Conflict between 'Navigable Airspace' and 'Urban Development (Vertical Cities)' around Aerodromes

Background

A Memorandum of Understanding (MoU) enhancing the synergies between Urban Development and Aviation has been signed by the Secretary General of the International Civil Aviation Organization, and the Executive Director of the United Nations Human Settlements Programme (UN-Habitat).

The MOU provides for UN-Habitat and ICAO to strengthen their cooperation with a view to advising States on technical and policy matters relating to aviation issues raised within the context of the sustainable integration of airports in urban areas and within national development programmes. It directly supports SDGs 9, 11, and 13, which respectively pertain to economic development, urban well-being, and climate change.

The relationship is reciprocal as urban conditions impact on aviation safety, navigation, efficiency, and security, and consequently the economic development of air connectivity and its environmental consequences.

This MOU calls for the strengthening of coordination efforts on the effective integration of civil aviation and urbanization into sustainable development frameworks at all levels. UN-Habitat and ICAO should continue to work together to produce new knowledge about the **spatial relationship between Urban development and Aviation.**

"All stakeholders should seize the opportunity presented by the adoption of the New Urban Agenda to join ICAO in the promotion of the integration of air transport systems into the sustainable urbanization planning and development".

Source: ICAO NEWS RELEASE

Montréal and Quito, 20 October 2016: *New UN agreement to foster sustainable development synergies between air transport and urban development*

The signing took place on the occasion of the United Nations Conference on Housing and Sustainable Urban Development (HABITAT III).

Summary

There is a need for enhanced cooperation and knowledge exchange on science, technology and innovation to benefit sustainable urban development, in full coherence, coordination and synergy with Air transport and the processes of the Technology Facilitation Mechanism launched under the 2030 Agenda for Sustainable Development by the United Nations.

Permissible height zoning

The feasibility and success of any Real Estate project depends on the increasing use of available vertical space (permissible height).

Fatal errors in height planning (vertical space utilization) for a proposed structure can lead to huge capital losses. FSI granted by Municipal bodies can be utilized only if certain above ground height of the building is permitted by the Airport Authority of India.

Also high rise buildings are a threat to exponentially increasing Air traffic.

Estates around airports have become a scarce, valuable resource for industry. Large airport projects such as new runways at Mumbai, Delhi and other upcoming new airports demonstrate the conflict potential between urban planning and air traffic operator's interests.

1. The basic problem with regulating height in the vicinity of airports is one of reasonableness. In general, laws in other countries including FAA state that the airspace above a certain height is in the public domain and may be used for public passage so long as there is no interference with the reasonable use of the land over which the flights take place. **But, where the surfaces defining the navigable airspace extend so close to the ground that reasonable use of the land is precluded, the ordinance may be, and occasionally has been, declared invalid.**

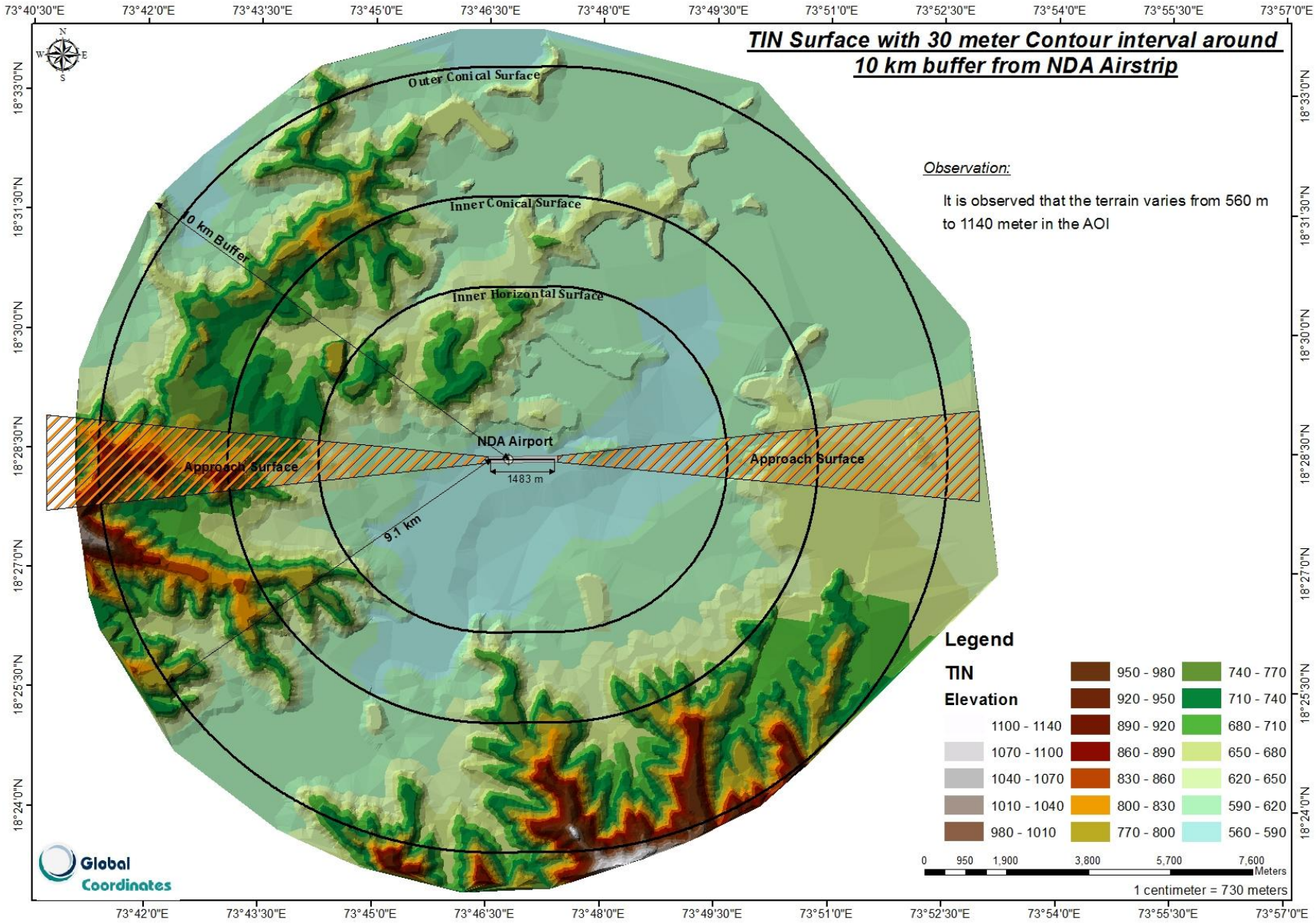
   [Source: https://www.planning.org/pas/reports/report231.html] ***[1]***

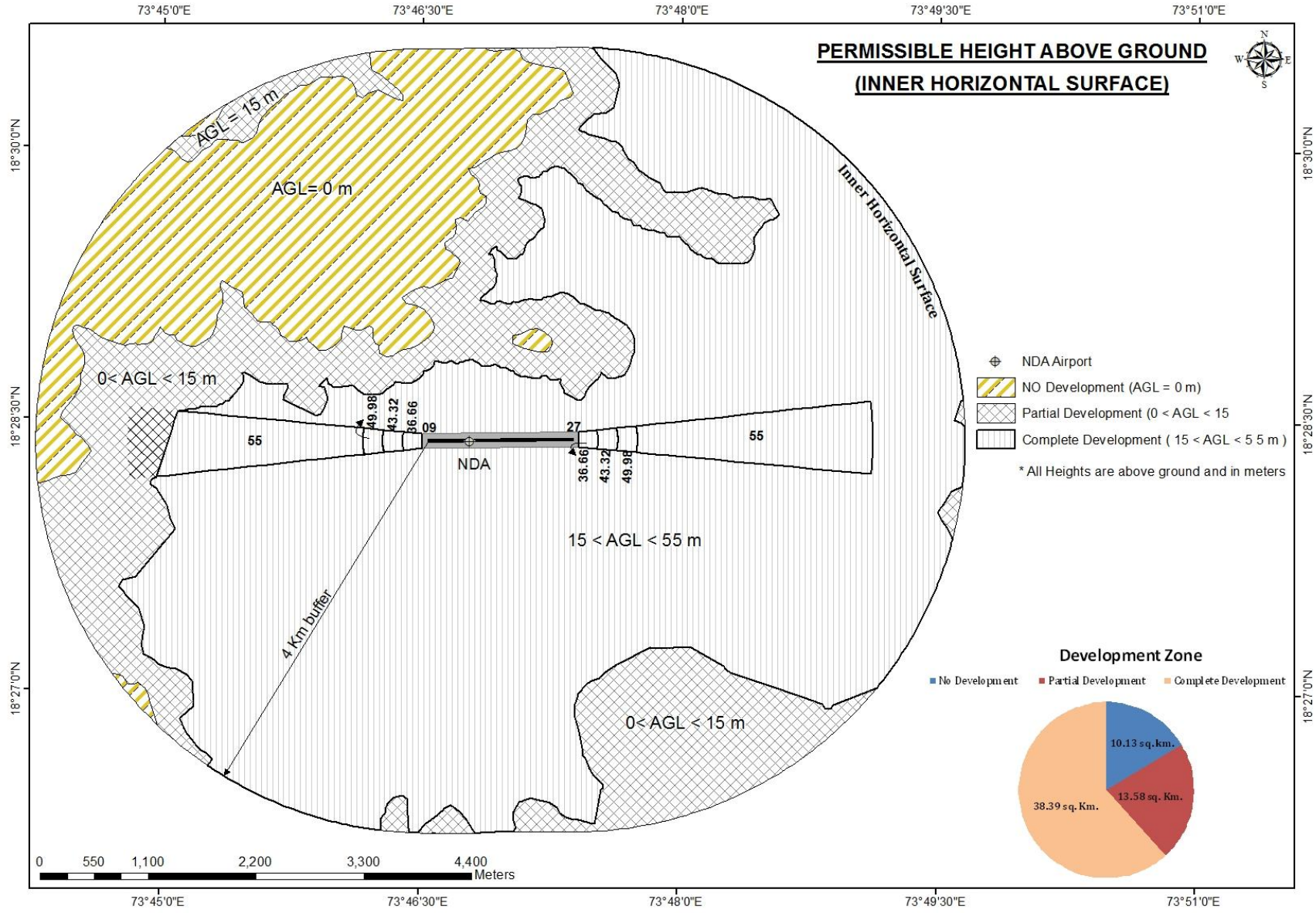
2. Any height limitations imposed by a zoning ordinance must be "reasonable," meaning that the height limitations prescribed should not be so low at any point as to constitute a taking of property without compensations under local law. Therefore, the zoning ordinance should not purport to impose height limitations in any area so close to the ground that the application of criteria prescribed would result in unreasonable or unduly restrictive height limitations. This is provided for by provision 12, Excepted Height Limitations, of Section IV, Airport Zone Height Limitations, in the Model Zoning Ordinance.

   [Source: https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5190-4A.pdf] ***[2]***

3. The Annexure 14 surfaces can be considered as maximum permissible height limits around Aerodromes but care must be taken in hilly areas where the surrounding terrain rises near or even penetrates the surfaces. **A height limitation ordinance cannot be so strict so as to preclude any development on a particular property without risking an 'unconstitutional taking of property'.**

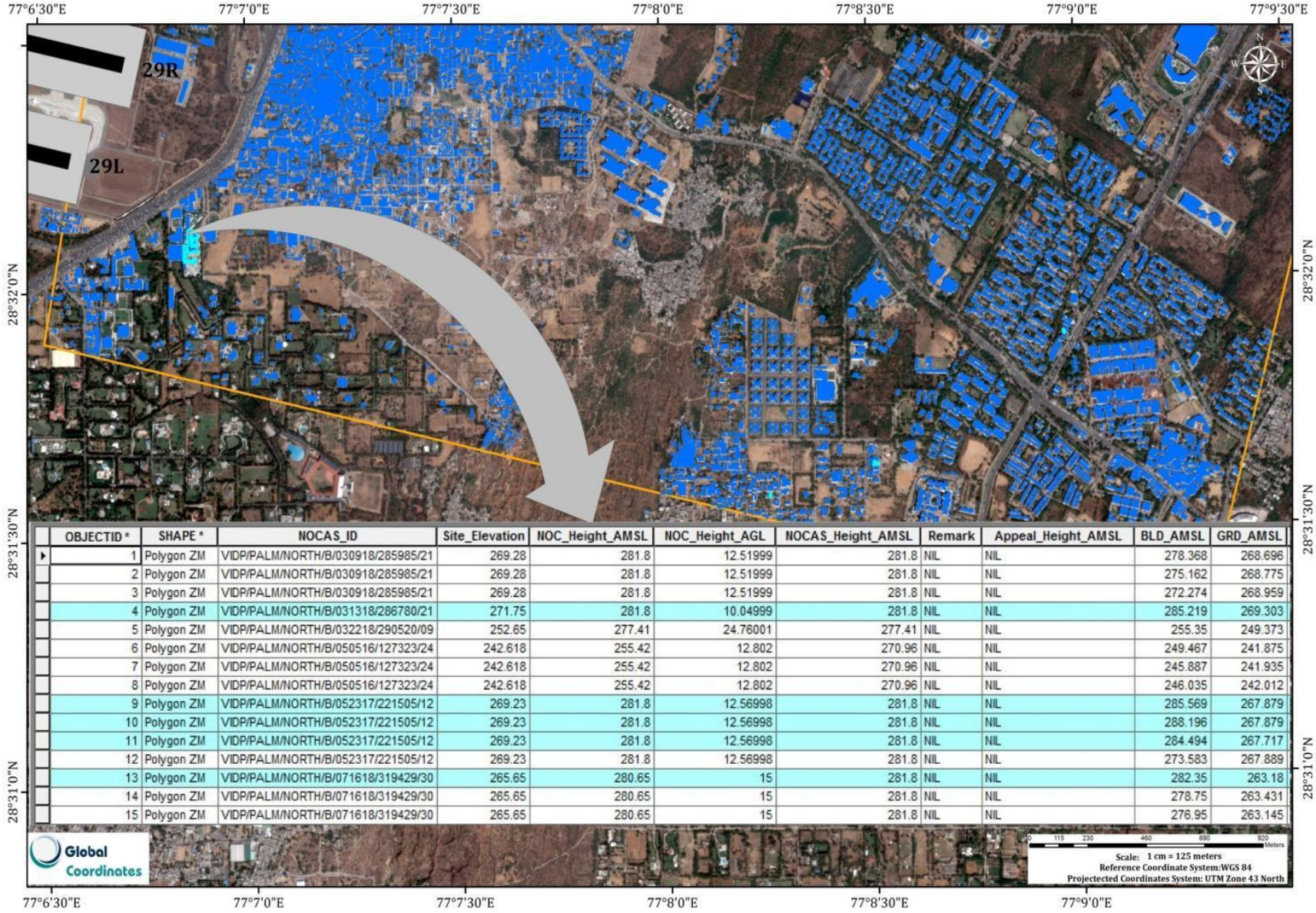
   In such cases the Government may choose to provide a variance for structures of reasonable height subject to an Aeronautical Study to ensure that the structure will not be a hazard.*[Source: Planning and Urban Design Standards by American Planning Association]* ***[3]***


TIN Surface with 30 meter Contour interval around 10 km buffer from NDA Airstrip
Outer Conical Surface
Inner Conical Surface
Inner Horizontal Surface
10 km Buffer
Approach Surface
Approach Surface
NDA Airport
1483 m
9.1 km
Observation:
It is observed that the terrain varies from 560 m to 1140 meter in the AOI
Legend
TIN Elevation
1100 - 1140
1070 - 1100
1040 - 1070
1010 - 1040
980 - 1010
950 - 980
920 - 950
890 - 920
860 - 890
830 - 860
800 - 830
770 - 800
740 - 770
710 - 740
680 - 710
650 - 680
620 - 650
590 - 620
560 - 590
0 950 1,900 3,800 5,700 7,600 Meters
1 centimeter = 730 meters
Global Coordinates
73°40'30"E
73°42'0"E
73°43'30"E
73°45'0"E
73°46'30"E
73°48'0"E
73°49'30"E
73°51'0"E
73°52'30"E
73°54'0"E
73°55'30"E
73°57'0"E
18°33'0"N
18°31'30"N
18°30'0"N
18°28'30"N
18°27'0"N
18°25'30"N
18°24'0"N


PERMISSIBLE HEIGHT ABOVE GROUND
(INNER HORIZONTAL SURFACE)
73°45'0"E
73°46'30"E
73°48'0"E
73°49'30"E
73°51'0"E
18°30'0"N
18°28'30"N
18°27'0"N
AGL = 15 m
AGL= 0 m
Inner Horizontal Surface
0< AGL < 15 m
49.98
43.32
36.66
09
27
55
55
NDA
15 < AGL < 55 m
4 Km buffer
0< AGL < 15 m
NDA Airport
NO Development (AGL = 0 m)
Partial Development (0 < AGL < 15
Complete Development (15 < AGL < 5 5 m)
* All Heights are above ground and in meters
Development Zone
No Development
Partial Development
Complete Development
10.13 sq.km.
13.58 sq. Km.
38.39 sq. Km.
0
550
1,100
2,200
3,300
4,400
Meters

Conflict between ‘Navigable Airspace’ and ‘Urban Development (Vertical Cities)’ around Aerodromes

Buildings Height > NOC Height



OBJECTID *	SHAPE *	NOCAS_ID	Site_Elevation	NOC_Height_AMSL	NOC_Height_AGL	NOCAS_Height_AMSL	Remark	Appeal_Height_AMSL	BLD_AMSL	GRD_AMSL
1	Polygon ZM	VIDP/PALM/NORTH/B/030918/285985/21	269.28	281.8	12.51999	281.8	NIL	NIL	278.368	268.696
2	Polygon ZM	VIDP/PALM/NORTH/B/030918/285985/21	269.28	281.8	12.51999	281.8	NIL	NIL	275.162	268.775
3	Polygon ZM	VIDP/PALM/NORTH/B/030918/285985/21	269.28	281.8	12.51999	281.8	NIL	NIL	272.274	268.959
4	Polygon ZM	VIDP/PALM/NORTH/B/031318/286780/21	271.75	281.8	10.04999	281.8	NIL	NIL	285.219	269.303
5	Polygon ZM	VIDP/PALM/NORTH/B/032218/290520/09	252.65	277.41	24.76001	277.41	NIL	NIL	255.35	249.373
6	Polygon ZM	VIDP/PALM/NORTH/B/050516/127323/24	242.618	255.42	12.802	270.96	NIL	NIL	249.467	241.875
7	Polygon ZM	VIDP/PALM/NORTH/B/050516/127323/24	242.618	255.42	12.802	270.96	NIL	NIL	245.887	241.935
8	Polygon ZM	VIDP/PALM/NORTH/B/050516/127323/24	242.618	255.42	12.802	270.96	NIL	NIL	246.035	242.012
9	Polygon ZM	VIDP/PALM/NORTH/B/052317/221505/12	269.23	281.8	12.56998	281.8	NIL	NIL	285.569	267.879
10	Polygon ZM	VIDP/PALM/NORTH/B/052317/221505/12	269.23	281.8	12.56998	281.8	NIL	NIL	288.196	267.879
11	Polygon ZM	VIDP/PALM/NORTH/B/052317/221505/12	269.23	281.8	12.56998	281.8	NIL	NIL	284.494	267.717
12	Polygon ZM	VIDP/PALM/NORTH/B/052317/221505/12	269.23	281.8	12.56998	281.8	NIL	NIL	273.583	267.889
13	Polygon ZM	VIDP/PALM/NORTH/B/071618/319429/30	265.65	280.65	15	281.8	NIL	NIL	282.35	263.18
14	Polygon ZM	VIDP/PALM/NORTH/B/071618/319429/30	265.65	280.65	15	281.8	NIL	NIL	278.75	263.431
15	Polygon ZM	VIDP/PALM/NORTH/B/071618/319429/30	265.65	280.65	15	281.8	NIL	NIL	276.95	263.145

The Legality of Comprehensive Airport Height Zoning.

The reasonableness of any application of power, including zoning, is based on its relation to the public health, safety, morals, or general welfare. **The courts, therefore, have generally looked with disfavor upon any intent to impose a regulation, resulting in a restriction, hardship, or penalty that does not provide a commensurate benefit to the general public. And, where zoning is confiscatory or substantially interferes with the reasonable use or enjoyment of the land, the courts have generally required that compensation be made.**

Another generally accepted principle is that zoning for a particular parcel of land must bear some relation to its potential use. For example, exclusive agricultural zoning is often considered confiscatory unless there is a clearly demonstrated demand for agricultural use.

There have been numerous court decisions relating to the "taking" or "inverse condemnation" of land near airports. The major precedent-setting cases are as follows: *United States v. Causby*,21 established the principle that excessive airport noise could constitute a taking of property. The Court said that "Flights over private land are not a taking, unless they are so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land." In *Griggs v. Allegheny County*, 369 U.S. 84 (1962) the Court decided that the airport owner, rather than the U.S. government or the airlines, is liable for depreciation of property values that results from airport noise.

Finally, in *Martin v. Port of Seattle*, 391 P.2d 540, (Wash. 1964), cert. den., 379 U.S. 989 (1965), the court decided that recovery under the State of Washington constitution provided for inverse condemnation under which recovery was permitted not only for a "taking" of the property but also for damage to the property. Thus, recovery was permitted to those property owners subject to over flights in take-offs and landings as well as to the property owners who were damaged and whose property was adjacent to the path of flight in landings and take-offs.

Land-use controls around airports have been invalidated by the courts on numerous occasions when they have restricted land in affected areas to uses which do not interfere with airport operations or which are not sensitive to noise and other airport environmental effects and when they have caused a substantial decrease in property values of the zoned lands. When there has been no decrease in property values, the courts have almost invariably upheld the imposition of the controls.

Court Rulings

Recently, in the case *Indiana Toll Road Commission v. Jankovich*, 379 U.S. 897, 85 S. Ct. 493, 13 L.Ed.2d 439 (1965), the U. S. Supreme Court refused to review an Indiana Supreme Court decision which declared the airport zoning ordinance in Gary unconstitutional as applied to a height limitation for the Indiana Toll Road. This ordinance was based on the NIMLO-FAA Model Airport Zoning Ordinance.

[4]U.S. Supreme Court

Jankovich v. Indiana Toll Road Comm'n, 379 U.S. 487 (1965)

Jankovich v. Indiana Toll Road Commission

No. 60

Argued December 10, 1964

Decided January 18, 1965

379 U.S. 487

Syllabus

Petitioners, operators of a municipal airport, brought suit in a state court for injunctive relief and damages against respondent toll road commission which had constructed a toll road whose height at a point from a planned runway petitioners contended exceeded that permitted by the municipal airport zoning ordinance. The State Supreme Court reversed the trial court's award of damages to petitioners, holding that the **ordinance purported to authorize an appropriation of property (airspace) without compensation, which was unlawful under the Indiana Constitution and under the Fourteenth Amendment**.

Held:

1. **In holding that the ordinance effected a taking of respondent's property right in the airspace above its land without compensation, the State Supreme Court rested its decision upon independent and adequate state grounds,** even though it also relied on similar federal grounds, and this Court is therefore deprived of jurisdiction to review the state court judgment. Pp. 379 U. S. 489-492.
2. The state court decision is compatible with the Federal Airport Act, which does not defeat this respondent's right under state law to compensation for the taking of airspace. Pp. 379 U. S. 493-405.

Certiorari dismissed as improvidently granted.

Reported below: 244 Ind. 574,193 N.E.2d 237.

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[5]U.S. Supreme Court

United States v. Causby, 328 U.S. 256 (1946)

United States v. Causby

No. 630

Argued May 1, 1946

Decided May 27, 1946

328 U.S. 256

Syllabus

Respondents owned a dwelling and a chicken farm near a municipal airport. The safe path of glide to one of the runways of the airport passed directly over respondents' property at 83 feet, which was 67 feet above the house, 63 feet above the barn and 18 feet above the highest tree. It was used 4% of the time in taking off and 7% of the time in landing. The Government leased the use of the airport for a term of one month commencing June 1, 1942, with a provision for renewals until June 30, 1967, or six months after the end of the national emergency, whichever was earlier. Various military aircraft of the United States used the airport. They frequently came so close to respondents' property that they barely missed the tops of trees, the noise was startling, and the glare from their landing lights lighted the place up brightly at night. This destroyed the use of the property as a chicken farm and caused loss of sleep, nervousness, and fright on the part of respondents. They sued in the Court of Claims to recover for an alleged taking of their property and for damages to their poultry business. The Court of Claims found that the Government had taken an easement over respondents' property and that the value of the property destroyed and the easement taken was $2,000; but it made no finding as to the precise nature or duration of the easement.

Held:

1. A servitude has been imposed upon the land for which respondents are entitled to compensation under the Fifth Amendment. Pp. 328 U. S. 260-267.

(a) The common law doctrine that ownership of land extends to the periphery of the universe has no place in the modern world. Pp. 328 U. S. 260-261.

(b) **The air above the minimum safe altitude of flight prescribed by the Civil Aeronautics Authority is a public highway and part of the public domain, as declared by Congress in the Air Commerce Act of 1926, as amended by the Civil Aeronautics Act of 1938.** Pp. 328 U. S. 260-261, 328 U. S. 266.

(c) **Flights below that altitude are not within the navigable air space which Congress placed within the public domain, even though they are within the path of glide approved by the Civil Aeronautics Authority**. Pp. 328 U. S. 263-264.

Page 328 U. S. 257

(d**) Flights of aircraft over private land which is so low and frequent as to be a direct and immediate interference with the enjoyment and use of the land are as much an appropriation of the use of the land as a more conventional entry upon it**. Pp. 328 U. S. 261-262, 328 U. S. 264-267.

2. Since there was a taking of private property for public use, the claim was "founded upon the Constitution," within the meaning of § 141(1) of the Judicial Code, and the Court of Claims had jurisdiction to hear and determine it. P. 328 U. S. 267.

3. Since the court's findings of fact contain no precise description of the nature or duration of the easement taken, the judgment is reversed, and the cause is remanded to the Court of Claims so that it may make the necessary findings. Pp. 328 U. S. 267-268.

(a) An accurate description of the easement taken is essential, since that interest vests in the United States. P. 328 U. S. 267.

(b) Findings of fact on every "material issue" are a statutory requirement, and a deficiency in the findings cannot be rectified by statements in the opinion. Pp. 328 U. S. 267-268.

(c) A conjecture in lieu of a conclusion from evidence would not be a proper foundation for liability of the United States. P. 328 U. S. 268.

The Court of Claims granted respondents a judgment for the value of property destroyed and damage to their property resulting from the taking of an easement over their property by low-flying military aircraft of the United States, but failed to include in its findings of fact a specific description of the nature or duration of the easement. 104 Ct.Cls. 342, 60 F.Supp. 751. This Court granted certiorari. 327 U.S. 775. *Reversed and remanded,* p. 328 U. S. 268.

Extract from Advisory Circular 150/5050-6, Airport-Land Use Compatibility Planning, current edition, presents generalized guidance for compatible land use planning in the vicinity of airports.

1. Aviation safety requires a minimum clear space (or buffer) between operating aircraft and other objects. When these other objects are structures (such as buildings), the buffer may be achieved by limiting aircraft operations, by limiting the location and height of these objects, or, by a combination of these factors. This advisory circular concerns itself with developing zoning ordinances to control the height of objects, based on the obstruction surfaces described in Subpart C of Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace, current edition. It should be recognized, however, that not all obstructions (objects whose height exceeds an obstruction surface) are a hazard to air navigation.

2. The Federal Aviation Administration (FAA) conducts aeronautical studies on obstructions which examine their effect on such factors as: aircraft operational capabilities; electronic and procedural requirements; and, airport hazard standards. If an aeronautical study shows that an obstruction, when evaluated against these factors, has no substantial adverse effect upon the safe and efficient use of navigable airspace, then the obstruction is considered not to be a hazard to air navigation. Advisory Circular 150/5300-4, Utility Airports- Air Access to National Transportation, current edition, presents additional discussion on hazards to air navigation.

3. Airport zoning ordinances developed for height limitations do not in themselves ensure compatible land use surrounding the airport. Land use zoning, incorporating height limiting criteria, is an appropriate means for achieving this objective. Advisory Circular 150/5050-6, Airport-Land Use Compatibility Planning, current edition, presents generalized guidance for compatible land use planning in the vicinity of airports.
   [Source: https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5190-4A.pdf][2]

Solutions for height restriction ordinances

1. State legislation mandating intergovernmental coordination on issues of regional significance including Airports and providing a structured policy framework within which to make planning and development decisions can help overcome barriers to coordination.
2. The local municipal bodies and stakeholders such as Developers, Utility companies to be involved in local planning for Airport facilities with land use compatibility.

3. Any height limitation ordinance to not be so strict so as to preclude any development on a particular property amounting to an 'unconstitutional taking of property'.
4. **Where the surfaces defining the navigable airspace extend so close to the ground that reasonable use of the land is precluded, the height regulating ordinance should be revised to provide a variance for structures of reasonable height subject to an Aeronautical Study to ensure that the structure will not be a hazard.**
5. Any ordinance purported to authorize an appropriation of property (airspace) without compensation would be unlawful.
6. One of AAI's duties is to conduct Aeronautical Studies of proposals for building structures to determine whether they may become hazards to Air Navigation. But AAI is not a land use regulator and it needs to take decisions in collaboration with the local government. If the proposed constructions cannot be restricted due to cost of land and FSI granted, AAI should modify the published minima at the Airport and in cases of hilly terrain, even re-design Airspace and alter Air traffic Control procedures to ensure safe air navigation.

Suggestions

Special Airport Planning Compatibility Entities

Another Approach could be to establish special Airport Land use compatibility Planning Commissions (ALUCs) and to require them to prepare Airport vicinity land use plans in consultation with affected local governments and stakeholders.

The resulting plans will provide guidelines for drafting permissible height ordinances for specific regions, keeping in view the spatial relationship between 'urban Development' and 'Aviation' and joining ICAO in the promotion of the integration of air transport systems into the sustainable urbanization planning and development".
The decision as to the excepted height limits should be made on the basis of local conditions and circumstances, including the uses being made of property in the vicinity of the airport. In making such a decision, the political subdivision should use the same procedures generally recognized as desirable in preparing comprehensive zoning ordinances, including necessary coordination with recognized state, regional, and local planning offices, where applicable.

AAI and MOCA could establish special land use compatibility planning commission to prepare Airport vicinity land use plans for Hilly areas in consultation with local government and affected stakeholders such as Developers.

Joint Airport Zoning Boards

Joint Airport Zoning Board could be formed by the communities operating the Airport and affected by the Airport Impacts. Each community could appoint a representative to the Airport Zoning Board which could enact a special Airport zoning ordinance and is empowered to enforce it. The authority of these bodies could be limited to dealing with Airport –land use compatibility planning and zoning.
[Source: Planning and Urban Design Standards by American Planning Association] [3]

References:

1. https://www.planning.org/pas/reports/report231.html
2. https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5190-4A.pdf]
3. Planning and Urban Design Standards by American Planning Association
4. U.S. Supreme Court - Jankovich v. Indiana Toll Road Comm'n, 379 U.S. 487 (1965)
5. U.S. Supreme Court - United States v. Causby, 328 U.S. 256 (1946)
6. G.S.R 751 (E) Guidelines issued by MOCA
7. GSR 770 (E) Guidelines issued by MOCA