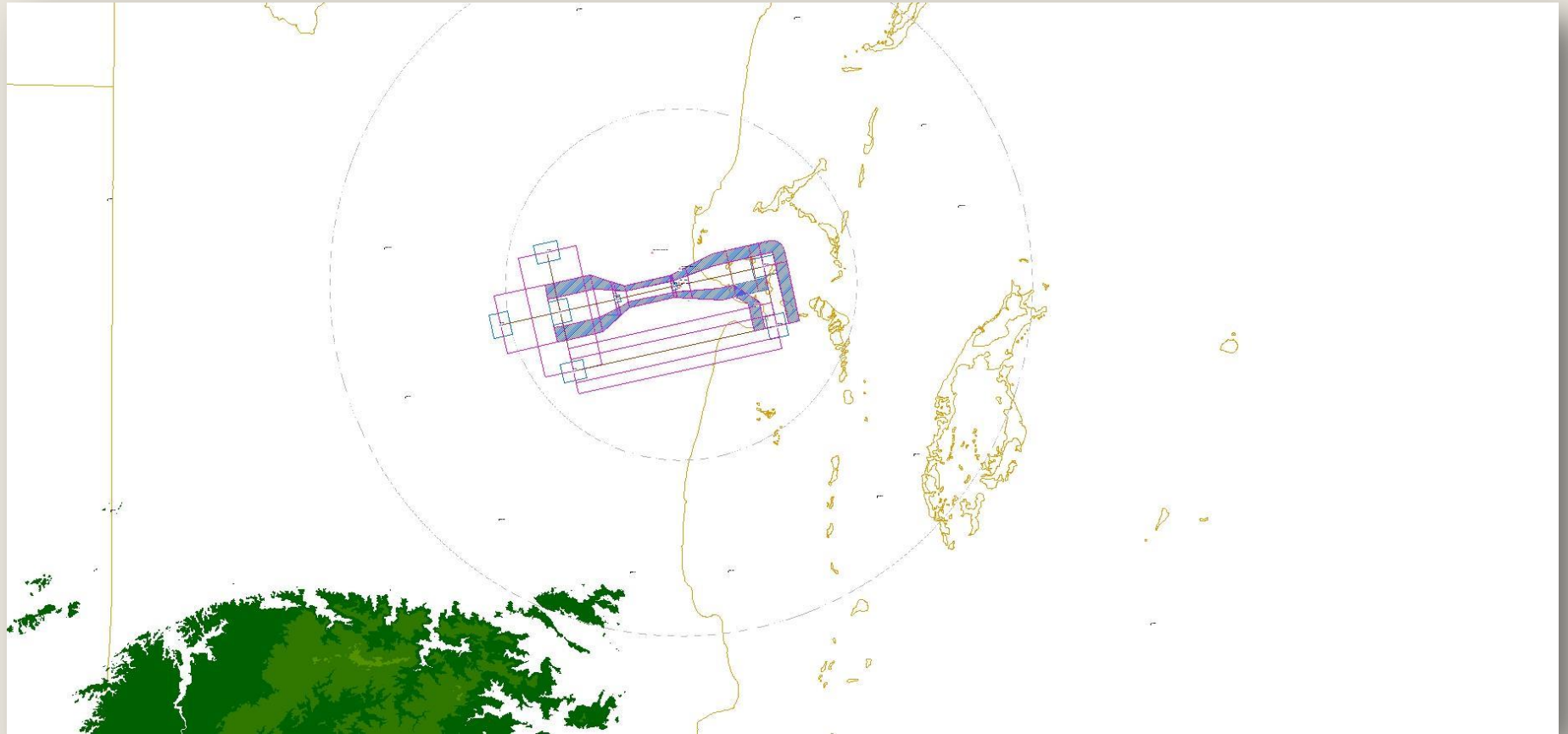
INITIAL AREA MISSED APPROACH FILTERED 37m



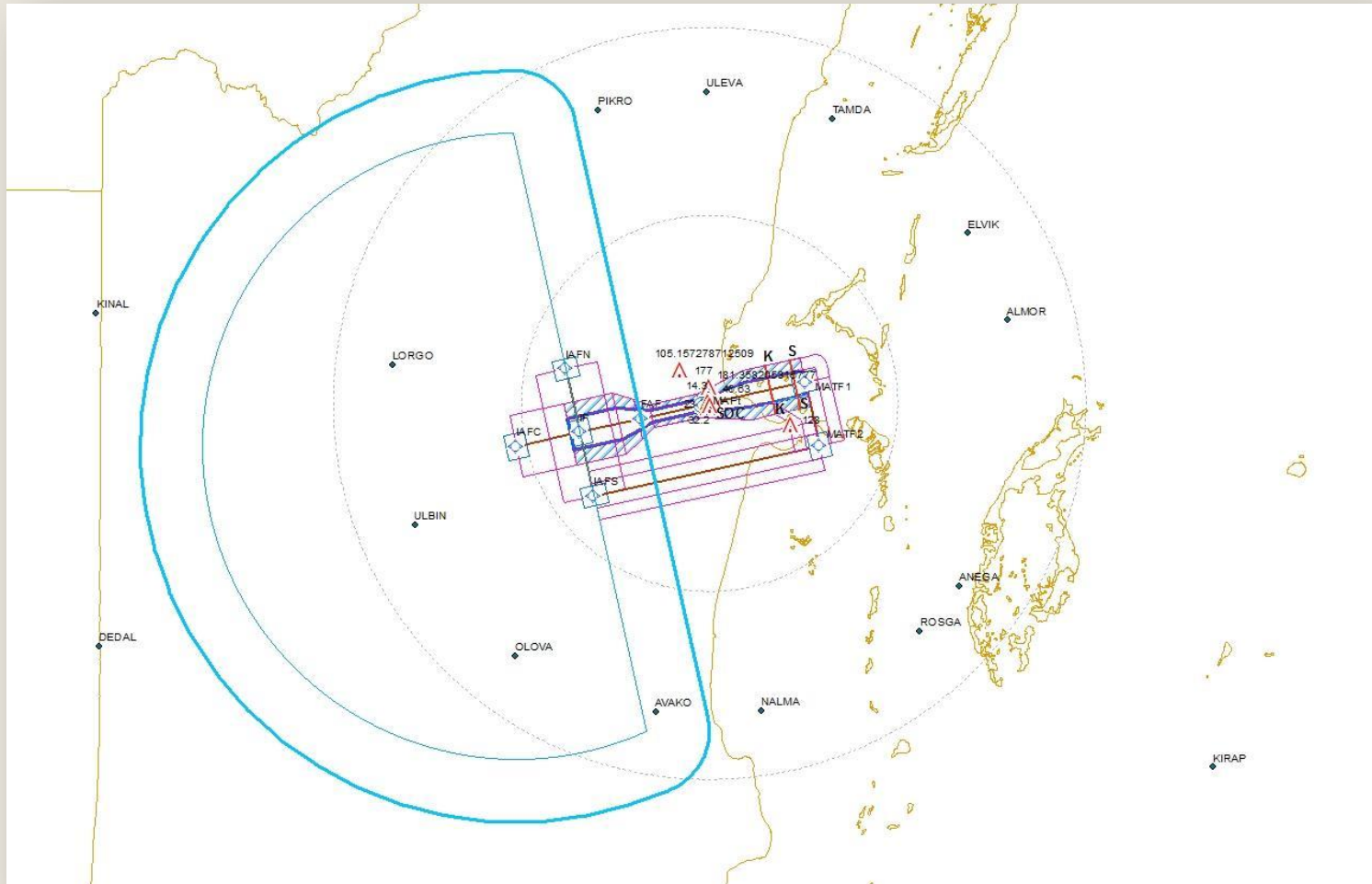
MISSED APPROACH INTERMEDIATE AREA



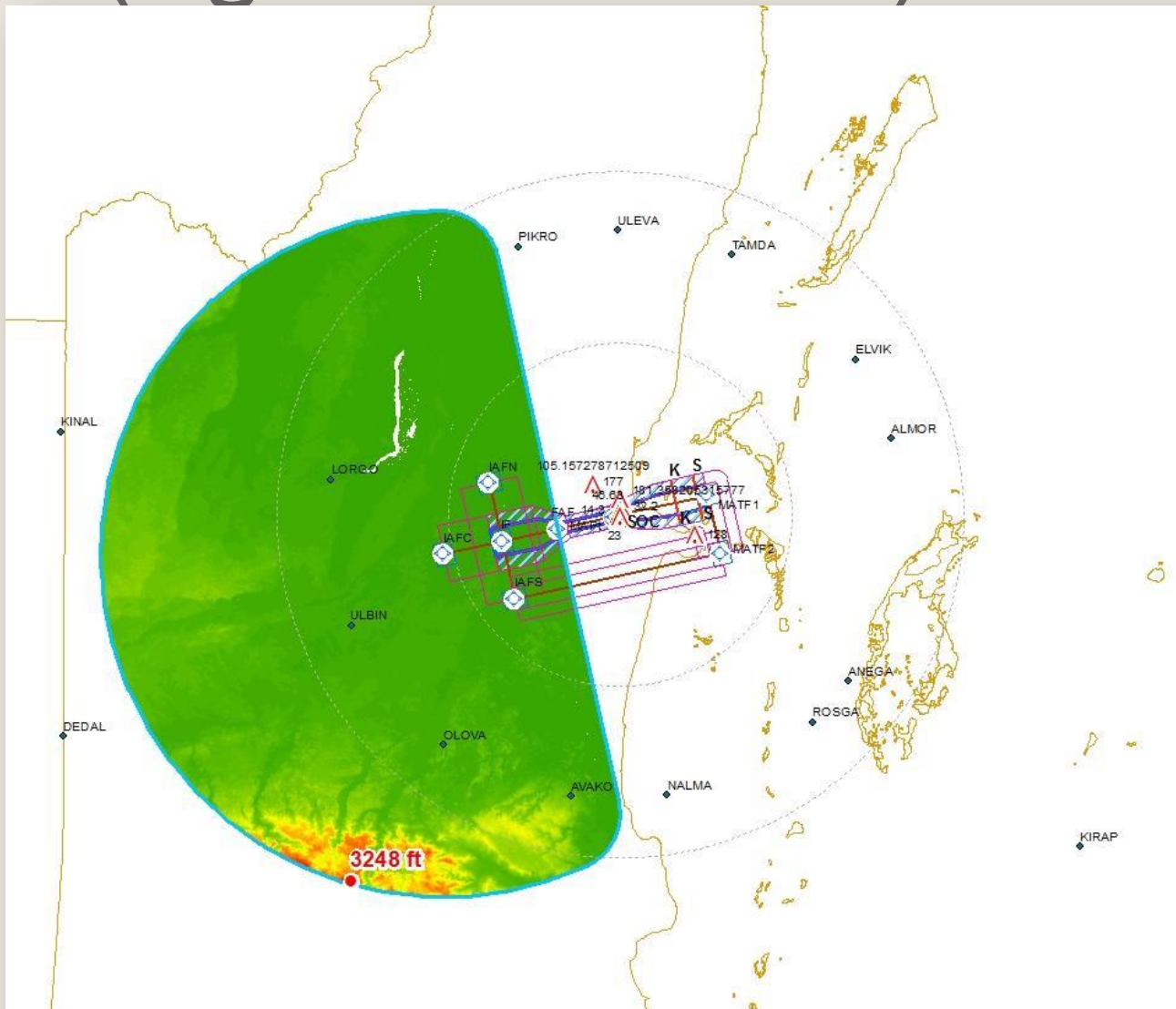
MISSED APPROACH FINAL AREA



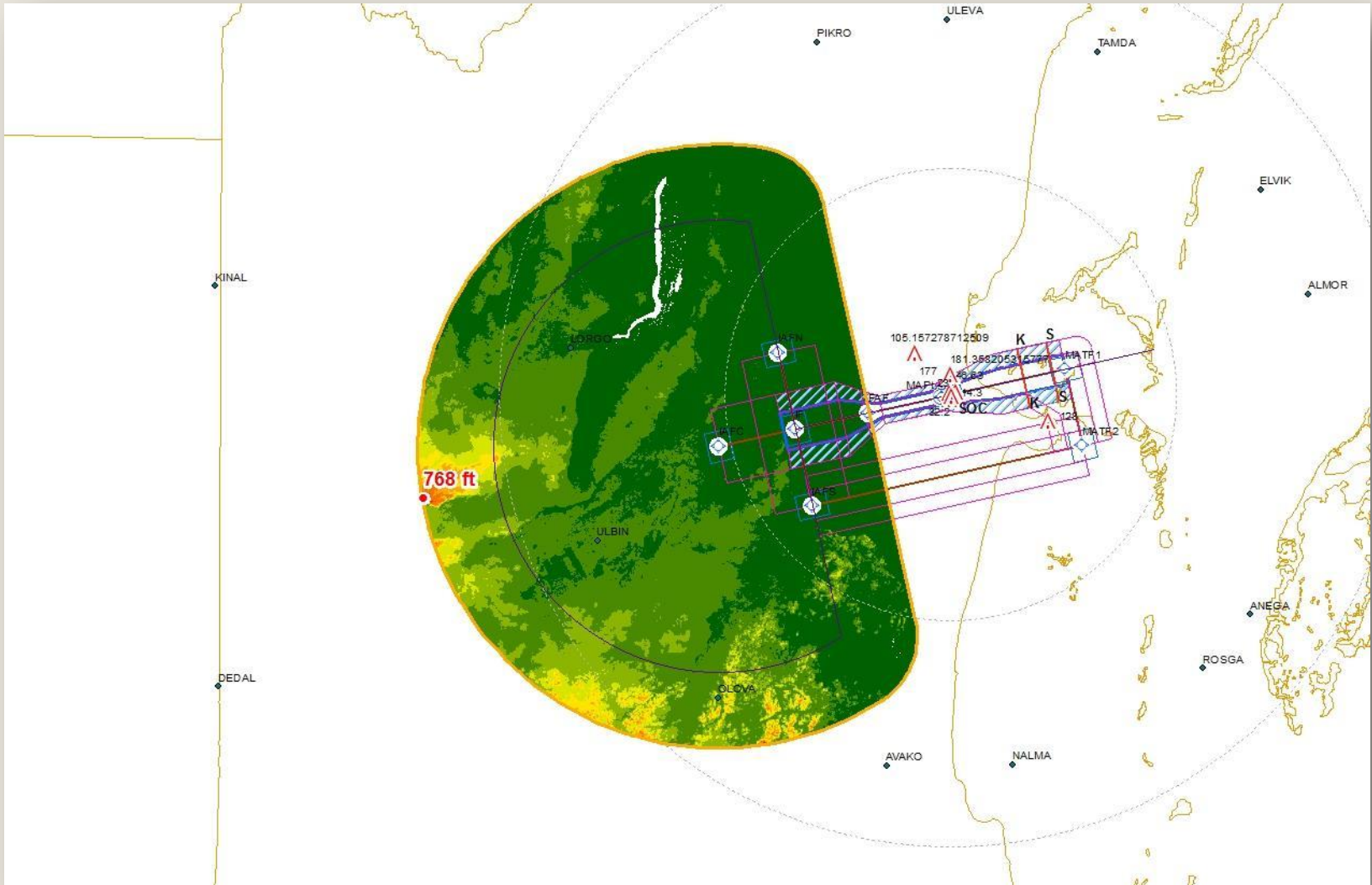
TAA (Terminal Arrival Altitude) CENTER



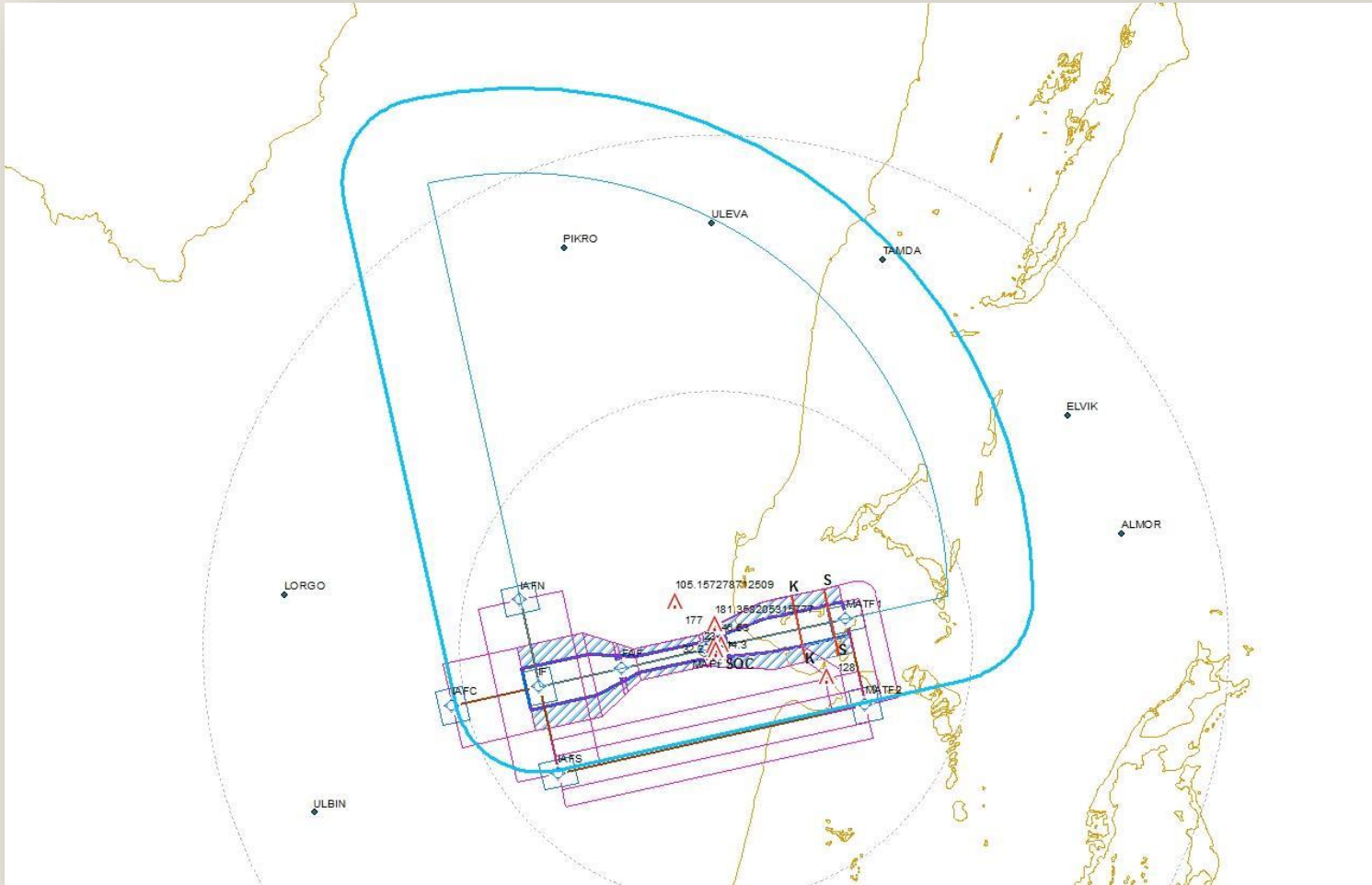
TAA CENTER CONTROL DTM (Digital Terrain Model) OBSTACLES



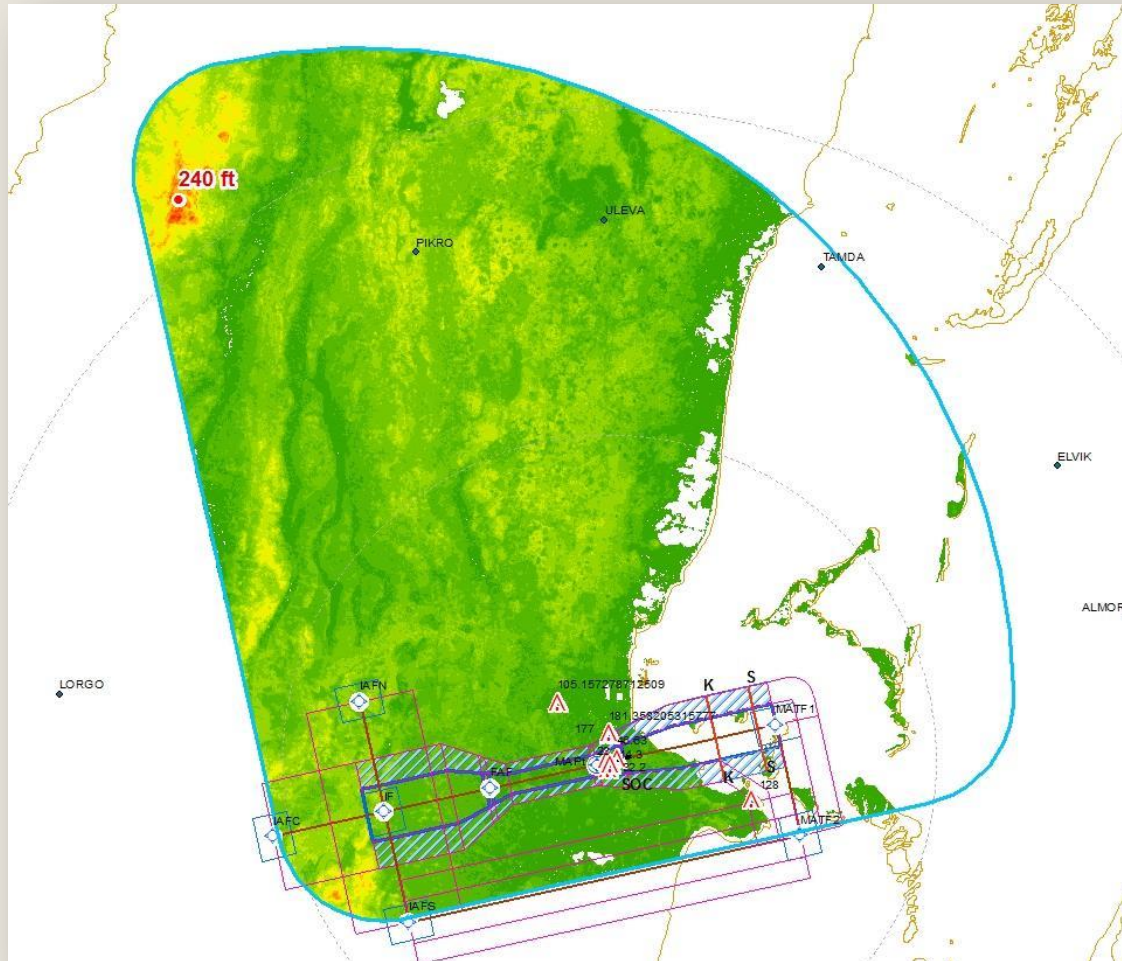
TAA CENTER CONTROL DTM OBSTACLES 15 nm SUBSECTOR



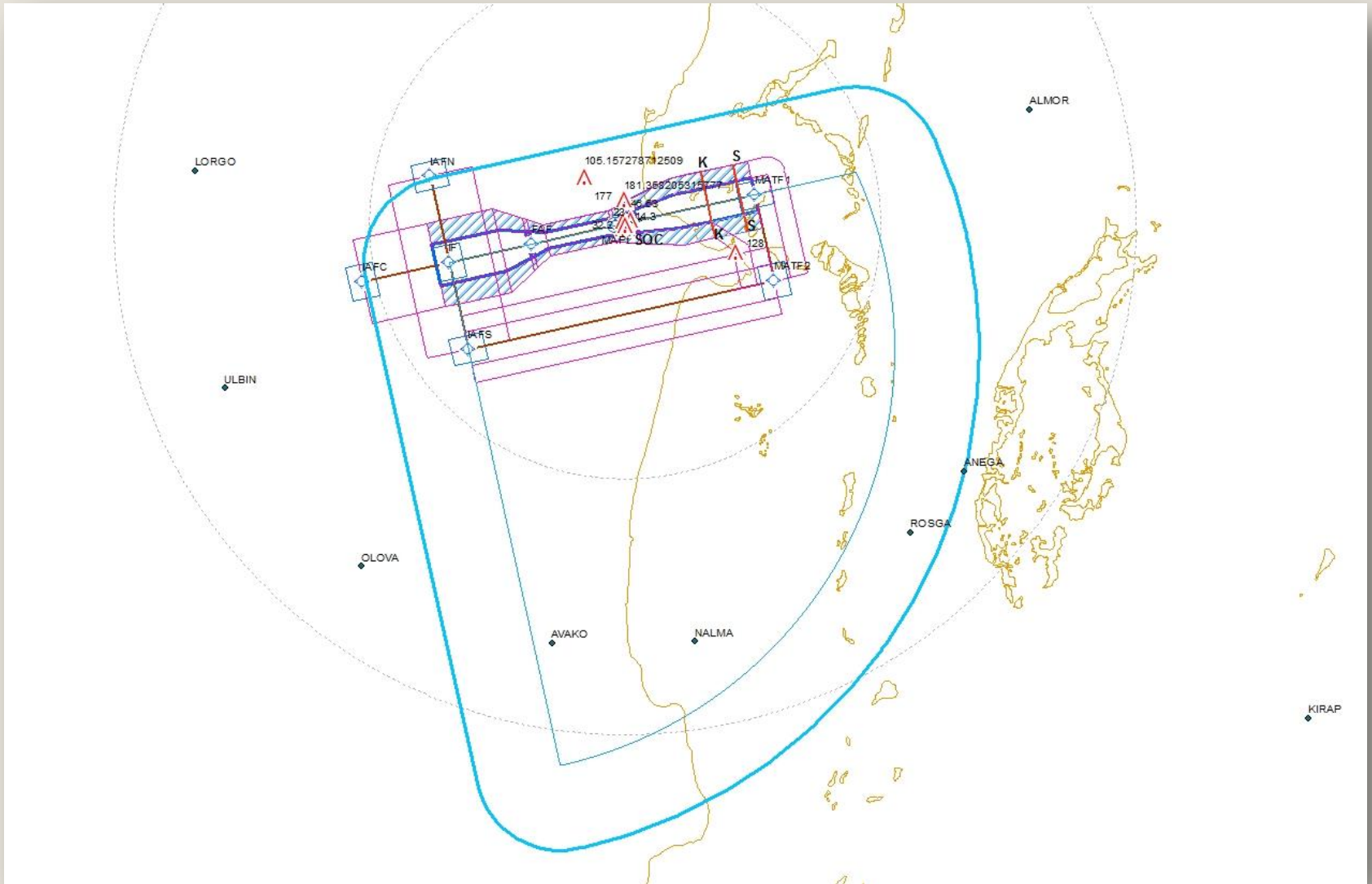
TAA NORTH



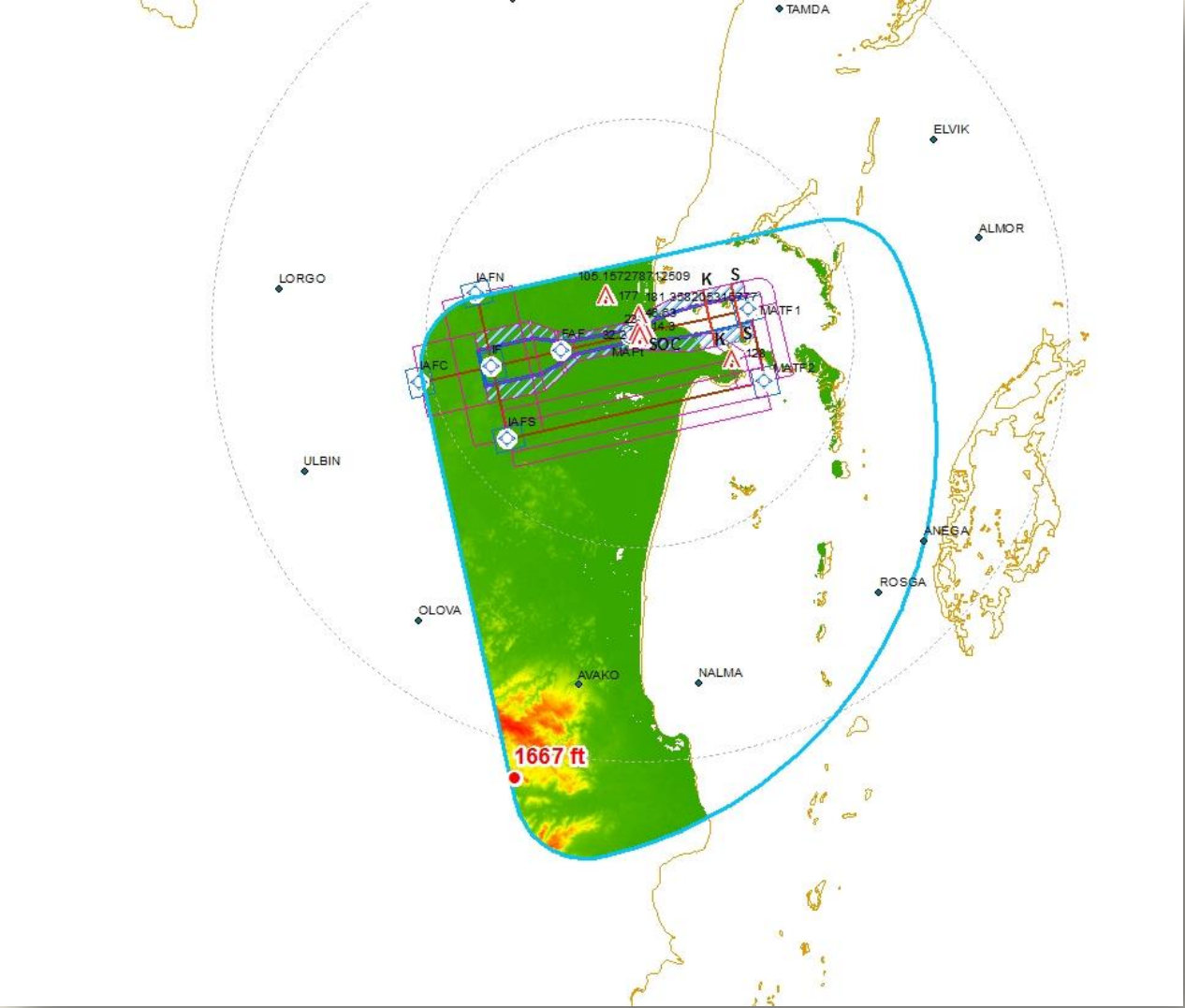
TAA NORTH CONTROL DTM OBSTACLES



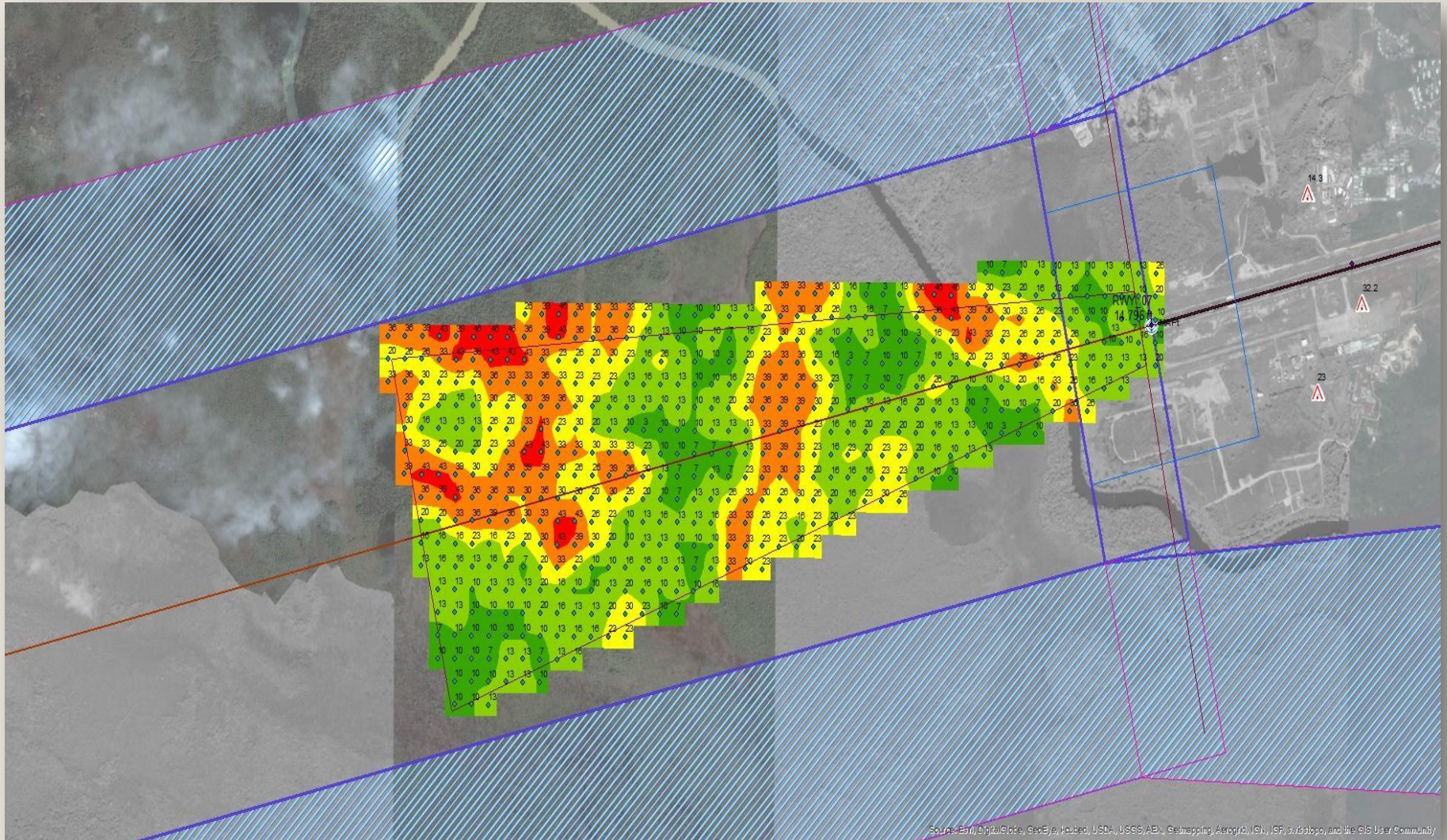
TAA SOUTH



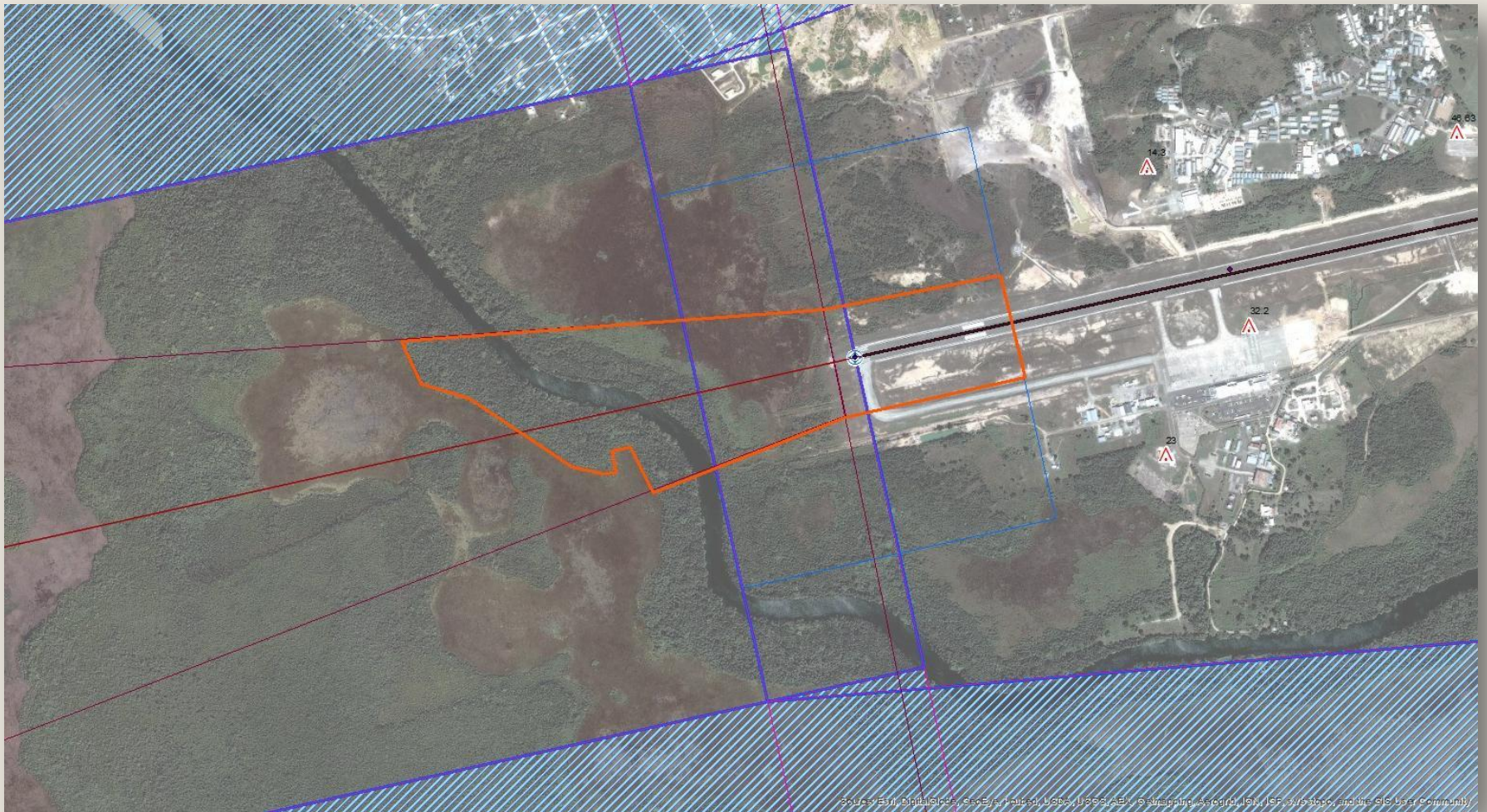
TAA SOUTH CONTROL DTM OBSTACLES



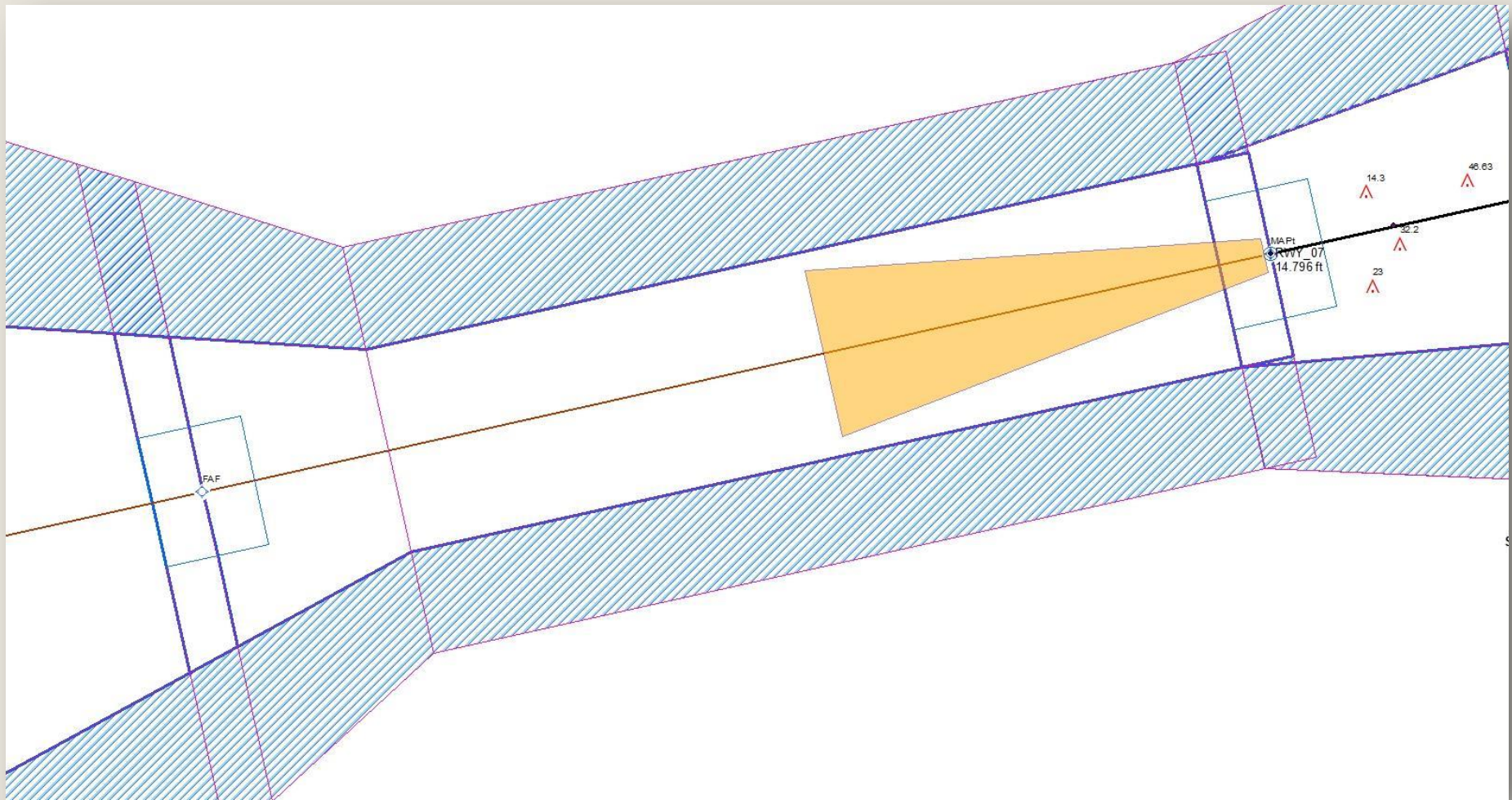
VSS (Visual Segment Surface) SRTM ANALYSIS



VSS SUGGESTED SURVEY AREA



VSS SURVEY OBSTACLES



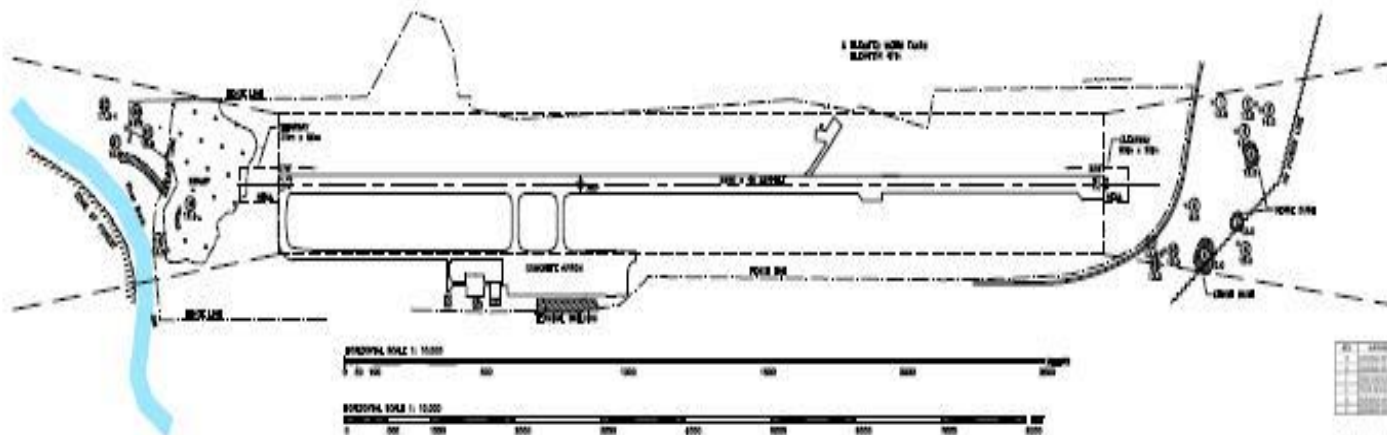
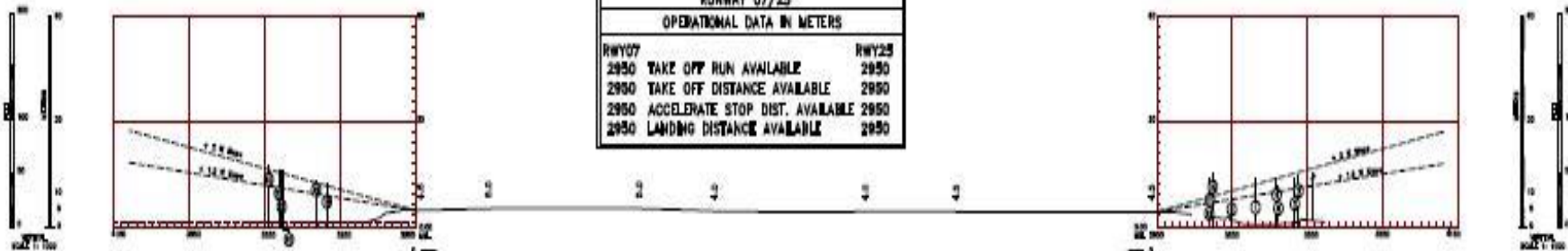
OBSTACLE SURVEY 2013

MAGNETIC VARIATION 0036.0° EAST
(JULY 2013)

AERODROME OBSTACLE CHART
ICAO TYPE 'A' (OPERATING LIMITATIONS)

BELIZE - PHILIP S.W. GOLDSON - INTERNATIONAL
RWY 07/25

RUNWAY 07/25	
OPERATIONAL DATA IN METERS	
RWY07	RWY25
2950 TAKE OFF RUN AVAILABLE	2950
2950 TAKE OFF DISTANCE AVAILABLE	2950
2950 ACCELERATE STOP DIST. AVAILABLE	2950
2950 LANDING DISTANCE AVAILABLE	2950



LEGEND	
TERRAIN	○
OBSTACLE No.	①
HIGH WINDS GALE	~~~~~
SWAMP	□
LONG BUSH	▨
RAIL	—+—+—+—
ROAD	—

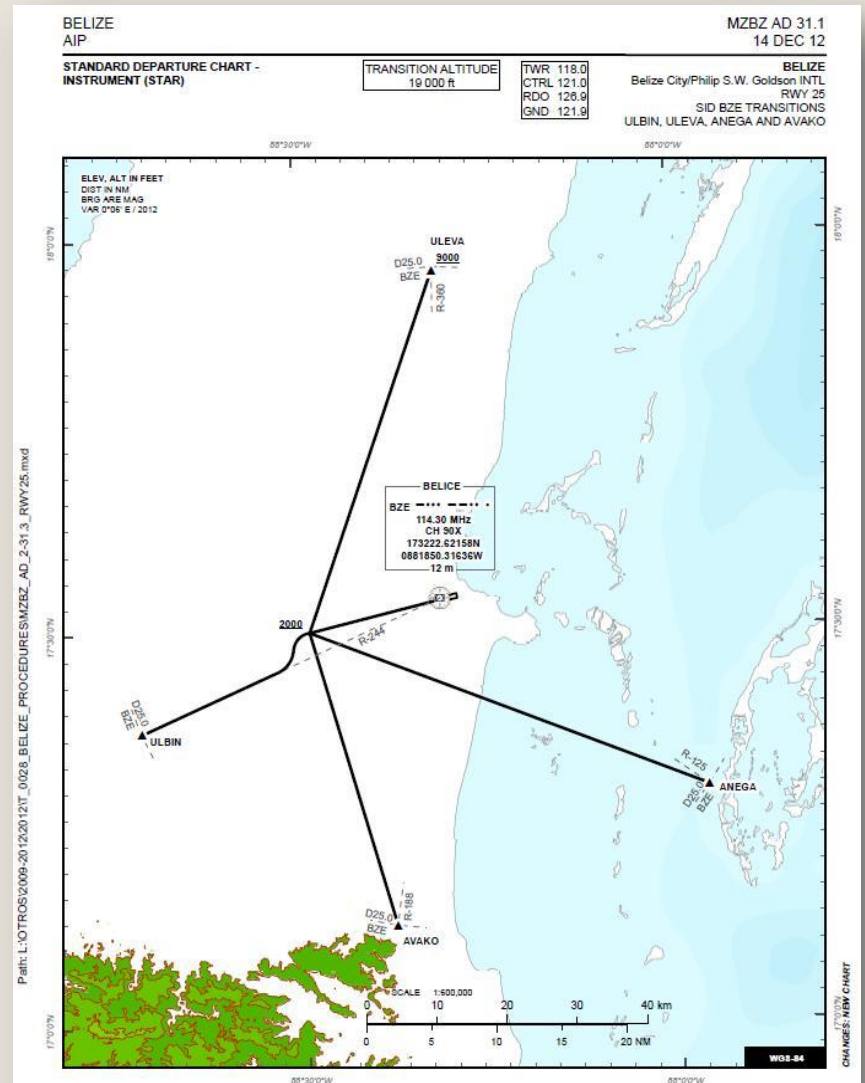
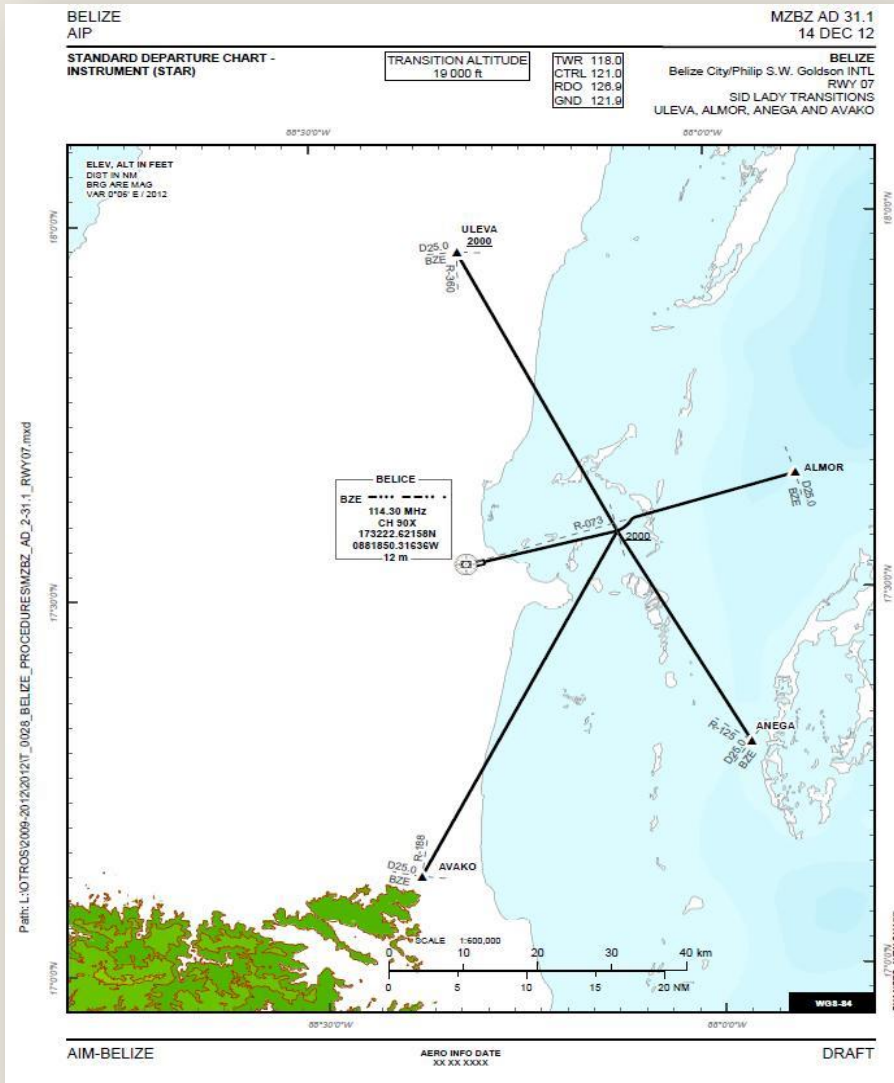
NO.	CLASSIFICATION	HEIGHT	REF.
1	OBSTACLE	15.0	1
2	OBSTACLE	15.0	1
3	OBSTACLE	15.0	1
4	OBSTACLE	15.0	1
5	OBSTACLE	15.0	1
6	OBSTACLE	15.0	1
7	OBSTACLE	15.0	1
8	OBSTACLE	15.0	1
9	OBSTACLE	15.0	1
10	OBSTACLE	15.0	1

PROFESSIONAL ENGINEERING SERVICES LTD., BELIZE

OBSTACLE ASSESMENT



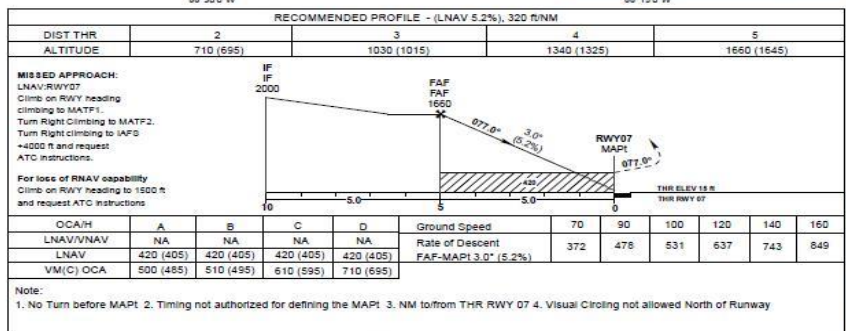
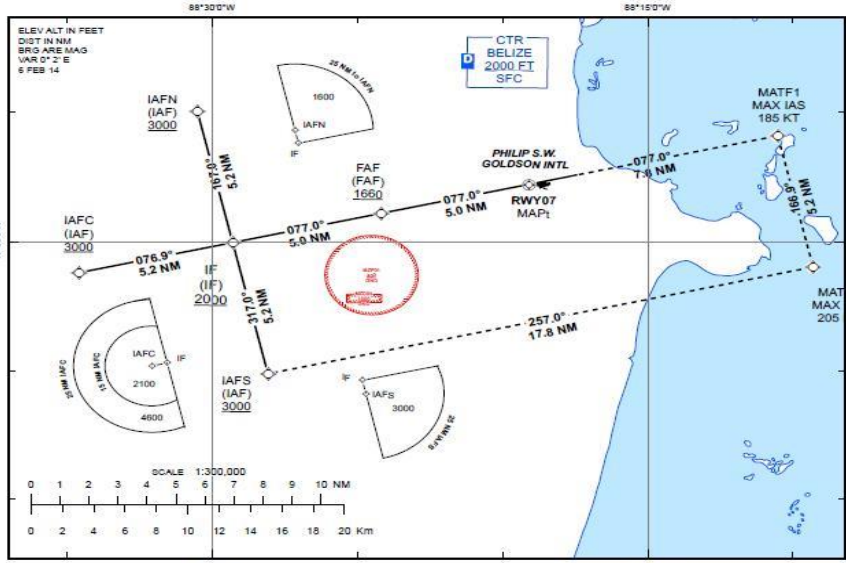
CONVENTIONAL SIDs RWY 07/25 IN DRAFT FORM



RNAV GNSS APPROACH RWY 07 IN DRAFT FORM

BELIZE AIP MZBZ AD 2-XX
6 FEB 14

INSTRUMENT APPROACH CHART BELIZE CITY PHILIP S. W. GOLDSON INTL/ RNAV (GNSS) RWY 07
THR ELEV 15 ft HEIGHTS RELATED TO THR ELEVATION TRANSITION ALTITUDE 19 000 ft
APP 121.0 TWR 118.0 GND 121.9 ATIS 132.75



AIM-BELIZE AERO INFO DATE 2013 AIRAC SUP XX-13

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6 FEB 14

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THR ELEV 15 ft HEIGHTS RELATED TO THR ELEVATION TRANSITION ALTITUDE 19 000 ft
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IAF IAFN

Designator	Path Descriptor	Waypoint Identifier	Latitude	Longitude	Flyover	Course (M/T)	Turn Direction	Altitude (ft)	Distance (Nm)	Speed Limit (kt)	Magnetic Variation	VPAC/V TCH (ft)	Navigation Specification
RNAV (GNSS) RWY07	IF	IAFN	173503.1099N	0883030.2719W	-	-	-	+ 2 000	-	-	0°04' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	IF	172957.8146N	0882917.1368W	-	-	L	+ 2 000	5.2	-	0°04' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	FAF	173105.3284N	0882411.2080W	-	077.0 (077.0)	-	+ 1 660	5.0	-	0°01' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	RNAV07	173212.8422N	0881905.2488W	Y	077.0 (077.0)	-	+ 420	5.0	-	0°02' E	-3°50'	RNP APCH
RNAV (GNSS) RWY07	TF	MATF1	173405.0398N	0881031.1127W	-	077.0 (077.1)	R	+ 1 500	7.8	185	0°07' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	MATF2	172900.7466N	0880917.9717W	-	166.9 (167.1)	R	+ 2 140	5.2	205	0°07' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	IAFS	172452.5092N	0882804.0675W	-	257.0 (257.1)	-	+ 4 000	17.8	250	-	-	RNP APCH

IAF IAFI

Designator	Path Descriptor	Waypoint Identifier	Latitude	Longitude	Flyover	Course (M/T)	Turn Direction	Altitude (ft)	Distance (Nm)	Speed Limit (kt)	Magnetic Variation	VPAC/V TCH (ft)	Navigation Specification
RNAV (GNSS) RWY07	IF	IAFI	172847.5974N	0883435.2668W	-	-	-	+ 3 000	-	-	0°07' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	IF	172957.8146N	0882917.1368W	-	076.9 (077.0)	-	+ 2 000	5.2	-	0°04' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	FAF	173105.3284N	0882411.2080W	-	077.0 (077.0)	-	+ 1 660	5.0	-	0°01' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	RNAV07	173212.8422N	0881905.2488W	Y	077.0 (077.0)	-	+ 420	5.0	-	0°02' E	-3°50'	RNP APCH
RNAV (GNSS) RWY07	TF	MATF1	173405.0398N	0881031.1127W	-	077.0 (077.1)	R	+ 1 500	7.8	185	0°07' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	MATF2	172900.7466N	0880917.9717W	-	166.9 (167.1)	R	+ 2 140	5.2	205	0°07' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	IAFS	172452.5092N	0882804.0675W	-	257.0 (257.1)	-	+ 4 000	17.8	250	-	-	RNP APCH

IAF IAFS

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RNAV (GNSS) RWY07	IF	IAFS	172452.5092N	0882804.0675W	-	-	-	+ 3 000	-	-	0°04' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	IAFS	172957.8146N	0882917.1368W	-	347.0 (347.1)	R	+ 2 000	5.2	-	0°04' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	FAF	173105.3284N	0882411.2080W	-	077.0 (077.0)	-	+ 1 660	5.0	-	0°01' E	-	RNP APCH
RNAV (GNSS) RWY07	TF	RNAV07	173212.8422N	0881905.2488W	Y	077.0 (077.0)	-	+ 420	5.0	-	0°02' E	-3°50'	RNP APCH
RNAV (GNSS) RWY07	TF	MATF1	173405.0398N	0881031.1127W	-	077.0 (077.1)	R	+ 1 500	7.8	185	0°07' E	-	RNP APCH
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AIM-BELIZE AERO INFO DATE 2013 AIRAC SUP XX-13

CHANGES: NEW PROCEDURE



PENDING TASKS TO BE DEVELOPED IN ACCORDANCE WITH ICAO DOC 9906

- a) To elaborate a compliance certificate which indicates that tasks have been completed in accordance with criteria approved by Belize;
- b) Belize must elaborate a Risk Assessment Programme and also a Mitigation Plan;
- c) The procedure must be evaluated by a IFP who is an independent person not working in the original design;
- d) The use of methods and an independent tool increases the effectiveness of evaluation;
- e) A ground validation procedure shall be conducted once step (c) has been completed;



ADDITIONAL TASKS TO BE DEVELOPED IN ACCORDANCE WITH ICAO DOC 9906

- e) A flight simulation validation will be conducted hopefully with the collaboration from an aircraft operator or other means readily available;
- f) Presentation of the procedures to the stakeholders involved and adapted to make it as informative as possible,
- g) Review feedbacks before a validation flight is conducted;
- g) Execute the flight validation; and
- h) Publish the AIP Supplement in accordance with the recommended and anticipated AIRAC cycles.



ONGOING ACTIVITIES

- MEETING WITH STAKEHOLDERS
- LETTERS OF AGREEMENT
- TRAINING ISSUES
- LEGAL FRAMEWORK

THANK YOU!



<http://www.civilaviation.gov.bz/>