Possibilities of Integrating Public Law Restrictions to 3D Cadastres

Dimitrios KITSAKIS and Efi DIMOPOULOU
National Technical University of Athens, Greece
Outline

- Introduction
- Public Law Restrictions (PLRs)
- Recording PLRs
- 3D PLRs in Greek Public Law
- Conclusions and Further research
Introduction (1/3)

- Urbanisation
- Technological development

High-rise, overlapping, interlocking structures

Above and below earth’s surface

Conflicts between overlapping land uses

Source: http://weburbanist.com

Source: UN, 2014
Introduction (2/3)

Law

• Regulates relations between individuals
• Regulates relations between individuals and government
• Promotes public benefit

➢ Vertical RRRs imposed on real property
➢ Vertical restrictions on land ownership
➢ Public Law Restrictions imposed on 3D space

Source: http://mapia.net/a/971345/
Introduction (3/3)

Cadastres

• Record specific rights, restrictions
• 2D recording
• Integrated or individual systems of specific PLRs’ recording

Paper’s aim

✓ Identify and present PLRs applying to 3D space
✓ Presentation of relative cases within Greek legislation

Source: v. Oosterom et al., 2013
Source: Doner et al., 2010
Source: National Cadastre and Mapping Agency (NCMA) Greece
Public Law Restrictions (1/9)

Source: http://k-associates.com/db/works/77_104.jpg

Source: https://photos.travelblog.org

Source: http://www.mayan-yucatan-traveler.com

Source: https://wn.com/pollution

Source: http://www.yorkarchaeology.co.uk

Source: http://kurld.com

Source: https://sourceable.net
Public Law Restrictions (2/9)

- Mineral rights distinct from land parcel ownership
- Restrictions on surface parcel ownership
- State owned – Land owner minerals
- Mining Cadastres

Mines

Quadrangular polygons
2D coordinates system

Source: World Bank, 2009
Public Law Restrictions (3/9)

Archaeology

- Restrictions/responsibilities
- Buffer zones
- Servitudes
- Expropriation
- Land use restrictions
- Restrictions in buildings’ construction, restoration, alteration
- Restrictions in maritime activities
Public Law Restrictions (4/9)

Environment

- Waste management
- Pollution
- Marine space management
- Groundwater protection

3D aspects

✓ Location factors
✓ Existence of groundwater
✓ Geological-hydrogeological conditions
✓ Nature and cultural patrimony protection

✗ Variety of factors
✗ Depend on each development's characteristics
Public Law Restrictions (5/9)

Civil Aviation

1. Non military manned air vehicles
   - Definition of no flight zones
   - Definition of minimum flight height
   - Definition of Obstacle Limitation Surfaces (OLS)

Source: http://www.priorityonejets.com
Source: https://www.tc.gc.ca
Source: http://gis.icao.int
Public Law Restrictions (6/9)

2. Unmanned Air Vehicles (UAV)

- Similar characteristics with manned air vehicles
- Need of further restrictions
- Variable conditions
- Permission above specific heights
- Prohibition over specific facilities
- Maximum flight height

Source: https://a2ua.com
Public Law Restrictions (7/9)

*Urban Planning and Construction*

1. Urban planning

- Land use
- Infrastructure and development
- Special economic policies
- Transport
- Education

- Energy consumption
- Public investments
- Environment
- Traditional architecture preservation

Source: Guidelines for New Development in Proximity to Railway Operations, 2013

Source: Greater London Authority, 2012

Source: http://www.soundplan.com
Public Law Restrictions (8/9)

Urban Planning and Construction

2. Construction regulations

- Permitted building height, land cover ratio
- Regulations on lighting, ventilation, solar exposure
- Interrelation with neighbouring buildings
- Protection of traditional architectural characteristics (e.g. façades)

Source: http://www.esri.com
Source: Kitsakis and Dimopoulou, 2014
Public Law Restrictions (9/9)

Utilities

• Utility servitudes
• Specific legislation
• Restrictions along underground pipeline’s centre line
  ✘ Buildings’ height,
  ✘ Buildings’ depth
  ✘ Types of cultivation

Source: http://greeklandscapes.com

Source: www.tap-ag.gr
Recording PLRs (1/2)

- **Separate registries**
  - Archaeological Cadastres
  - Utility Cadastres
  - Contaminated sites
  - Protected areas
  - ...

- **Unified registries**

- **Notification on Land Cadastres**

- **PLR Cadastres**
  - 2D maps
  - Limited number of PLRs recorded
  - No reference on vertical restrictions

Source: http://gis.zrc-sazu.si/zrcgiseng/

Source: http://portals.flexicadastre.com/zambia/
Recording PLRs (2/2)

**PLR Cadastres**

- Present all PRLs imposed on land
- Presentation as 2D polygons in 2D maps
- Height restrictions by accompanying legal documents

"Charte d’ éthique de la 3D"

- 2D based legislation
- Complexities performing spatial analysis

Source: http://oereb.tg.ch/

Source: http://xgis.maaamet.ee/xGIS/XGis
3D PLRs in Greek Public Law (1/4)

Background

• Ongoing Hellenic Cadastre project
• No provision for PLR recording
• No 3D recordings
• Principle of “open” Cadastre

Examined cases

- Urban planning and construction restrictions
- Establishment of no-flight zone
- Above ground powerline
3D PLRs in Greek Public Law (2/4)

Urban planning and construction restrictions

• Building restrictions defined by Presidential Decree

• 2D area and land parcel boundaries delimitation

- Built-surface ratio
- Minimum land parcel size
- Maximum building height

Source: Gatsogianni, 2016
3D PLRs in Greek Public Law (3/4)

Establishment of no flight zone

- Circular no flight zone
- East/North cyrcle’s centre coordinates
- Flight height restrictions

- Combination with UAS regulation
- Combination with building restrictions

✓ Accurate information of permissible building space
3D PLRs in Greek Public Law (4/4)

Public Utilities

- Above ground powerline
- Expropriation
- Servitude of passage (along centre-line)
- Height restrictions
Conclusions and further research (1/2)

Conclusions

• Variety of PLRs in 3D
• Influence by various factors
• Use of themed or PLR Cadastres
• 2D polygon projections
• Height restrictions (legal documents)

Different legal resources
✗ Operation within 2D cadastral context
✗ Ambiguities in presentation and interrelation
✗ Conflicts in 3D space
Conclusions and further research (2/2)

- Clarification of complex restrictions
- Exact restrictions’ delimitation
- Encumbrance of 3D space
- Efficient 3D space exploitation

Further research

- Definition of PLRs requiring 3D definition
- 3D data accuracy and update
- Arbitration processes in 3D space
- Definition of ownership right’s content
Thank you!