Airports GIS

Aeronautical Survey Data Collection, Submission, and Maintenance

Presented to: Montana Airport Managers Association

By: Gil Neumann, FAA Northwest Mountain Region

Date: September 24, 2014

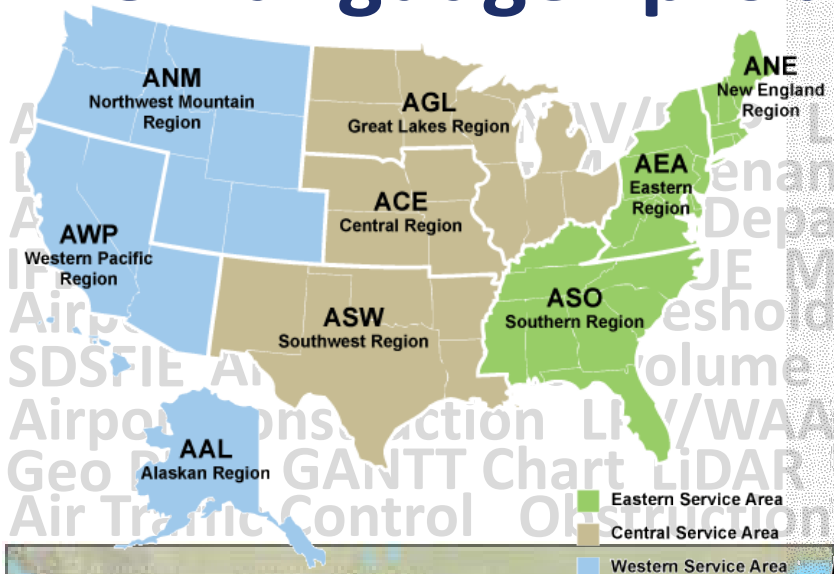
Objectives: FAA Problem Solving 101

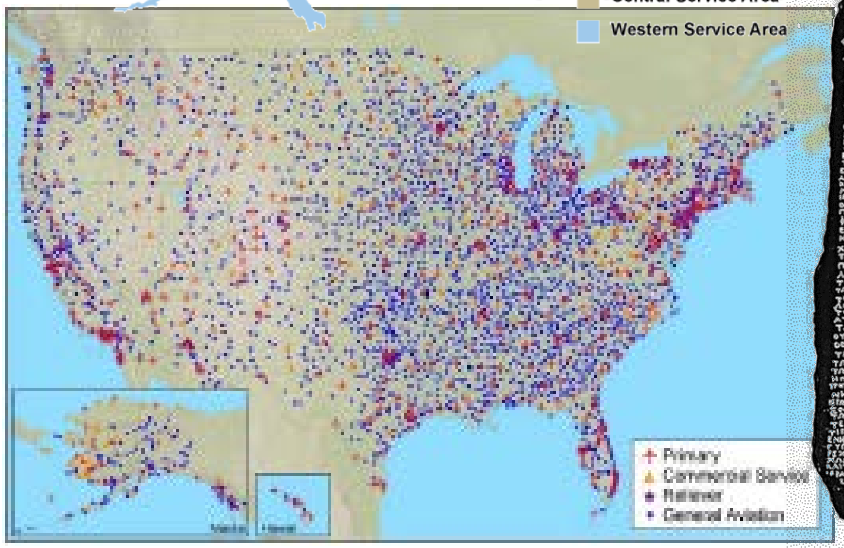
- Describe the problem
- Analyze the potential causes and challenges
- Identify possible solutions
- Select the best solutions
- Develop an action plan
- Implement the solution
- Evaluate Progress

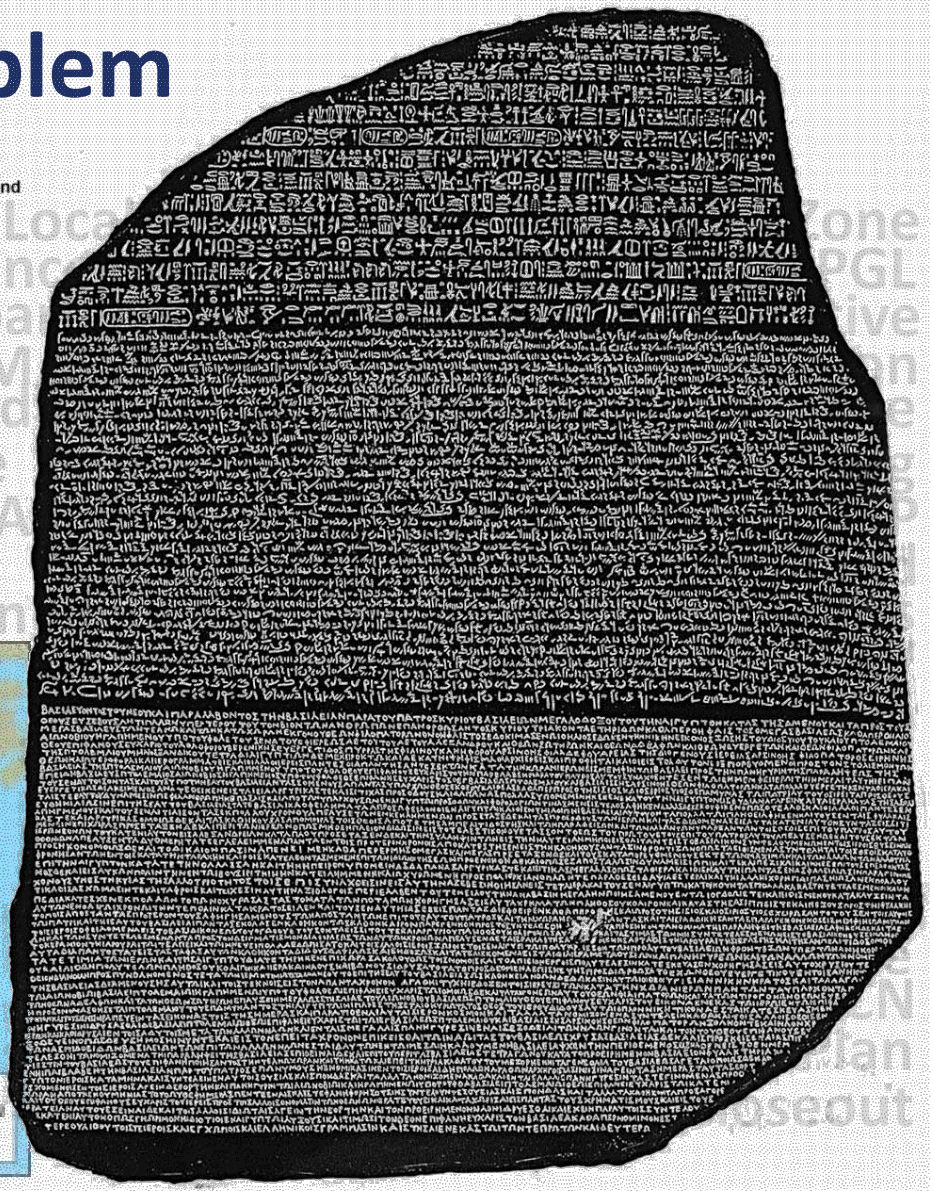
The “language” problem

Airport planning RNAV/RNP Localizer Runway Protection Zone
Emissions modeling Maintenance order SOAR II GRE LEED PGL
Airport design Stopway Departure gap One Engine Inoperative
IFE Asset management SUE MALSR NextGen TDZE Transition
Airport engineering Threshold bar Flight Check Design surface
SDSFIE Annual service volume Best practices Billability Deicing
Airport construction LPV/WAAS Non-aeronautical revenue RFP
Geo PDFs GANTT Chart LiDAR Pilot deviation BCA ratio Wetland
Air Traffic Control Obstruction Identification Surfaces Non-revs
Hotspot CSPP DWG ASDE-X Grant assurances Aerodrome SOW
Flight Procedures Advisory Circular RAPT SMS 20:1 NAVAIDS
RASM Multiplier ROFA Haul route Metadata OSG NDVI OE/AAA
Tech Ops Engineering Brief Runway Incursion 65 DNL VFR RVR
Gap Analysis Threshold siting surface Value add PNR AIMM/S2
Engineering Services BIM LOS Cloud Server Master plan update
Congressional Crosswind Risk mitigation KMLARP NIRS Frangible
TERPS FME State plane coordinate system AGIS AIP PFC PCN
National ASSET Wake vortex CORS ALP Cadastral System Plan
Part 77 surfaces FONSI RTK Wildlife Hazards PACS Grant closeout

The “language” problem







Federal Aviation Administration

Problem Definition

- **Problem Statement**
  - Aeronautical survey data collection and maintenance at airports introduces a new “language” and process that are both vaguely familiar, but also conspicuously unfamiliar to the traditional airport planning/project management stakeholder community
- **The Desired Near-term State**
  - Aeronautical survey data collection and maintenance at airports will be integrated into the “language” and decision making of traditional airport planning and project management by 2016
- **The Desired End State**
  - Up-to-date aeronautical survey data and maintenance will serve as the common foundational “language” for enabling NextGen initiatives at airports by (its envisioned implementation) 2030

Problem: Disparate Aeronautical Surveys

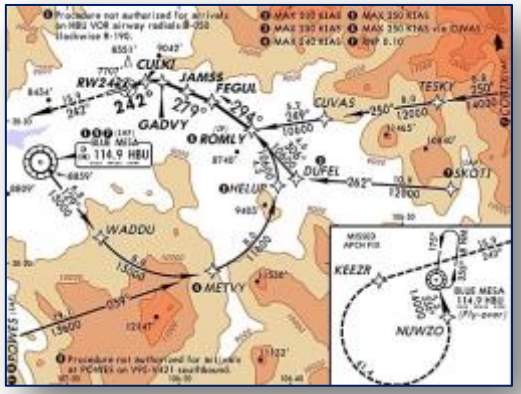
- **In the past, a disconnect between aeronautical survey data:**

OE/AAA case data	NGS OC Chart Surveys	USGS Quad Maps; Terrain Data
• Towers and tall buildings • Part 77 notification • Construction notification • No terrain data	• All other obstructions • Old survey standards (405) were accurate, but limited in their application at airports	• Part 77 data for ALPs • Structures greater than 200' • Terrain penetrations • Limited accuracy (50' contours)

- **Flight Procedures Office (FPO) data for the obstruction environment derived primarily from ATO and USGS surveys**
  - Often 20' Horizontal / 3' Vertical Accuracy

Problem: Partial Data; Outdated Standards

- **FPO software for design of instrument procedures used obstacles delivered in UDDF format**
- **Flat files were limited**
  - Old requirements: 4 points collected along the length of a runway with constrained application




```
|19L  |P|17097|
|Y|17097|
| 385719.1845| -772609.5261|1804003|11500|150|17097|
|  302.2|       |17097|
|            |            |       |     |
|    0|  293.2|       |17097|
| 4000|  305.1|       |17097|
| 8500|  312.4|       |17097|
|11500|  311.7|       |17097|
```

The Result: Aeronautical Data Silos

NFDC NASR/5010 Airport Data

Runway Information

Runway 09

Traffic Pattern: Left
Runway heading: 112
Markings: Basic
Markings condition: Good
Latitude: 44-30-7.037 N
Longitude: 123-17-30.385 W
Elevation: 241.4 ft.
Threshold crossing height:
Visual glide path angle: degrees

NFPG (Flight Procedures) Data

Rwy Number: 09

	Status: A	Survey: 5
	Markings:	BSC-

Threshold

Latitude:	N 44° 30' 06.3000"
Longitude:	W 123° 17' 27.8300"
Elevation:	241.0
Elipsoid Elev:	169.9 E
Horz. Datum:	NAD83
Vert. Datum:	NGVD29

Displaced Threshold

iOEAAA

	NASR	Opp. NASR
ID:	09	27
Heading:	112.03	292.04
Latitude:	44-30-6.194 N	44-29-53.097 N
Longitude:	123-17-27.503 W	123-16-42.138 W
Approach Category:	B(V) - Other than Utility (Visual)	B(V) - Other than Utility (Visual)
Elevation:	245	246.3
Approach Lights:		
Extension:	0	0
Length:	3545	3545
Width:	75	75

Yes, it is the same runway, but which information is correct?!

Airport Layout Plan (ALP) Data

RUNWAY END COORDINATES (NAD 83)

Ext Runway 9 LATITUDE 44-30'-07.044" N

ELEVATION 242.0 ft LONGITUDE 123-17'-28.929" W

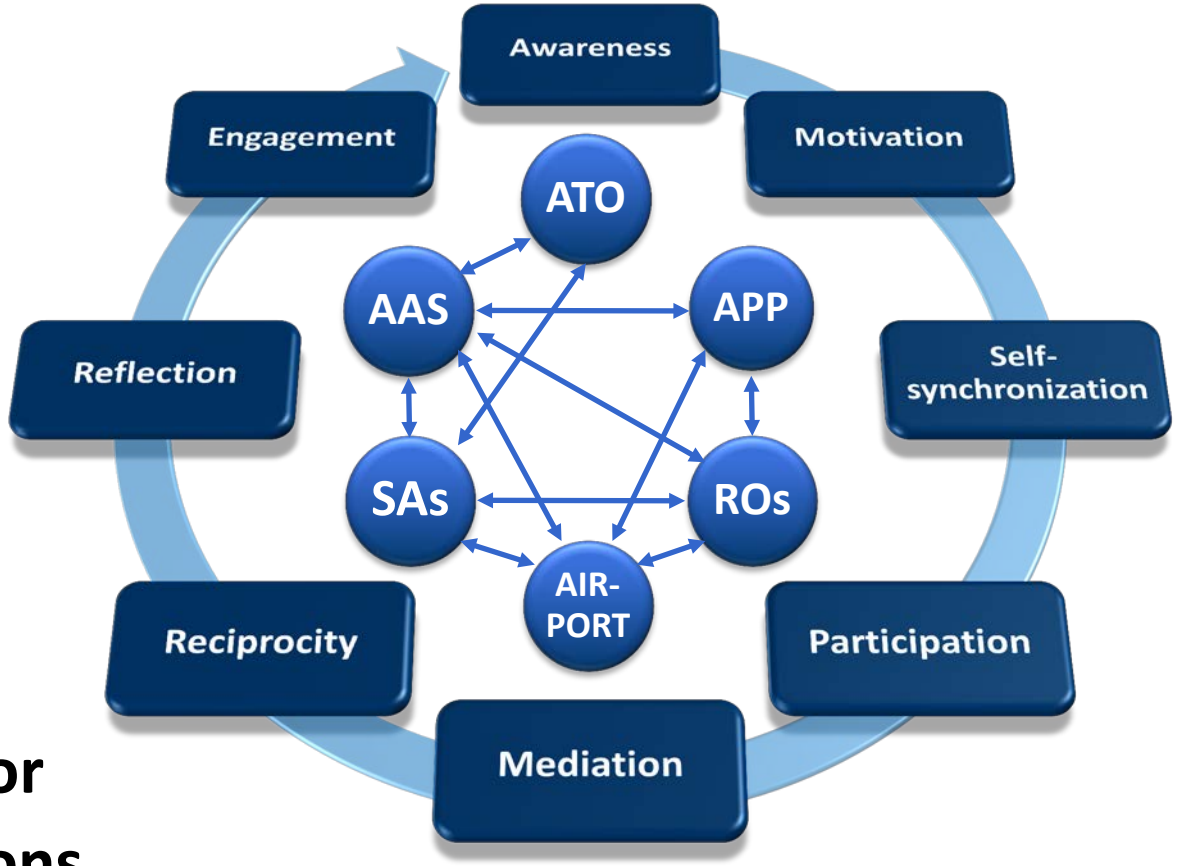
Challenges to implementation within FAA

Challenges to implementation within FAA

Fulfill the obligation to airport sponsors

- **Communication**
- **Collaboration**
- **Funding**
- **Vision**
- **Management**
- **Education**
- **Accommodation**

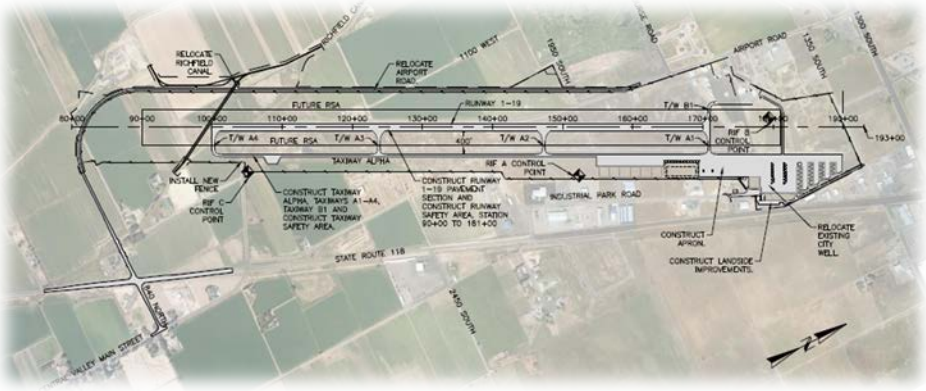
Bear in mind ARP, ATO, airport sponsor perspectives/missions



"If you've seen one airport..."

- **Part 139 airports**
  - Value-add: data management; improve FAA communication?
  - Many transitioning challenges
  - New responsibilities?
  - Will FAA meet its obligations?

- **Non-Part 139 airports**
  - One size requirement?
  - Software/hardware cost?
  - Impact of ASSET Study?
  - Help me, FAA



Lessons Learned and Recommendations

- Scoping is Critical to Project Success
- Training/Outreach Must be On-going
- Two Fronts to Data Management
- Two Fronts to Acceptance and Use

} *FAA LOBs*
Airport Sponsors

- Data Verification Needs Refinement
- -18 Guidance Needs Refinement
- Presents More Challenges with Timing
- Consider Careful Examination of Resources
- Manage the Transition on all Fronts

Manage the Transition - FAA

•HQ

- **FAA must continue to lead and work with airports, consultants, and industry to manage the transition**
- **FAA must work cohesively across LOBs for data sharing**
- **Deploy an FAA executive-endorsed, managed transition**
  - Development window for Airports GIS tools and processes
  - Manage the data to be developed

•ROs/ADOs

  - Accommodate the learning curve of the airport community in understanding the requirements and benefits
  - Translate “gray areas” in the guidance during transition
- **Clarify AIP/PFC eligibility for program aspects**
- **Enforce draft policy/guidance materials; help educate**
  - Transition Policy; Implementation Guidance; Program Guidance

Manage the Transition - Airports

- **While FAA continues to guide the transition, Airport Sponsors play a vital role in mirroring the transition**
  - Adjusting data collection and data sharing processes
  - Determining data maintenance practices
  - Submitting required data deliverables to FAA for every project that effects the Airport Layout Plan
  - Submitting "As Built" data deliverables through Airports GIS
  - Begin preliminary design with Airports GIS-compliant data
  - Consideration of gathering additional data useful to airport decision makers beyond FAA requirements (eg., terminal concessions / lease management; utility plans)
  - Consideration of developing airport-specific apps

Fullfill the obligation to airports: ROs/ADOs

- **Learn the basics to gain confidence with AGIS implementation and eventual transition to the eALP**
  - Understand how AGIS fits into daily responsibilities and decision-making as projects and grants are managed for multiple airports
  - Appreciate that decisions up front have long-term effects
- **Introduce AGIS into up-front planning, decision making, and pre-conferences**
  - Help airports navigate funding eligibility for both aeronautical survey data collection and data maintenance activities
  - Help airports identify how AGIS fits into the project critical path
  - Help provide clarification during scoping meetings for AGIS tasks
  - Work with airports to maximize data use across multiple projects
- **Plan for and track progress of AGIS implementation**

Fullfill the obligation to airports: ROs/ADOs

- **Weave AGIS requirements into Regional work plans and project grant management processes**
- **Expanding Helena ADO PM knowledge base**
  - Runway Extension Project Lifecycle
  - AGIS project planning
    - Prior to annual ACIP meetings with sponsors, use Master Plans to identify projects that require aeronautical survey data collection; weave into prioritization thought process
  - Project Scoping process
    - AC 150/5300-18B, Change 1, Table 2-1
    - Scoping Matrix
    - Feature-by-feature narratives
  - AGIS Statement of Work checklist

Obligation for aeronautical survey data

- **All projects at these airports must collect, submit, and manage data per FAA AGIS requirements:**

State	City/Town	Airport Name	LOCID	Hub Size	AGIS Transition
MT	Billings	Billings Logan International	BIL	SMALL	FY 2013
MT	Bozeman	Bozeman Yellowstone International	BZN	SMALL	FY 2013
MT	Missoula	Missoula International	MSO	NONHUB	FY 2014
MT	Kalispell	Glacier Park International	GPI	NONHUB	FY 2014
MT	Great Falls	Great Falls International	GTF	NONHUB	FY 2014
MT	Helena	Helena Regional	HLN	NONHUB	FY 2014
MT	Butte	Bert Mooney	BTM	NONHUB	FY 2014
MT	West Yellowstone	Yellowstone	WYS		FY 2015
MT	Sidney	Sidney-Richland Municipal	SDY		FY 2015
MT	Glasgow	Wokal Field/Glasgow International	GGW		FY 2015
MT	Miles City	Frank Wiley Field	MLS		FY 2015
MT	Havre	Havre City-County	HVR		FY 2015
MT	Lewistown	Lewistown Municipal	LWT		FY 2015
MT	Wolf Point	L M Clayton	OLF		FY 2015
MT	Glendive	Dawson Community	GDV		FY 2015

- **At other airports, all projects involving safety-critical data must meet AGIS requirements**

Obligation for aeronautical survey data

- **Section 4.1.3: while all features defined in -18B are important, a subset of the data is critical for safe flight operations encompassing the approach, landing, takeoff, and departure of aircraft**

Safety-Critical Projects		Non-Safety Critical Projects
• All NAVAIDs • All Obstacles • All Runway Ends • All Touchdown Lift Off areas • All Airport Control Points • Most Runway projects • Most Stopway projects • Most Taxiway projects • Visual Aids • Airport Airspace Analysis	*Master Plan Updates are considered on a case-by-case basis. ALP updates require up-to-date obstacle data for the airspace and inner airspace. Thus, most MPUs are considered safety-critical projects. Baseline data is easier to update in the future.*	• Most aprons projects • Land acquisition, avigation, easements • AIP-funded environmental features • Noise contour mapping • Most lighting projects • Most construction of buildings (that do not penetrate airspace surfaces) • Installation of fencing • Installation of jetbridges

Obligation for aeronautical survey data

- **Understand the benefits of the program**
  - Long-term cost efficiencies (BCA ratio)
  - Better communication with all FAA LOBs
  - Appreciate "you get what you pay for"
- **Manage aeronautical data sets for future use**
  - Updates to data set, not the legacy ALP in AutoCAD
  - Electronic Airport Layout Plan (eALP) is coming!
  - Engineering Brief 91 - Managing vegetation in AGIS to protect airspace surfaces
- **Be proactive: don't wait to be told to implement**
- **Provide useful feedback to the Helena ADO**

Questions?

- **If there is time, we can answer a few questions now**
- **If we run out of time, please do not hesitate to find us later today, tomorrow, or in future meetings**

Gil Neumann

Program Manager: AGIS/SMS/NAS coordination

FAA Northwest Mountain Region – Airports

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Extra Slides

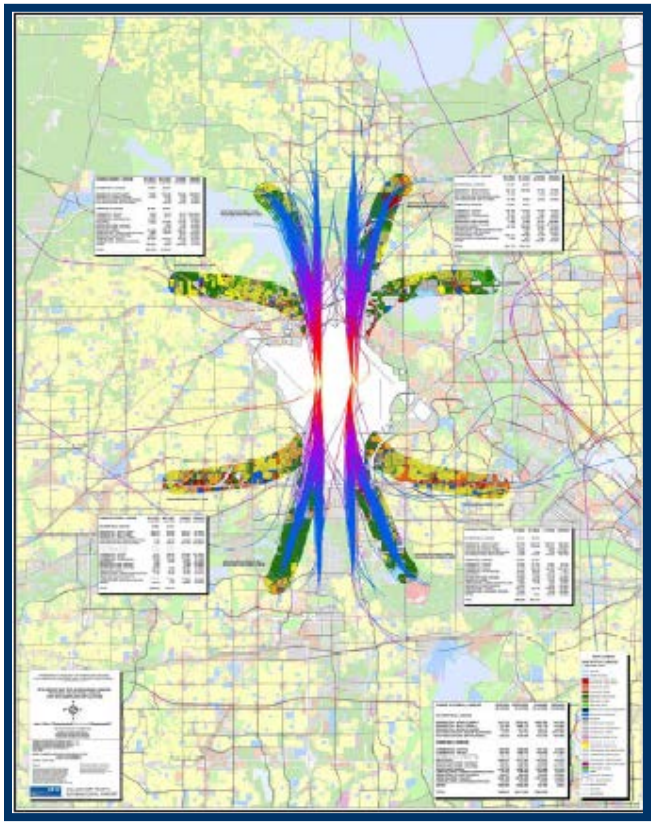
Program Benefits

Greater Productivity	Submission and processing of aeronautical survey data for airports in a digital, STANDARD format
Dependable	More accurate, SURVEY-GRADE data collected, managed, and maintained through AGIS—ensuring the most current data is readily available
Better Connected	E-management and processing of FAA aeronautical survey data for airports: a ONE-STOP-SHOP for accessing, managing, and updating data
Economic Efficiencies	GIS is a scalable and interoperable technology allowing others to use and SHARE DATA WITHOUT RECOLLECTING, because the metadata provides the source, accuracy, collection methodology, etc. of the dataset. Each entity builds on the base data set to meet its own requirements

Benefits | Practical Use at DFW

- **Airports GIS Pilot Program: DFW**

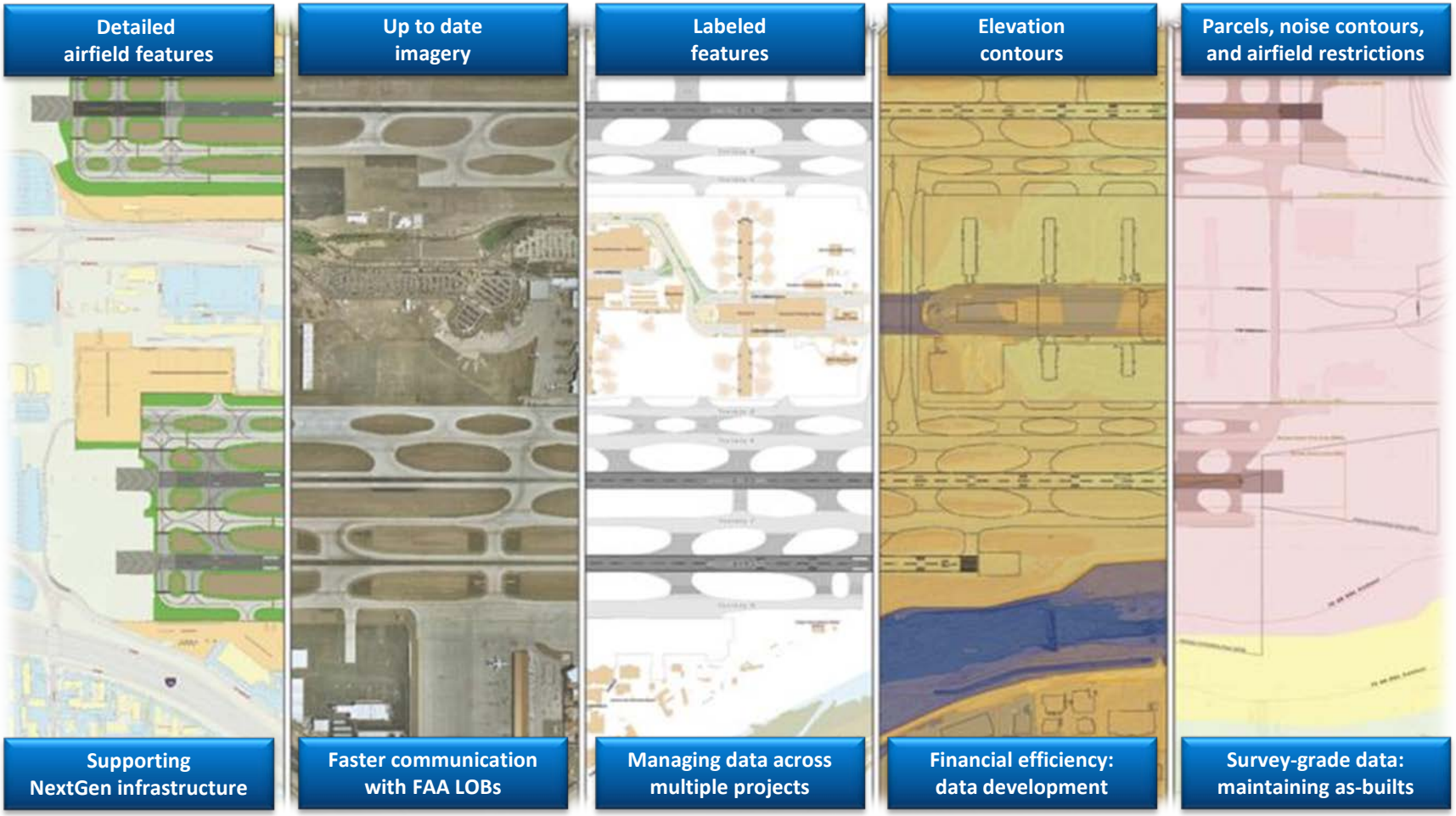
DFW: LIVE Parking Status



DFW: Flight Track Analysis

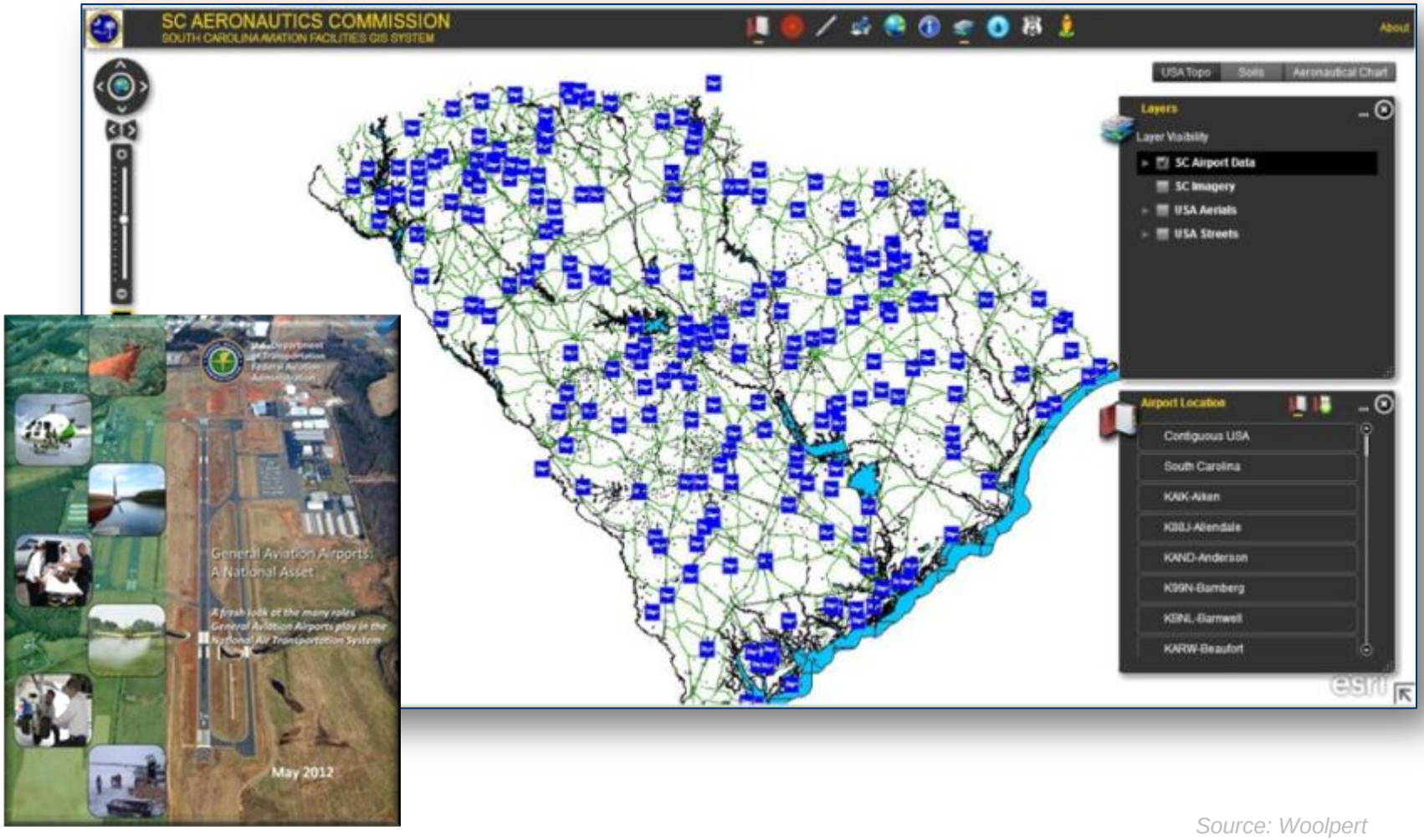
Source: DFW Airport

Benefits | Airport Sponsors



Source: PHX; ESRI

Benefits | GA Airports and State DOTs



Source: Woolpert

AGIS "Airport" view of imported 5010 data

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« Airports GI

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DALLAS LOVE FIELD, TX (DAL)

Airport Information | Survey and Design Projects | eALP Projects | Baseline Management | Baseline Information | Create Baseline Download | Baseline Downloads | Choose Airport

Auto collapse Collapse all

Location

Latitude:	32-50-49.6 N
Longitude:	96-51-6.4 W
Elevation:	487 ft.
Variation:	6 E 1990
From city:	5 miles NW of DALLAS, TX
ARTCC:	ZFW
Section chart:	DALLAS-FT WORTH
Time Zone:	UTC-6(-5DT)

View in Google Maps

DAL (KDAL)
DALLAS LOVE FIELD
DALLAS, TX
UNITED STATES

Data is effective:
05/05/2011 - 06/30/2011

- Operations
- Weather Data Services (none)
- Runways
- Heliports (none)
- Contacts
- Remarks
- Radio Aids to Navigation
- Communications

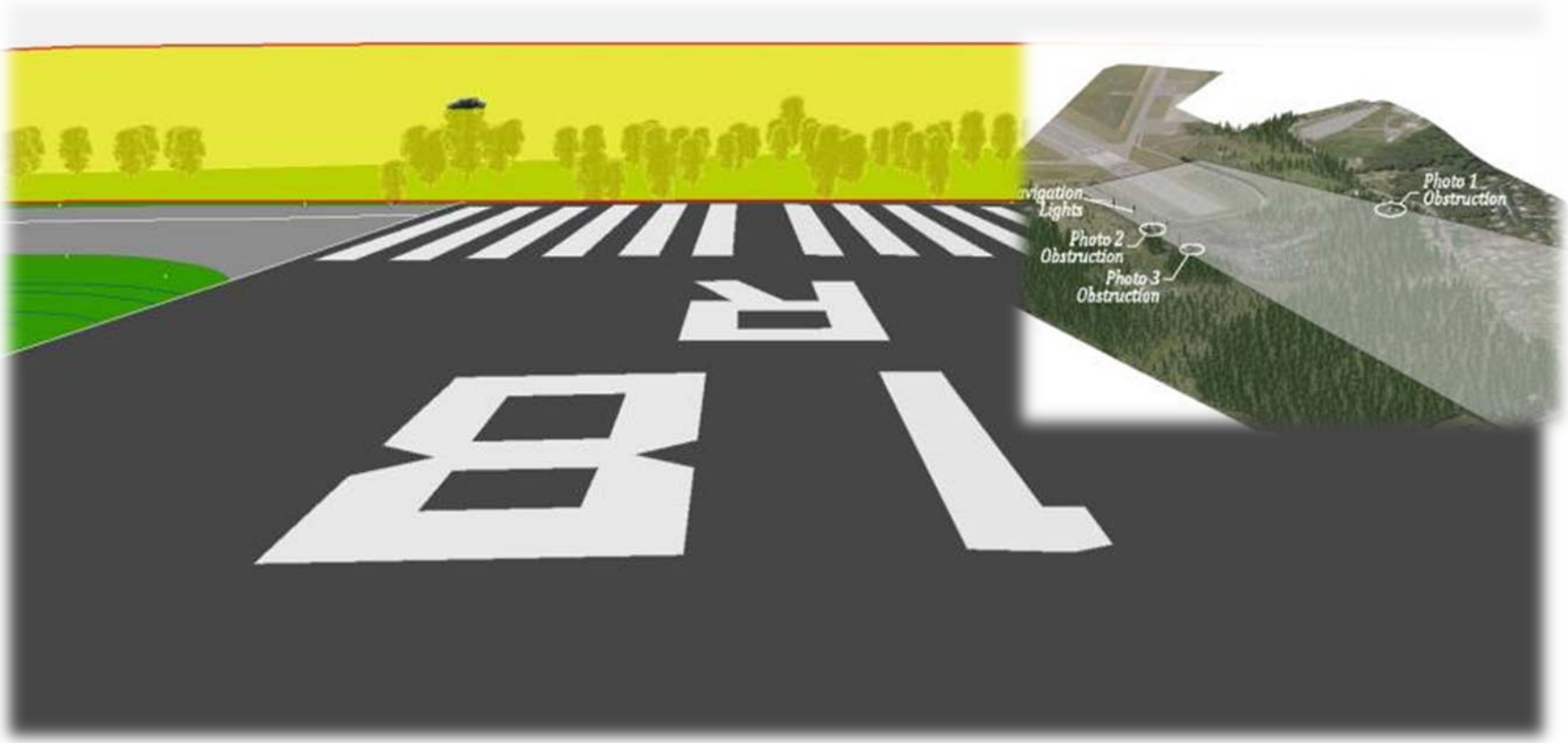
Google

Dallas Love Field (DAL)

Benefits | Obstruction Analysis

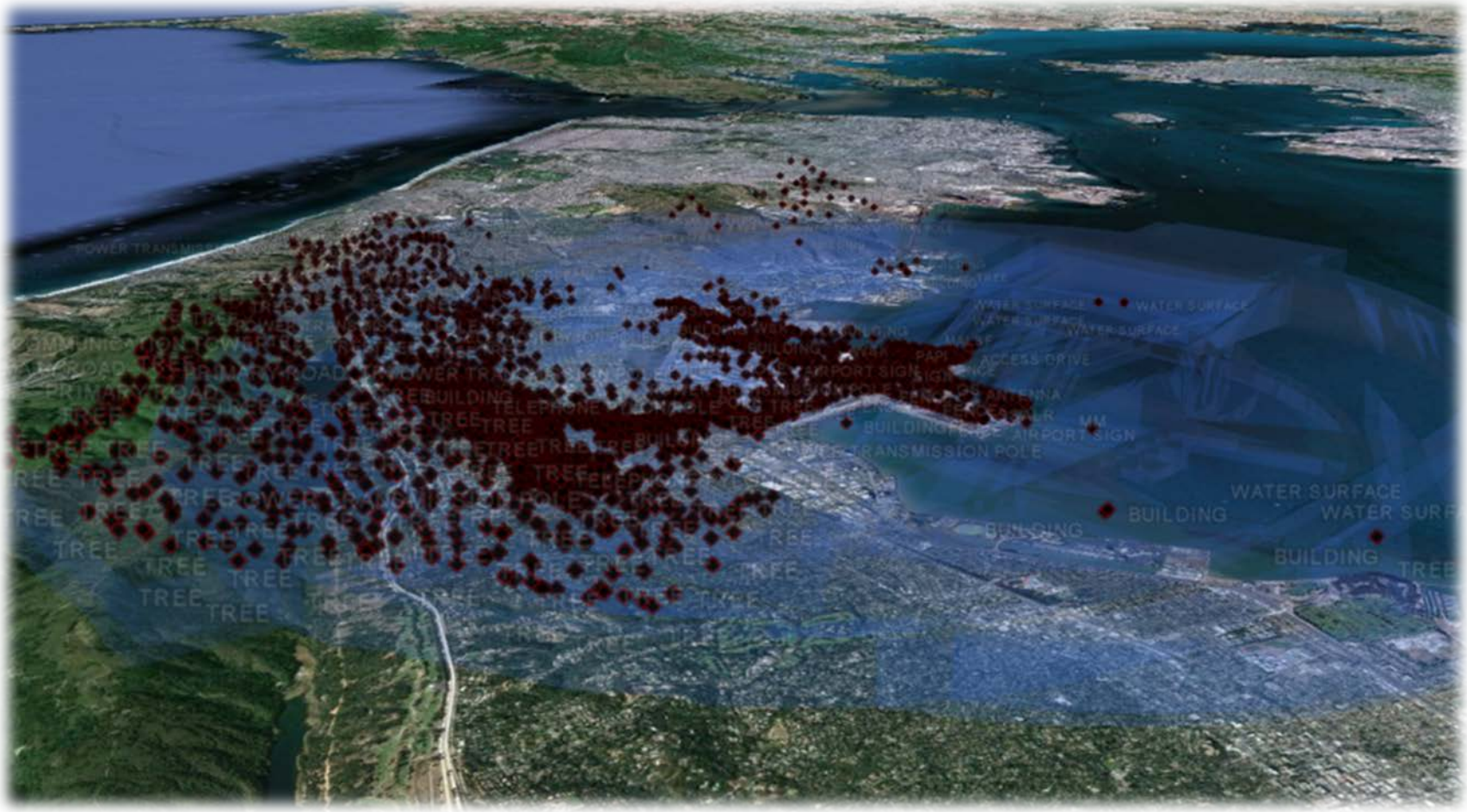
Source: Woolpert

Benefits | 3D Obstruction Analysis



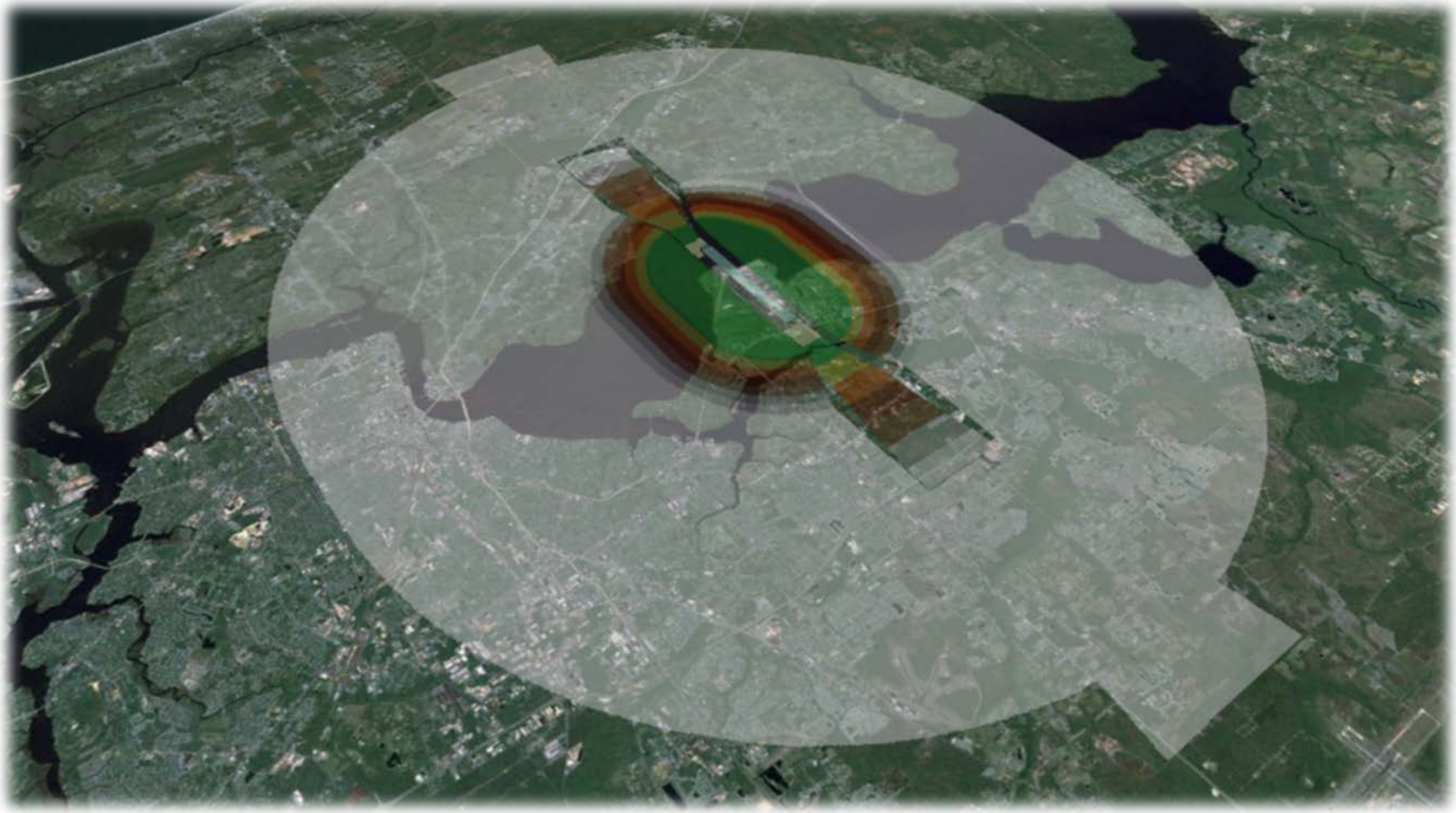
Source: Woolpert; ESRI

Benefits | 3D Obstacle KMZ files



Source: Woolpert

Benefits | 3D Airspace Surfaces



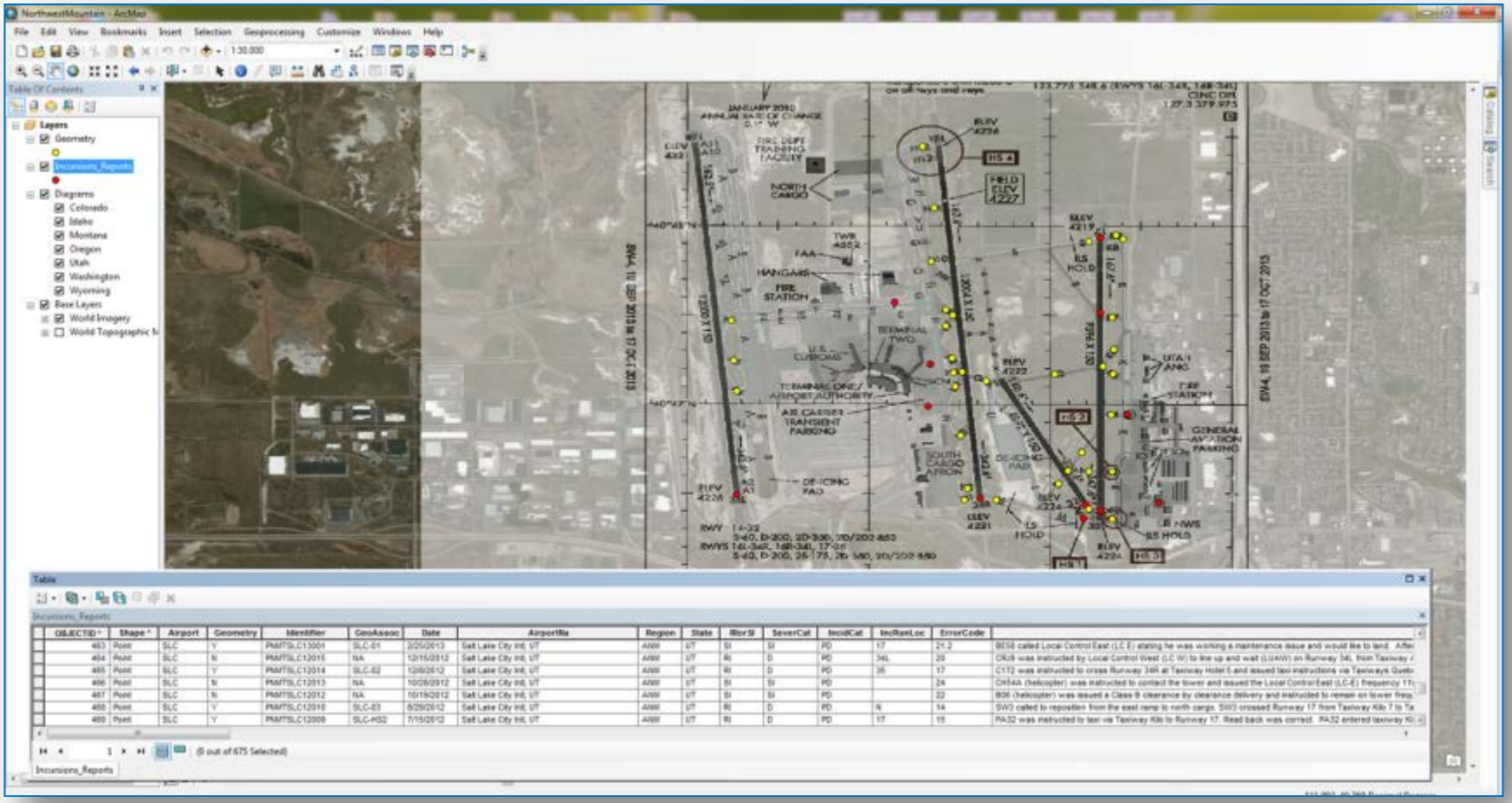
Source: ESRI

Benefits | Runway Protection Zones

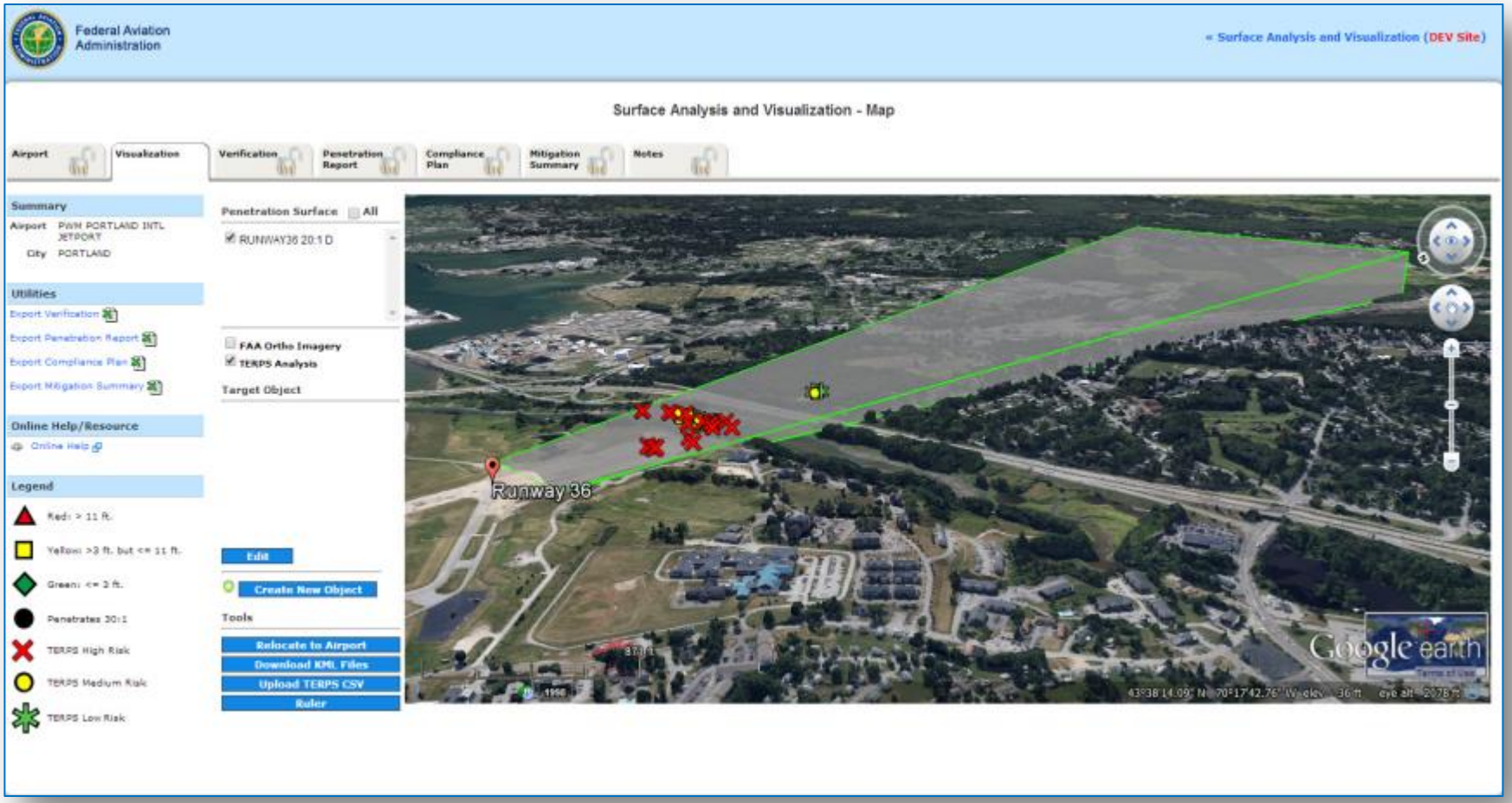
•Source: Woolpert

ADDITIONAL PROGRESS

Geospatial “hot spot” and RI locations



Airspace Evaluation - 20:1 SAV (Phase 1)



Airspace Evaluation - 20:1 SAV (Phase 1)

Federal Aviation Administration

« Surface Analysis and Visualization (DEV Site)

Surface Analysis and Visualization - Map

Airport | Visualization | Verification | Penetration Report | Compliance Plan | Mitigation Summary | Notes

Summary

Airport PWM PORTLAND INTL JETPORT

City PORTLAND

Utilities

Export Verification

Export Penetration Report

Export Compliance Plan

Export Mitigation Summary

Online Help/Resource

Online Help

Legend

Red: > 11 ft.

Yellow: >3 ft. but <= 11 ft.

Green: <= 3 ft.

Penetrates 20:1

TERPS High Risk

TERPS Medium Risk

TERPS Low Risk

Penetration Surface All

RUNWAY36 20:1 D

FAA Ortho Imagery

TERPS Analysis

Target Object

Runway	36
AMSL	78
Type	TREE
Slope	20:1
Source	TERPS Analysis
PenValue	17.31
ObjectId	KPWMT0642

Edit

Create New Object

Tools

Relocate to Airport

Download KML Files

Upload TERPS CSV

Ruler

TREE

Object Identifier	KPWMT0642
Airport Identifier	PWM
Runwayend Designator	36
Obstacle Type	TREE
Slope	20:1
Penetration Value	17.31
Latitude	N 43 38 17.14
Longitude	W 70 18 8.97
Elevation	78
Risk Level	High
Obstacle Lit	NO
Marking Feature Type	NOT DEFINED
Accuracy Code	1A
Source	TERPS Analysis
Original Source Stamp	2014-05-30 10:51:34.128886-04

Google earth

Airspace Evaluation - 20:1 SAV (Phase 1)

Federal Aviation Administration

« Surface Analysis and Visualization (DEV Site)

Surface Analysis and Visualization - Penetration Report

Airport | Visualization | Verification | Penetration Report | Compliance Plan | Mitigation Summary | Notes

Summary

Airport PWM PORTLAND INTL JETPORT

City PORTLAND

Utilities

Export Verification

Export Penetration Report

Export Compliance Plan

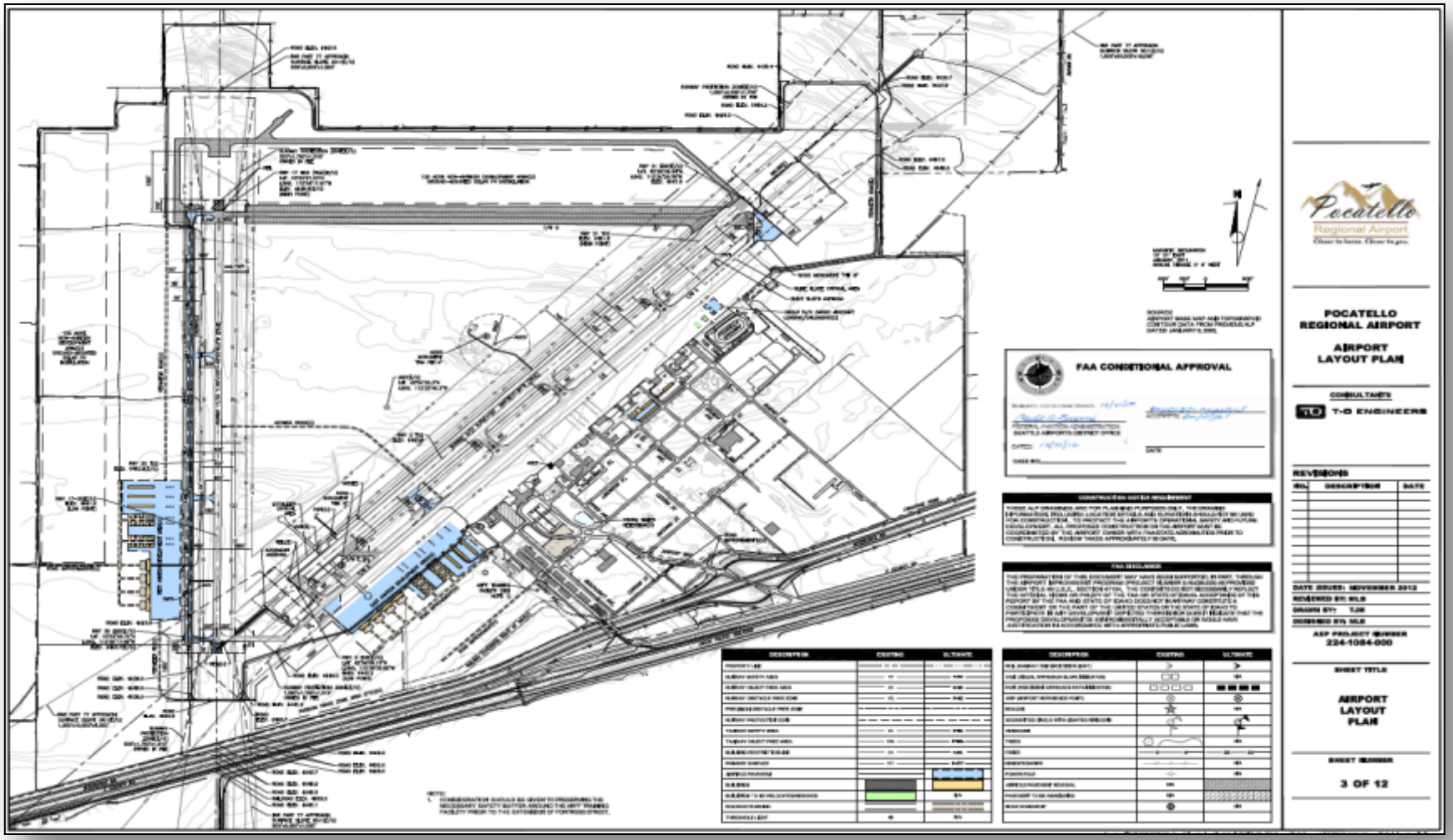
Export Mitigation Summary

Online Help/Resource

Online Help

Object Identifier	Object Type	Latitude	Longitude	Runway End Designator	Risk Level	Penetrates	Penetration Amount	Requires Mitigation	Source Stamp Date	Advisory Circular Reference
23-021358 (20:1 Slope)	VEGETATI	N 43 38 19.38	W 70 18 7.58	36	High	20:1 Surface(s)	22.61 feet	Yes	2014-05-30	TERPS Analysis
23-021359 (20:1 Slope)	TREE	N 43 38 18.37	W 70 17 56.63	36	High	20:1 Surface(s)	17.12 feet	Yes	2014-05-30	TERPS Analysis
23-021362 (20:1 Slope)	TREE	N 43 38 6.21	W 70 18 0.94	36	Low	20:1 Surface(s)	0.24 feet	Yes	2014-05-30	TERPS Analysis
KPWMT0630 (20:1 Slope)	TREE	N 43 38 18.29	W 70 17 56.60	36	High	20:1 Surface(s)	19.7 feet	Yes	2014-05-30	TERPS Analysis
KPWMT0639 (20:1 Slope)	TREE	N 43 38 17.08	W 70 18 6.44	36	High	20:1 Surface(s)	12.28 feet	Yes	2014-05-30	TERPS Analysis
KPWMT0642 (20:1 Slope)	TREE	N 43 38 17.14	W 70 18 6.07	36	High	20:1 Surface(s)	17.21 feet	Yes	2014-05-30	TERPS Analysis
KPWMT0836 (20:1 Slope)	TREE	N 43 38 19.74	W 70 18 6.55	36	High	20:1 Surface(s)	17.29 feet	Yes	2014-05-30	TERPS Analysis
KPWMT0838 (20:1 Slope)	TREE	N 43 38 19.47	W 70 18 7.87	36	High	20:1 Surface(s)	30.39 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1263 (20:1 Slope)	TREE	N 43 38 16.34	W 70 18 2.51	36	High	20:1 Surface(s)	12.52 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1274 (20:1 Slope)	TREE	N 43 38 15.99	W 70 18 2.99	36	Low	20:1 Surface(s)	2.34 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1275 (20:1 Slope)	TREE	N 43 38 16.90	W 70 17 58.84	36	High	20:1 Surface(s)	22.24 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1276 (20:1 Slope)	TREE	N 43 38 15.33	W 70 18 5.81	36	High	20:1 Surface(s)	29.13 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1278 (20:1 Slope)	TREE	N 43 38 16.31	W 70 18 0.25	36	Medium	20:1 Surface(s)	2.25 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1294 (20:1 Slope)	TREE	N 43 38 15.81	W 70 18 2.97	36	Medium	20:1 Surface(s)	4.44 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1296 (20:1 Slope)	TREE	N 43 38 16.70	W 70 17 58.61	36	High	20:1 Surface(s)	14.12 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1309 (20:1 Slope)	TREE	N 43 38 15.70	W 70 18 2.76	36	Low	20:1 Surface(s)	1.69 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1321 (20:1 Slope)	TREE	N 43 38 15.29	W 70 18 4.08	36	Low	20:1 Surface(s)	0.1 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1333 (20:1 Slope)	TREE	N 43 38 16.34	W 70 17 58.74	36	Medium	20:1 Surface(s)	4.32 feet	Yes	2014-05-30	TERPS Analysis
KPWMT1342 (20:1 Slope)	TREE	N 43 38 15.35	W 70 18 2.92	36	High	20:1 Surface(s)	12.16 feet	Yes	2014-05-30	TERPS Analysis

Traditional ALP (AutoCAD drawings)



Electronic Airport Layout Plan (eALP)

Federal Aviation Administration

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DBQ-20130530-ACE-{no ado}-143943

DUBUQUE RGNL, IA (DBQ)

eALP Project Summary | eALP Assembly | Airport Review | FAA Preliminary Review | FAA Final Review | Airport Sponsor Signature | FAA Official Signature

Next Project Action: None

View eALP | Download eALP as PDF

eALP Project Summary

eALP Project Information

Airport: DUBUQUE RGNL
View NASR Data for DBQ

Created By: Todd Dalsing on 05/30/2013

eALP Project Type: Revision to Current ALP (Minor Change)

AIP Grant Number: 3-19-0028-052-2010

eALP Sponsor Information

Contact Name: Todd Dalsing

Position: Operations Supervisor

Address: Dubuque Regional Airport
11000 Airport Road
Dubuque, IA 52003

Phone: 563-589-4233

Email: tdalsing@cityofdubuque.org

eALP Surveyor/Consultant Information

Name	Organization	Phone	Email	View	Review	Approve	Coordination
Steven Zeets	Foth Companies	319-365-9565	steve.zeets@foth.com	Yes	Yes	No	No
Adam Michael Wilhelm	Foth	515-251-2522	adam.wilhelm@foth.com	Yes	Yes	No	No

eALP Project History & Documents

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Date	User	Action	Notes/Comments
06/11/2014 03:21:53 PM	Brian Creasy	Requested File/Document Download	OFFICIAL_ON-FILE_eALP_DBQ-20130530-ACE-{no_ado}-143943.pdf
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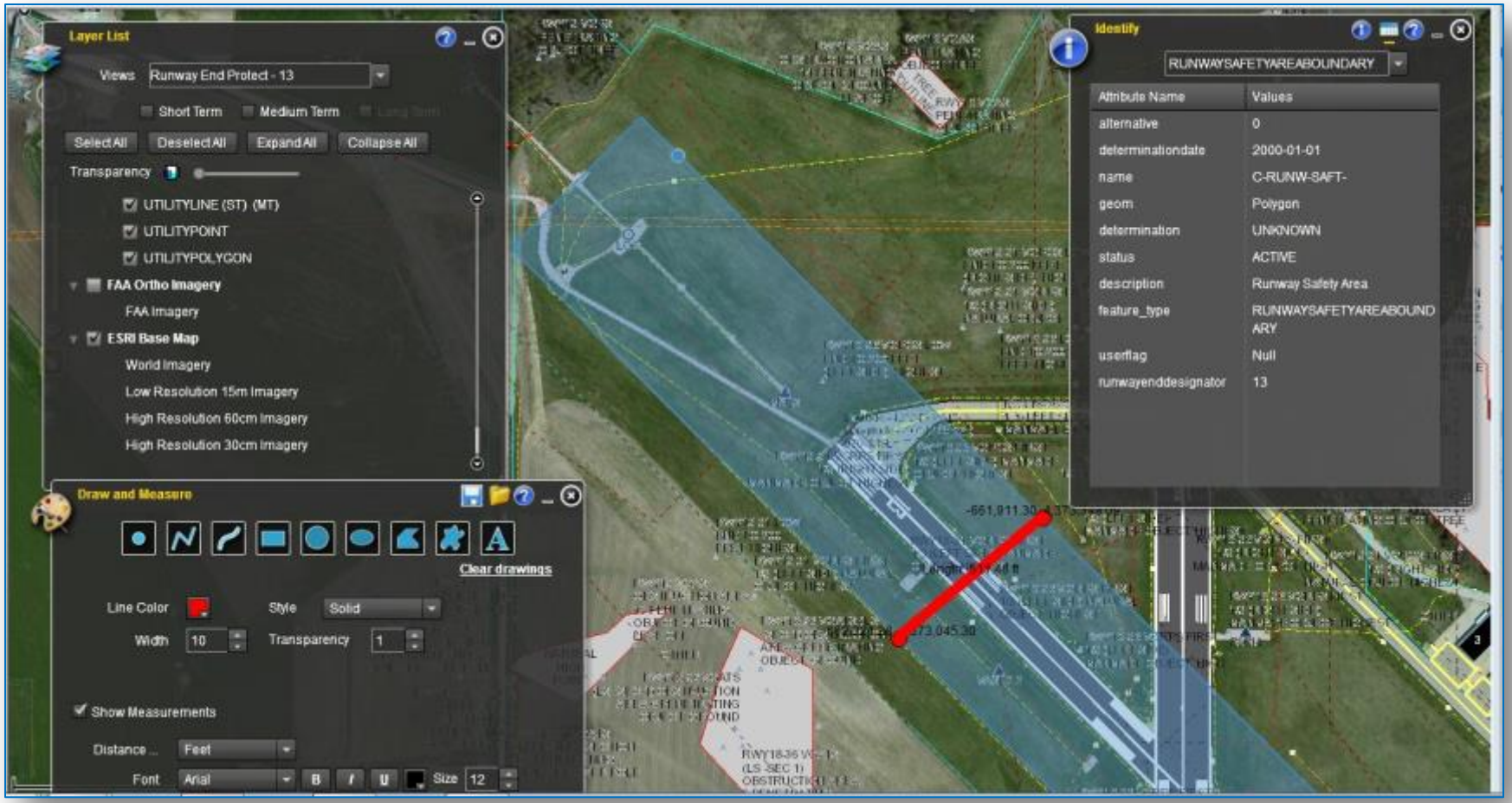
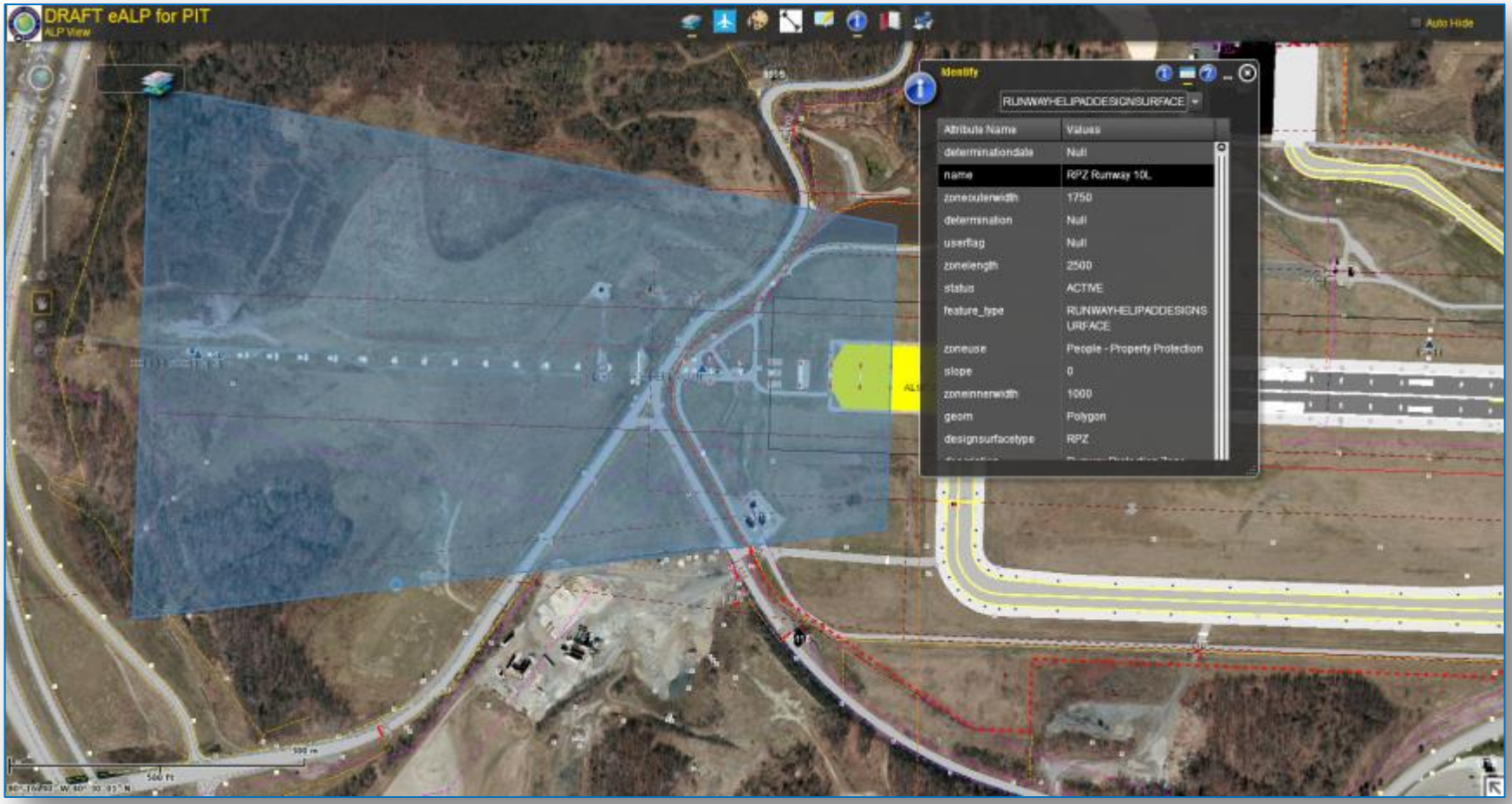
10/15/2013 10:27:25 AM	Tim Duan	Requested File/Document Download	OFFICIAL_ON-FILE_eALP_DBQ-20130530-ACE-{no_ado}-

Electronic Airport Layout Plan (eALP)

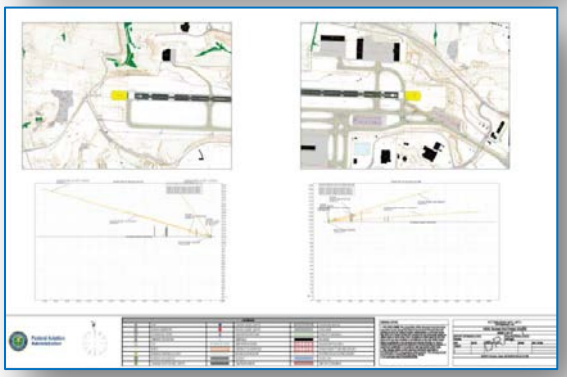


Electronic Airport Layout Plan (eALP)



eALP: Progress Report

- **Completed Steps:**
  - Features illustrated from AGIS data
  - Integration of a variety of user tools
  - Layering, overlays, metadata
  - Review/approval process flow



- **Next Steps:**
  - Print to standard PDF format
  - Interactive user interface (red-line)
  - Merged ALP SOP requirements
  - Replication of all required pages for a traditional ALP
  - Blended into the all Advisory Circulars (eg., Master Plan AC)

Airports GIS Schedule (as of 09/2014)

Module Development	FY13	FY14	FY15	FY16
ALP Level 1 - Print to standard PDF				
ALP Level 2 - interactive user interface				
Modification of Standards				
MOS with Spatial Analysis				
MOS with Document Management				
Cloud Server Aerial Photography				
20:1 SAV Tool				
Airport Airspace Evaluation Tool				
Airport Design Tools				
Pavement Management Tools				
NAV Lean Implementation	**FY13**	**FY14**	**FY15**	
AC 5300-19 and Order 5010.4A				
AC 5300-18C with New Schema				
Implement Survey Authoritative Source				
Web Feature Service with OE/AAA				
Data Migration from NASR				
5010 Data all digital submission				
Implement Airports Authoriative Source				
System Improvements	**FY13**	**FY14**	**FY15**	**FY16**
Migrate to new Shared Services Servers				
Upgrade to Oracle Database				
Upgrade to ArcGIS 10.2				

Moving forward via 2011 AGIS Strategic Plan

- **Progressing well with module development**
- **Estimated it would take 17 years to populate the ALP data for all 3,300 NPIAS airports**
- **Estimated the cost for data collection (without validation) would cost $600 million**
- **Accelerated data collection needed to meet schedule**

NUMBER OF AIRPORTS	FY09/10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	TOTAL
Large and Medium Hubs	3	6	12	12	11	10											53
Small and Non Hubs	2	12	49	49	47	47	47	46									299
Cat 1	1	7	0	0	0	18	18	18	18	13							93
Cat 2	0	1	0	0	0	29	29	29	29	32	23	23	23	23	19		260
Cats 3,4,5	1	1	0	0	0	124	166	224	239	324	310	310	310	310	308		2627
Subtotals	7	26	61	61	58	228	260	317	286	369	333	333	7	7	7		3332
PROGRAM COSTS	**FY09/10**	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**TOTAL**
Airport Improvement Program	$16.4	$9.4	$14.2	$16.1	$17.1	$32.8	$35.4	$43.2	$36.2	$47.4	$48.4	$32.6	$37.4	$38.4	$40.9		$465.9
AIP Airport Match	$2.6	$2.6	$2.1	$2.4	$2.6	$3.9	$3.4	$3.9	$3.6	$4.2	$4.6	$2.7	$3.0	$3.0	$3.0		$47.6
ARP Operations	$3.8	$2.3	$2.3	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$2.6	$42.2
AIM F&E	$0.0	$0.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$42.0
Subtotals	$22.8	$14.3	$21.6	$24.1	$25.3	$42.3	$44.4	$52.7	$45.4	$57.2	$58.6	$40.9	$46.0	$47.0	$49.5	$5.6	$597.7