



On the Contribution of Academic Institutions to Aerodrome Safeguarding

Some Reflections and a Case Study

*A Presentation for ICAO MID
Aerodrome Safeguarding Workshop
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1. Introduction



Objectives & Outline

Objectives:

- “ To highlight the role that academic institutions can play in the area of Aerodrome Safeguarding
- “ To identify some of the synergies that may be generated from academia working with NAAs
- “ To pinpoint any problems or obstacles that could turn up
- “ To share some of the spin-offs the exercise may generate
- “ To present a couple of case studies

Presentation Outline:

1. Introduction
 - “ Objectives & Outline
 - “ Who I am
 - “ Where I come from UOB...BIA...GISC...
 - “ Suitability to contribute to Aviation Safety efforts
2. Complexity of Aerodrome Safeguarding
3. Can the Academic Sector Do Anything???
4. The Case Study
5. Discussion and Reflections
6. Conclusions



1. Introduction



Who I amõ

- “ Professor of Mech. & Aero Engineering at **UOB**
- “ Head of Mech. & Aero Engineering Department at **UOB**
- “ Director of the **BIA**
- “ Head of the **GIS Center**
- “ Many other thingsõ
 - “ Head the Training Committee
 - “ Head of Commencement Committee & MC
 - “ Etc.





1. Introduction



Where I come from ã UOB...

- “ The University of Balamand ã *The Uni on the Beautiful Hill...*
- “ The University that overlooks the Mediterranean...





1. Introduction



Where I come from ã GISC & BIA...

“ We, at the GIS Center are a team of Faculty, Staff and Students ã



“ Who believe in the powers of GIS in making our world a better place ã

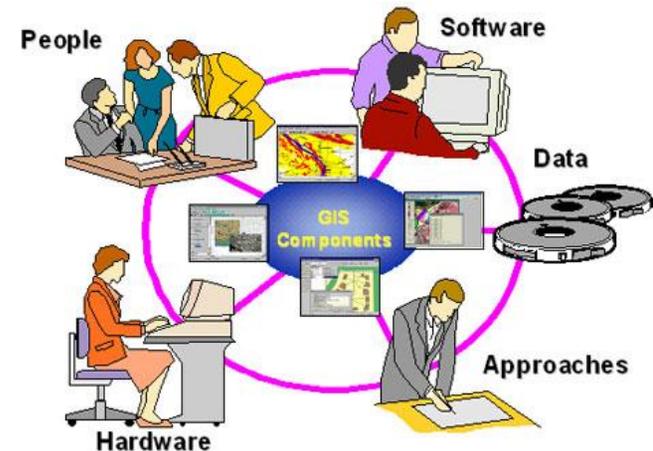


1. Introduction



Where I come from ã GIS & BIA...

- “ We use the powers of GIS to understand our surroundingsã
 - “ Draw mapsã
 - “ Link complex information to location on mapsã
 - “ Analyse relationsã
 - “ Learn & deductã
 - “ Make decisions on that basisã
-
- “ Come up with answers otherwise impossibleã





1. Introduction



Where I come from ã GISC & BIA...

“ We at the BIA are a team of Faculty, Staff and Students dedicated to advancing Aeronautics in our Lebanon to International standards ã



“ Our BIA is a flexible entity and we appreciate that Aeronautics is multifaceted ã



1. Introduction



Where I come from ã GISC & BIA...

- “ Our BIA is a flexible entity and we appreciate that Aeronautics is multifaceted ã Involving:
 - “ Technicalities
 - “ Theories
 - “ Regulations
 - “ Human Factors
 - “ Management
 - “ Art
 - “ Safety & Security
 - “ Etc.



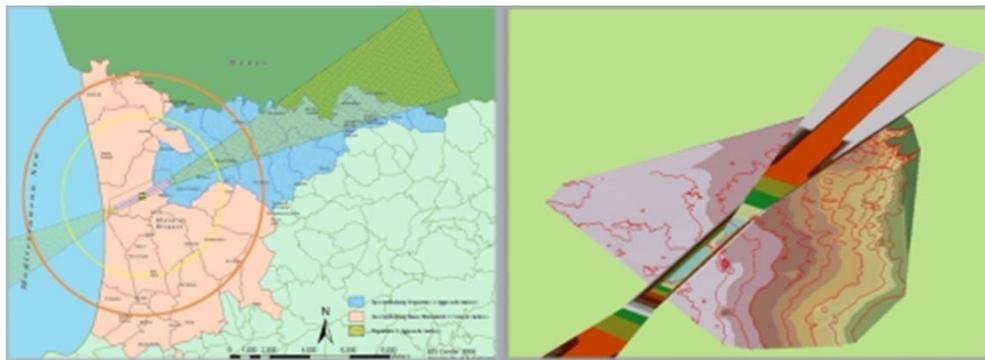


1. Introduction



GISC-BIA Capacity for Safeguarding

- “ Our BIA and GISC are jointly well equipped to deal with and OLS problem”
- “ Jointly, we:
 - “ understand the aviation system and
 - “ can manipulate maps





2. Complexity of Aerodrome Safeguarding



Reasons

- Needless to say that OLS definition & aerodrome safeguarding can be a very complex problem
- Its complexity may be attributed to:
 - Regulations
 - Available technology
 - Aerodrome location
 - Aerodrome characteristics & configuration
 - Administration, bureaucracy & red tape+levels
 - Data: collection, quality, update & management
 - Etc.
 - COST
 - COMPETENCE OF HUMAN ELEMENT
- Surely needs an integrated approach for its success!



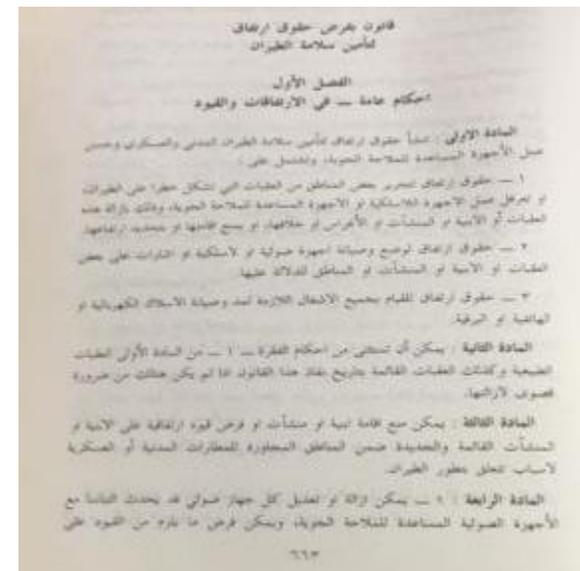
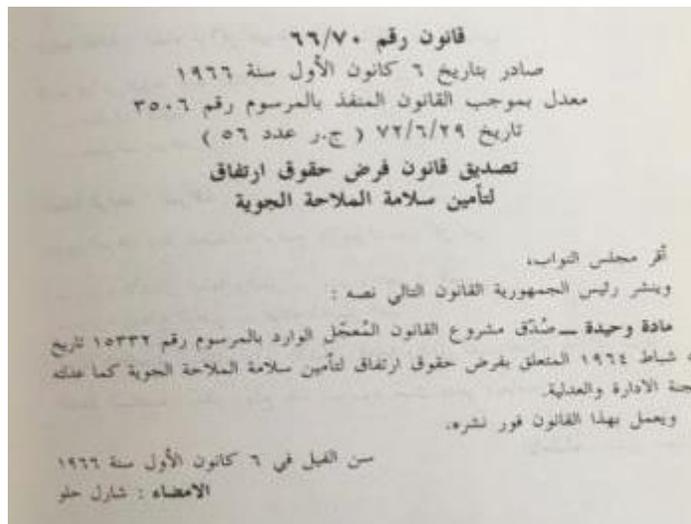


2. Complexity of Aerodrome Safeguarding



Reasons

- “ What adds % result to injury+is that it is not a luxury
- “ It is a must No two ways about it
- “ In our land, a law was passed in relation to OLS definitions in 1966!





3. Can the Academic Sector Do Anything???



Are we forgetting something here?!

- “ A resource that is usually overlooked in our part of the world isō Academiaō
 - “ our Universities
 - “ our Higher Educational Institutionsō
- “ Can they help here at all?!
- “ Can they work with the NAAs to tackle OLS-Safeguarding issues???
- “ According to ICAO Standards??





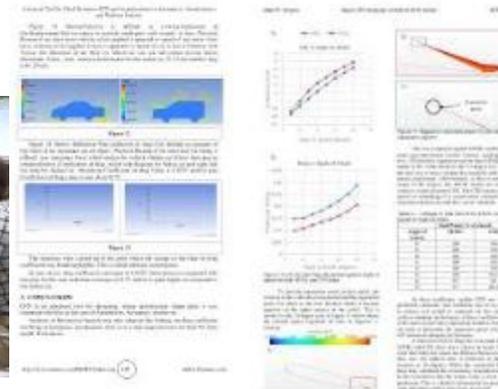
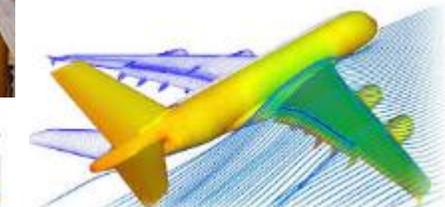
3. Can the Academic Sector Do Anything???



The Role of the Universities

Universities are places where knowledge is:

- “ Produced
- “ Analysed
- “ Debated
- “ Integrated
- “ Correlated
- “ Accumulated
- “ Disseminated



A University...Unites

الجامعة...تجمع



3. Can the Academic Sector Do Anything???



A Question and an Answer

- “ What do Universities have that no one else has?!”
 - “ Students *bright students willing to learn a new trick or two...*
 - “ Professors & scholars *who want to express themselves...academically...*
 - “ The infrastructure *specialised labs, libraries, work spaces, consumables, etc.*
 - “ Flexible of procedures *work all hours...*
 - “ Access to funds *for research and development...*

Need a Problem...





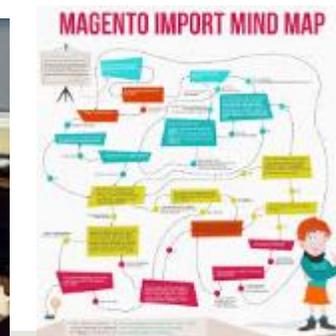
3. Can the Academic Sector Do Anything???



Another Question and an Answer

- “ What are some of the obstacles that some regional NAAs subjected to?!”
 - “ Overwhelmed...
 - “ Understaffed...
 - “ Complex procedures
 - “ Under continuous scrutiny
 - “ Lack resources...
 - “ Subjected to a lot of Red Tape...

There is a Problem



On the Contribution of Academia to Safeguarding

UOB GISC & BIA at ICAO MID



3. Can the Academic Sector Do Anything???



Complimentarityõ a Possible Path!!!

- “ Many common interests between academia and the NAAsõ
- “ One has a problem or two to be solvedõ the other needs a problemõ
- “ Joining forces can result in Higher efficiencyõ *for bothõ*
 - “ No effort duplicationõ
 - “ Many resources can be sharedõ *Cost effectivenessõ*
 - “ Objectives can be better reachedõ *promptlyõ*
 - “ Capacities can be builtõ *new expertise generated...*
- “ But, how to get it going? *Proactivity and Openness...*

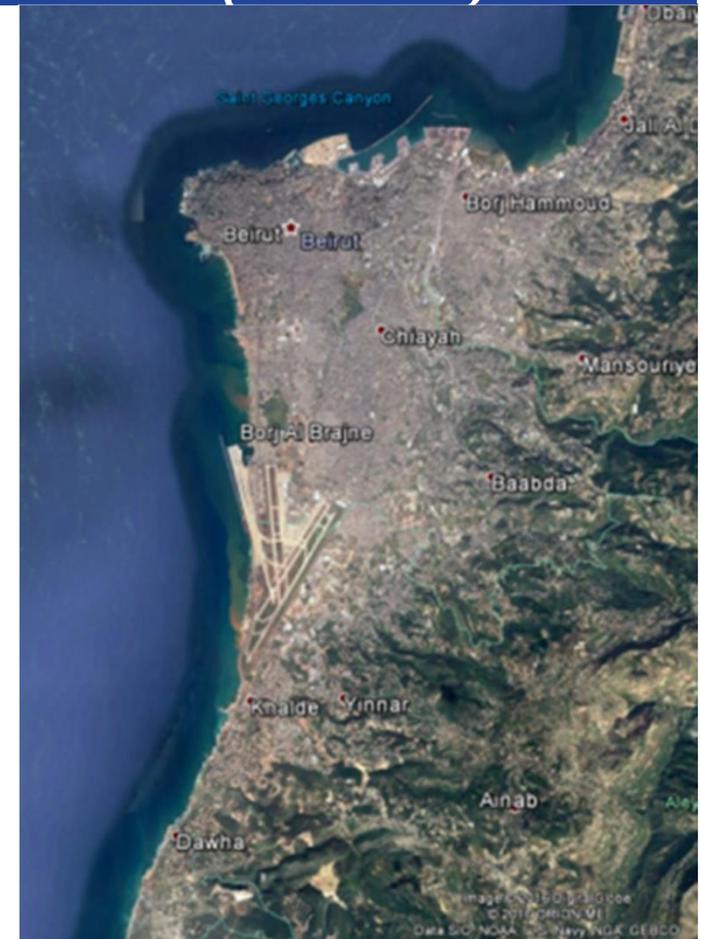


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

- “ A Purely Academic Exercise!!!
- “ An MS Graduation Project for two Aero-Engineers
- “ Supervised by a dear colleague who works at the DGCA
- “ Why don't we develop a GIS for RHIA-B OLS?



4. The Case Studies

The Case Study: Rafic Hariri International Airport RHIA-B (OLBA)

“ Airport Details Modeling



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

- “ Details Modeling:
Base Map
Digitization
- “ Features drawn
according to ICAO
standards



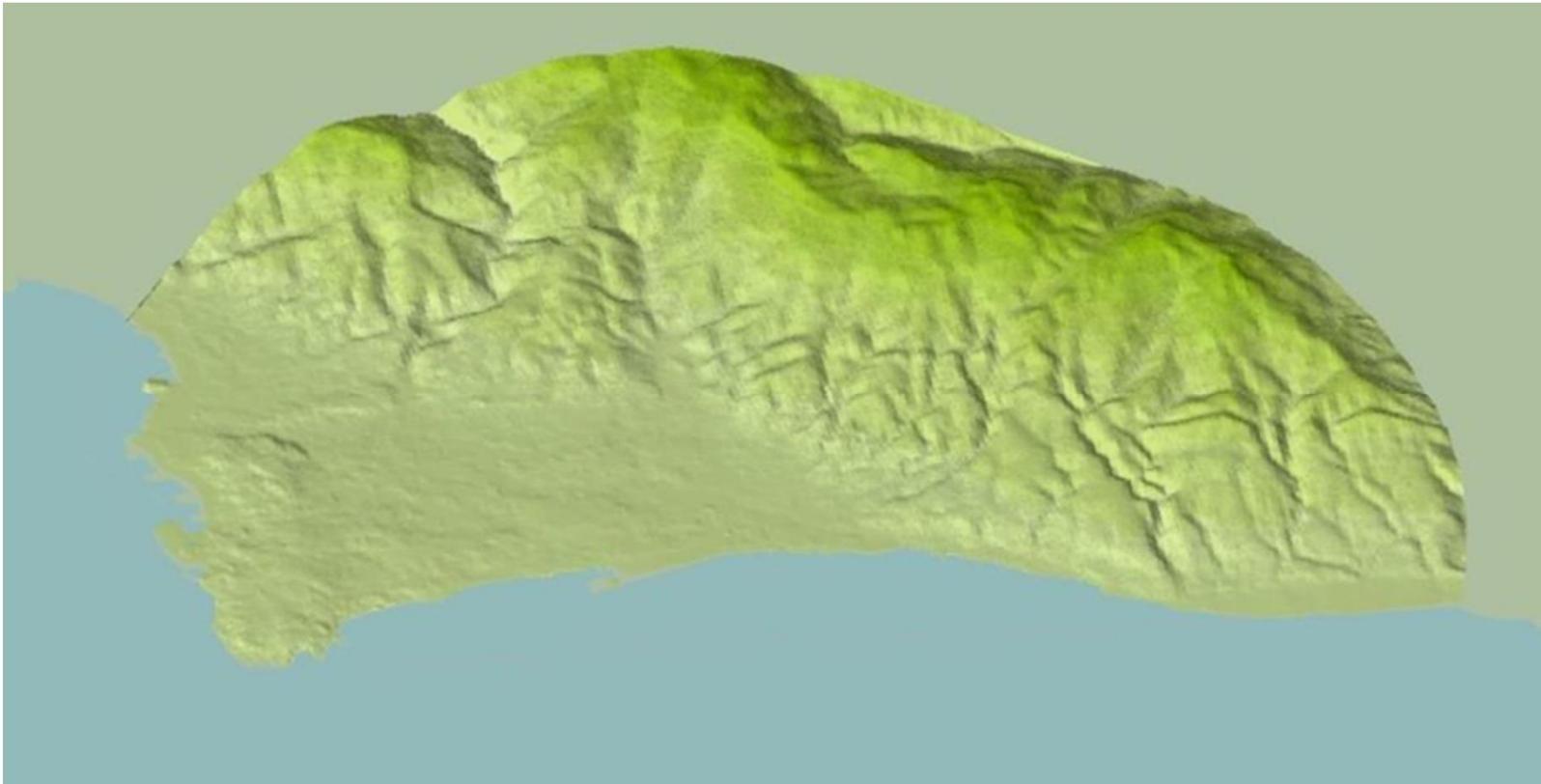


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ 3-D Terrain Model



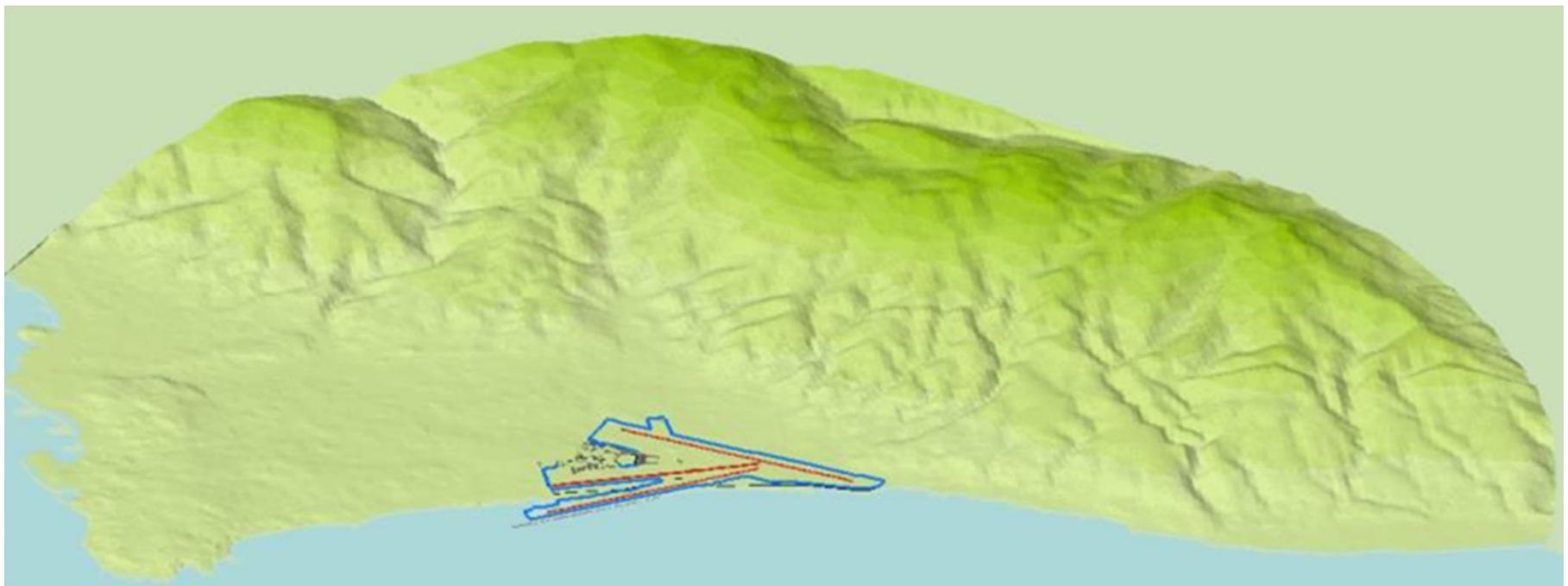


4. The Case Studies



The Case Study: Rafic Hariri International Airport RHIA-B (OLBA)

“ 3-D Terrain Model with Airport Base Map





4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ Draping the Satellite Image on the 3D Terrain Model



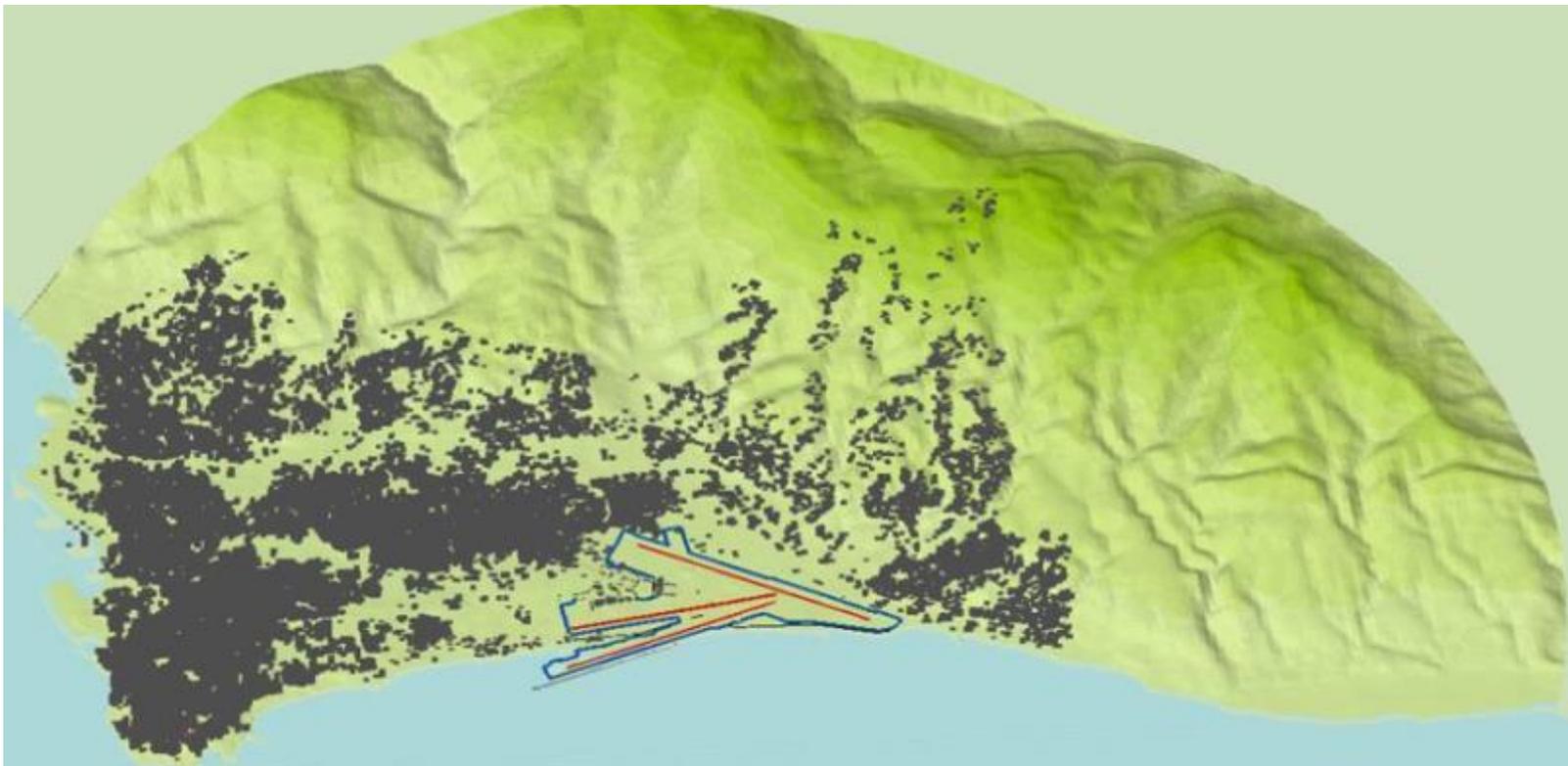


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ Buildings were also fixed in their actual locations and actual heights AGL



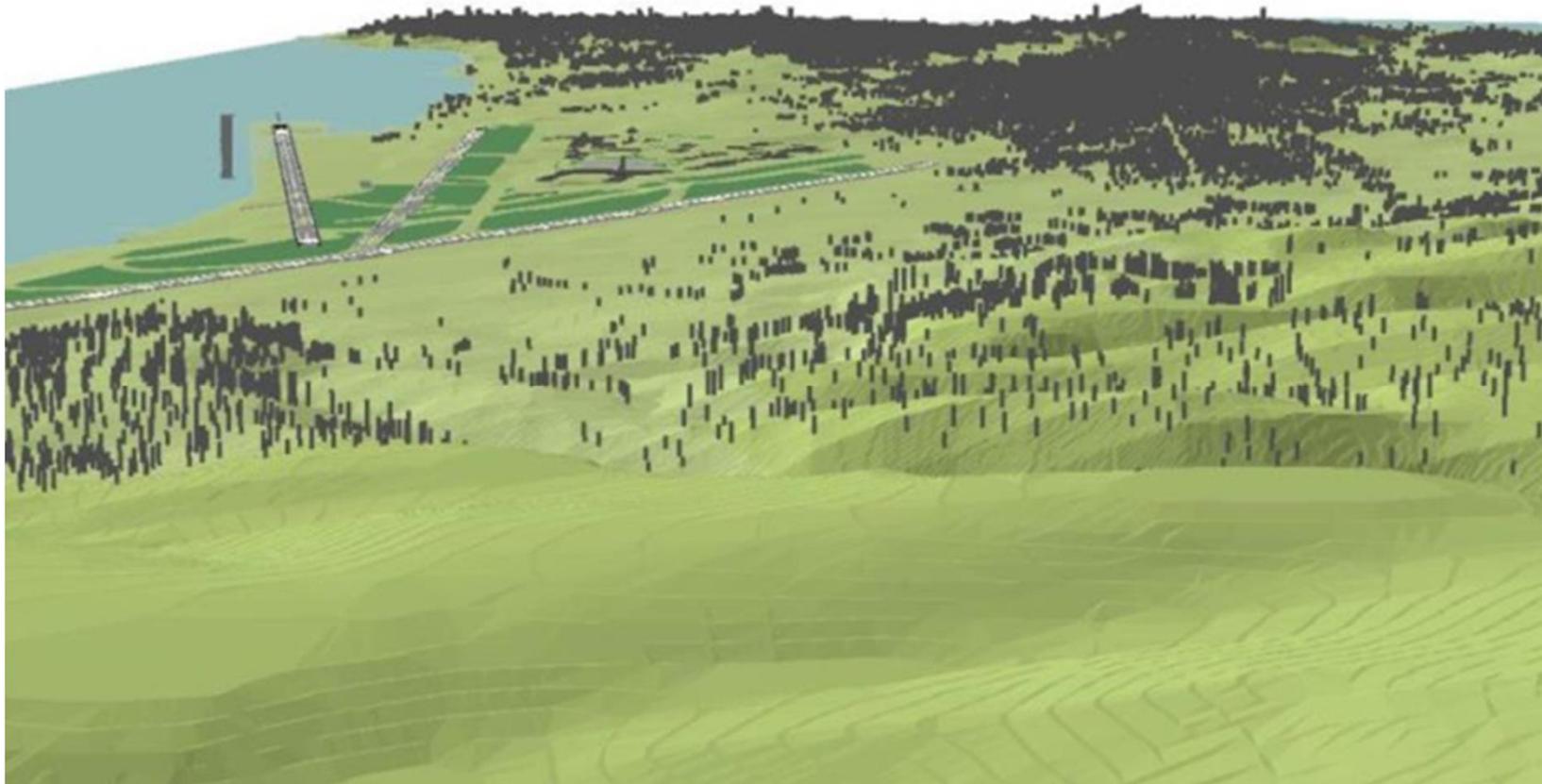


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ And another view looking down Runway 34





4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

- “ Methodology for OLS mapping:
 - “ Identification of airport category as per facilities
 - “ Accurate 2D mapping of OLS extents
 - “ Surface lifting to enable 3D definitions



Airport Type:
Precision Approach,
Cat I

Code: 4E

“ As per Annex 14

Runways meant for take-off	
Surface and Dimensions	Code number 4
Take-off Climb	
Length of inner edge	180m
Distance from runway end	60m
Divergence (each side)	12.50%
Final width	1200m or 1800m
Length	15000m
Slope	2%

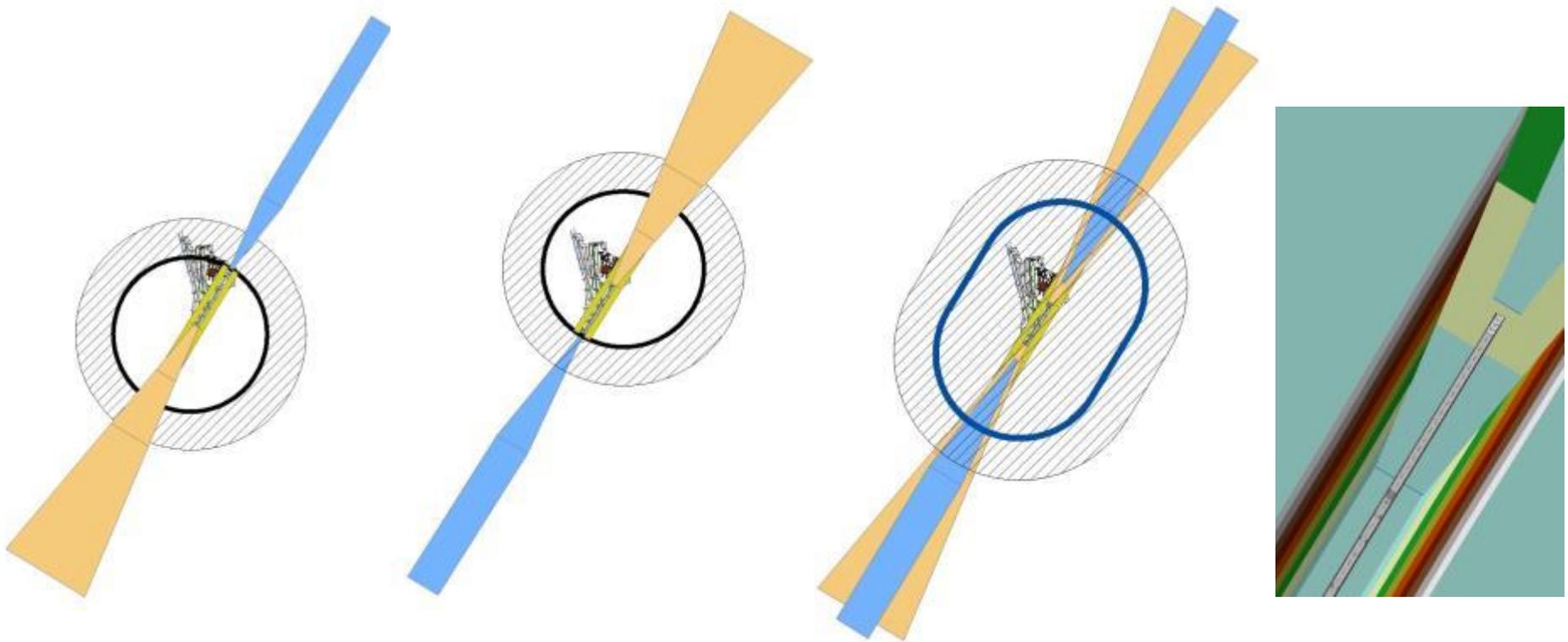
Approach Runways	
Surface and Dimensions Cat I, code number 4	
Conical	
Slope	5%
Height	100m
Inner Horizontal	
Height	45m
Radius	4000m
Approach	
Length of inner edge	300m
Distance from threshold	60m
Divergence (each side)	15%
First section	
Length	3000m
Slope	2%
Second Section	
Length	3600m
Slope	2.50%
Horizontal section	
Length	8400m
Total length	15000m
Transitional	
Slope	14.30%



4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)



2-D OLS for a Typical Runway

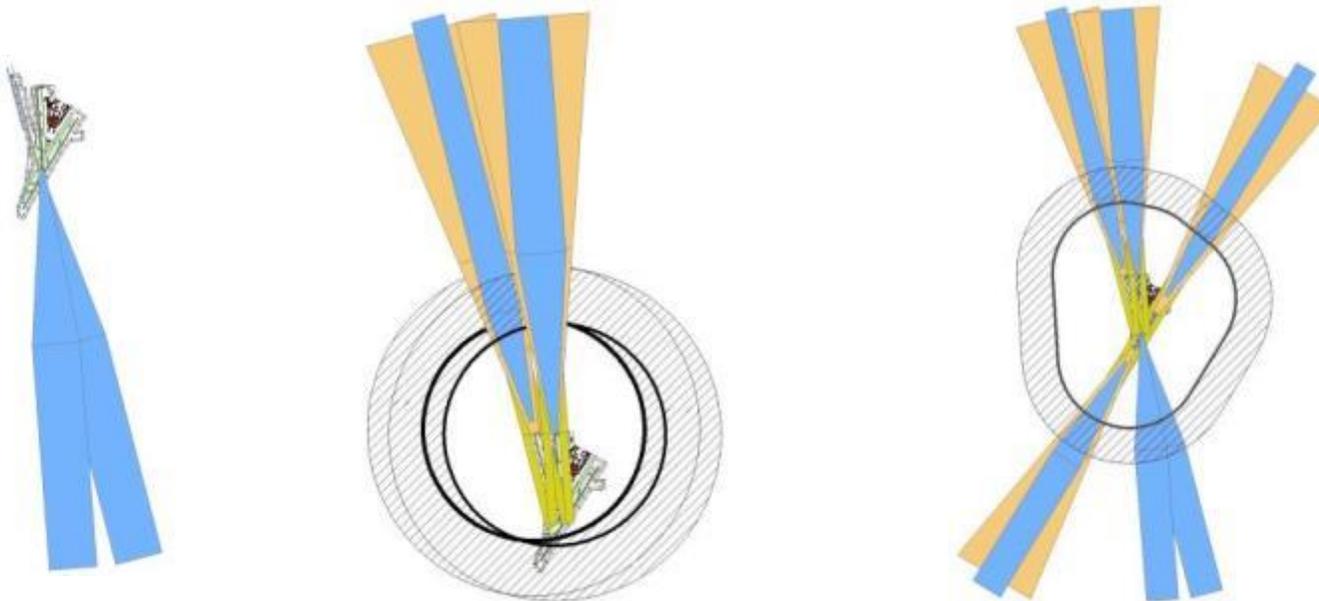


4. The Case Studies



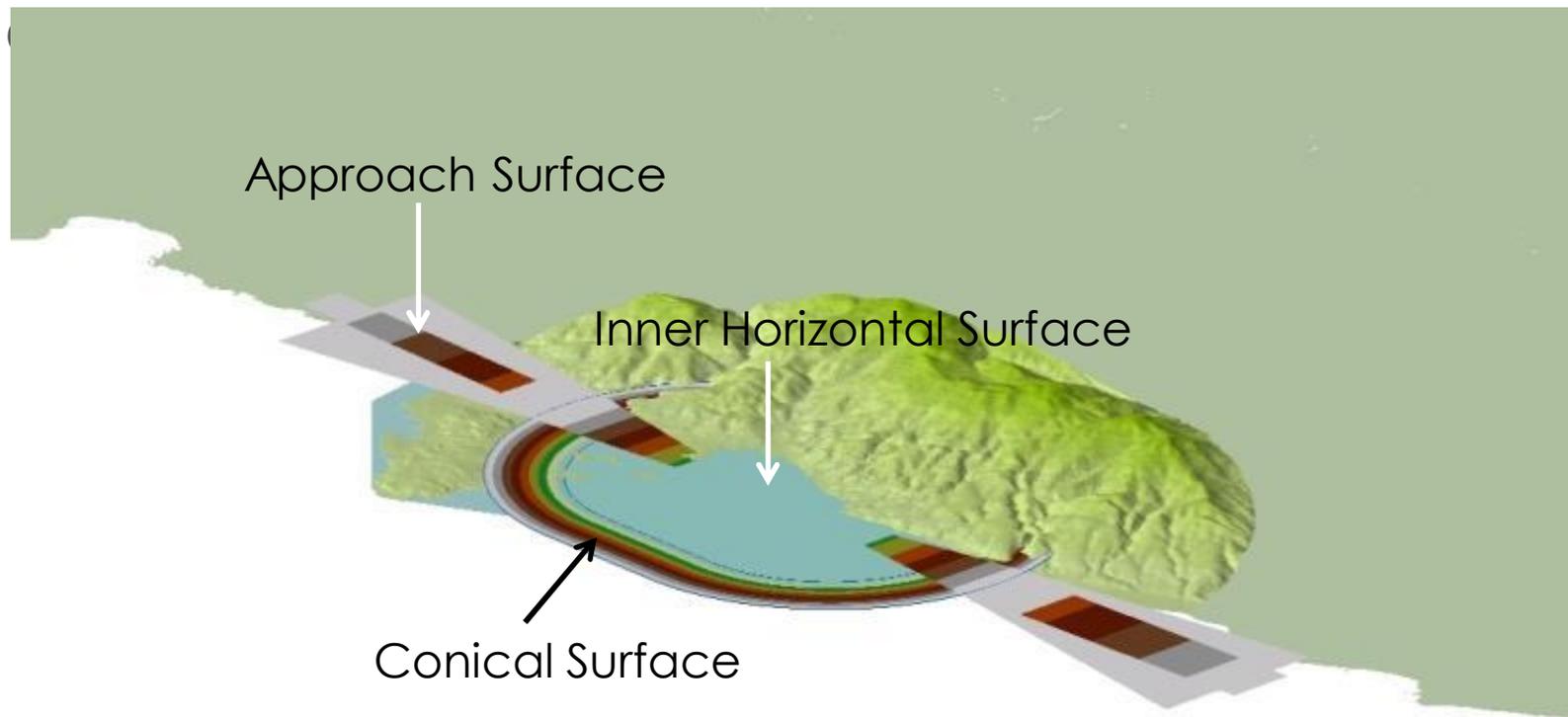
The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

- “ OLS visualization becomes very complicated in multi-runway aerodromes
- “ OLS emanating from different runways intersect ã Such is the case in RHIA-B!



4. The Case Studies

The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)



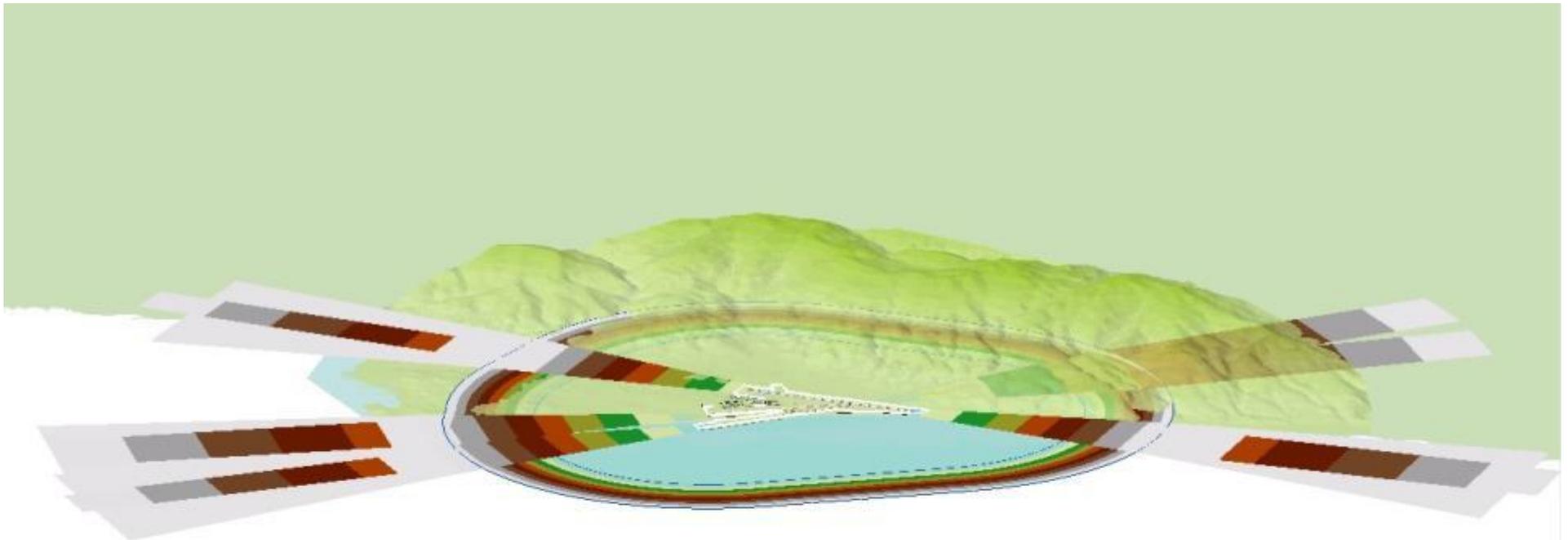


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ Interference of the 3-D OLS with neighbouring terrain

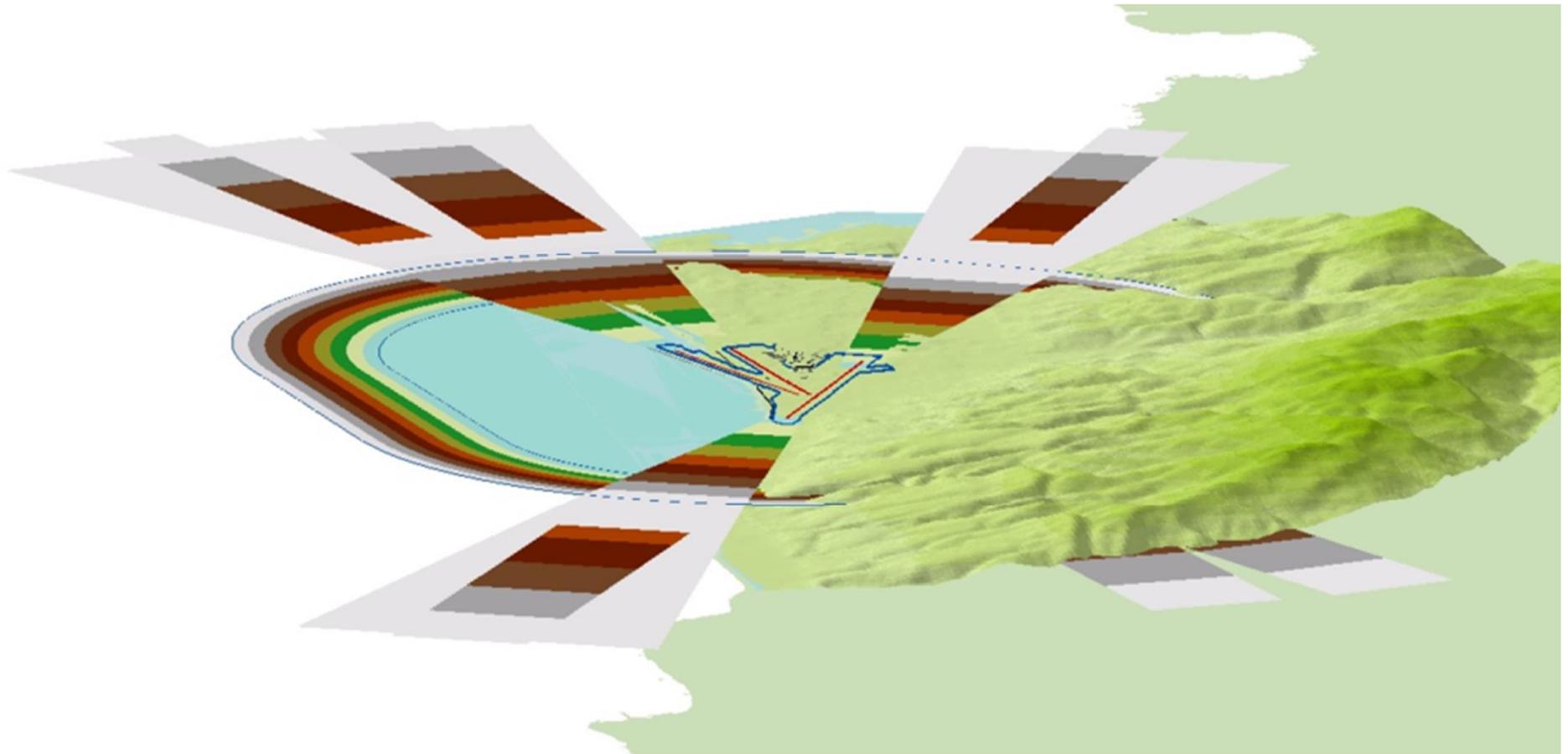




4. The Case Studies



The Case Study: Rafic Hariri International Airport RHIA-B (OLBA)



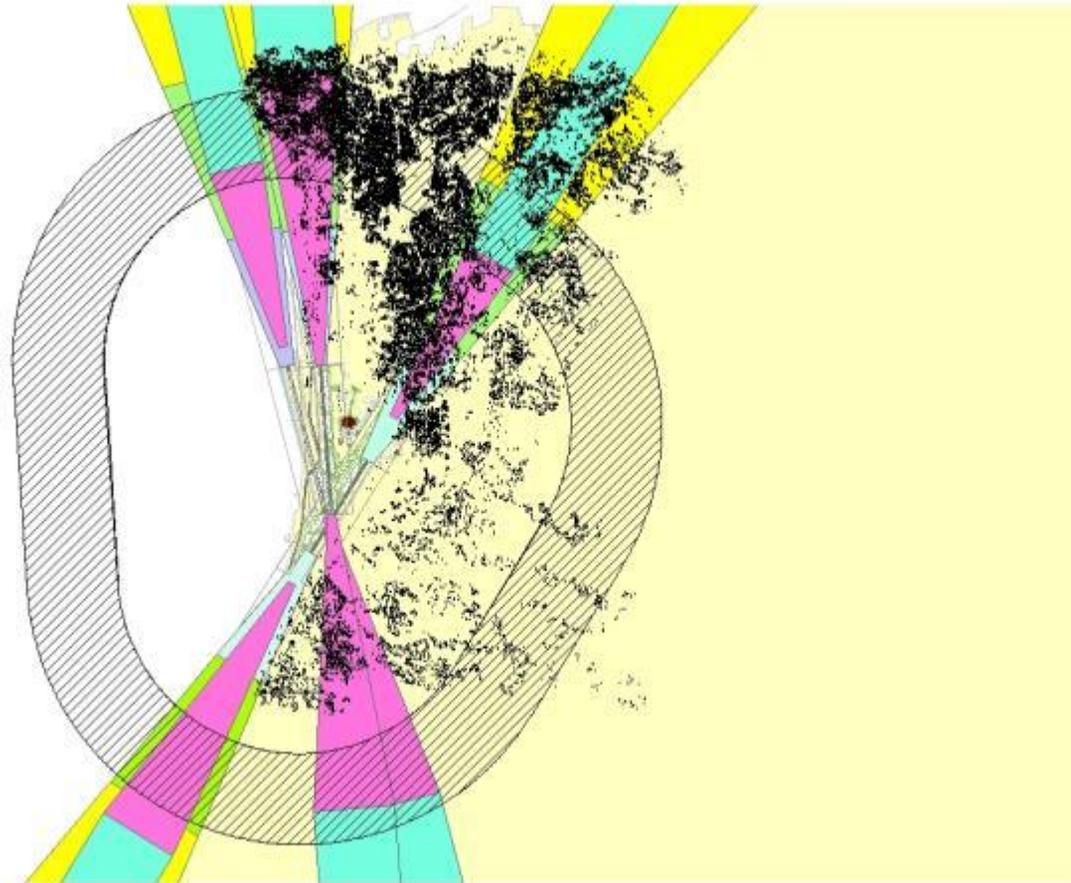


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

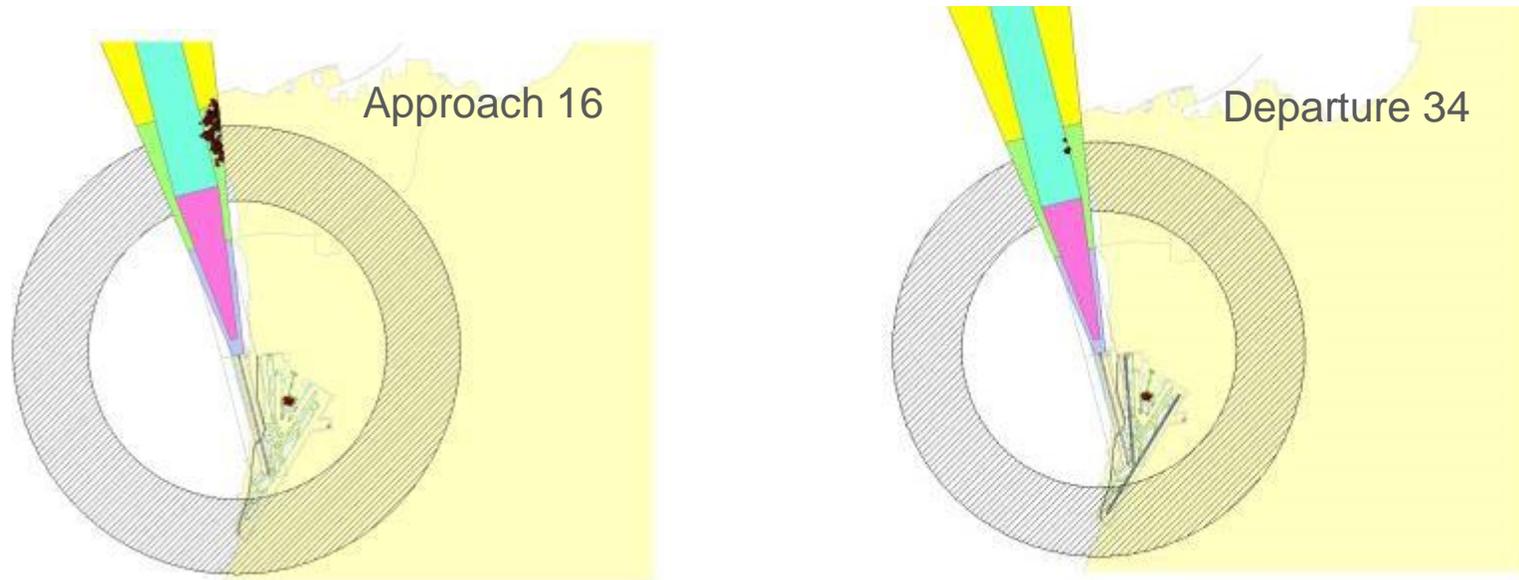
“ 3 in 1!



4. The Case Studies

The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ Some Problematic Buildings ã



OBJECTII	Bldg Elevation	Long_DD	Lat_DD	X_meters	Y_meters	Height Above OLS
1	80.0800000000	35.47441704930	33.89335658260	728819.31530000000	3753088.02900000000	9.12033660900
2	80.0800000000	35.47440130750	33.89330680410	728817.99230000000	3753082.47270000000	9.05757720900
3	82.5000000000	35.47599456790	33.88606337320	728984.73370000000	3752282.61650000000	14.66799926800

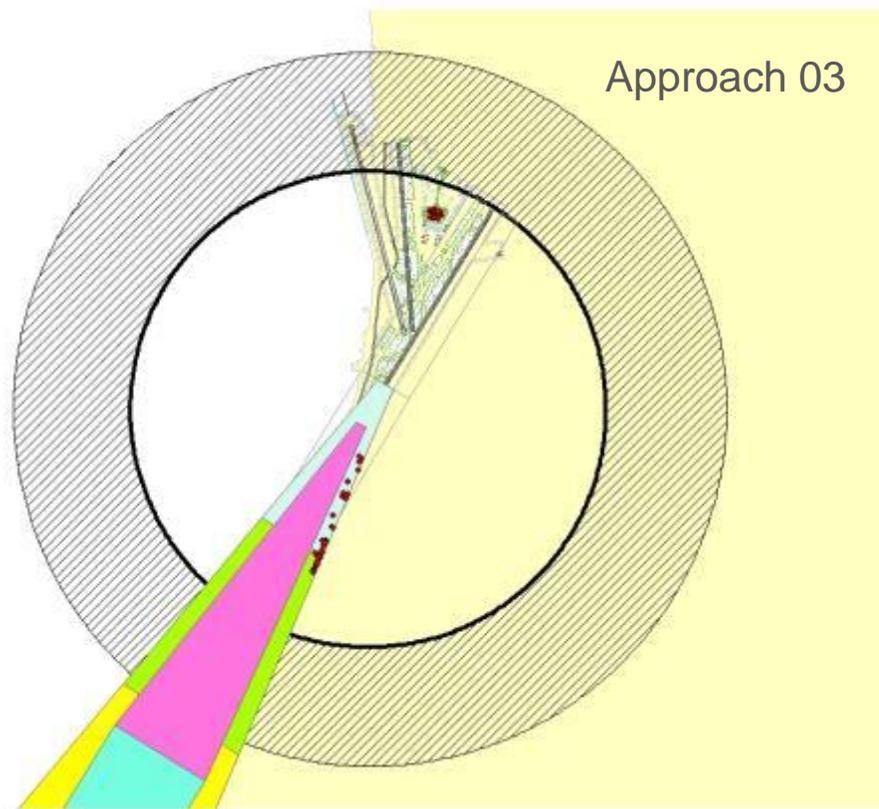


4. The Case Studies



The Case Study: Rafic Hariri International Airport ã RHIA-B (OLBA)

“ Some Problematic Buildings ã





5. Discussion & Reflections



Technical Achievements

- “ Now we have a fully operational GIS for OLKA and OLBA!
- “ Its main purpose is to:
 - “ define the airspace around the airport to be maintained free from obstacles
 - “ permit the intended airplane operations to be conducted safely.
- “ With obstacles surrounding the airport now identified and to ensure safety of aerial operations, it is necessary to:
 - “ Implement rules regarding tall structures surrounding the airport.
 - “ Determine the new runways length with recommended safety areas (TORA, TODA, ASDA).
 - “ Determine the largest aircraft able to use the different runways with the new restrictions.
 - “ Take this data in consideration for new flight procedures design.



5. Discussion & Reflections



Technical Achievements

- “ Now we have a fully operational GIS for OLBA & OLKA!
- “ Primary Usage is OLS definition & Obstacle identification
- “ It can also be used for many other things:
 - “ Facility Management
 - “ Maintenance Planning and Management
 - “ Security & Safety Management
 - “ Crisis Management
 - “ Policy Setting



5. Discussion & Reflections



Spin Offs

- “ During this process many people:
 - “ Became older and wiser!
 - “ Capacities were built
 - “ Put on the right track to interact and mitigate OLS & Safeguarding issues
 - “ Put on the right track to interact and mitigate other aviation safety issues

- “ The exercise brought UOB and LDGCA closer to one another
 - “ Trust was built gradually
 - “ They can jointly tackle other projects

- “ Exercise served to bridge a gap in International wisdom

- “ Generated many new problems for us to look at!!!



6. Conclusions



What's to say?! What Can be Learnt?!

- “ There is a lot of scope in the NAAs/Academic partnershipsõ
- “ There are synergies generated that can serve to ensure the continuity, development and sustainabilityõ for both partiesõ
- “ Exercise can generate much needed competent people for the aeronautical sectorõ



Acknowledgements



A Word of Gratitude is in Order

- “ To ICAO MID Office for their kind invitationõ To Nawal Abdul Hady & Angie El Yazzyõ
- “ To Mohammad Al-Dossari of the UAE GCAA who suggested that we work towards this workshop and make it happenõ
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- “ To Angele Aouad of the LDGCA for the endless discussions and dedicationõ
- “ To the many students who helped make this work come trueõ
- “ To my colleagues at the GISC, the BIA and UOBõ for providing us with all the needed support



Acknowledgements



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And of course the great audience for
putting up with me!!!

A Big Thank Youõ