

Study of Project Site and Environmental Challenges for Greenfield Projects: A Case Study of NMIA Project

Nagarjuna Pilaka

NICMAR University, Pune, M.S., India

(Received 18 August, 2025; Accepted 24 October, 2025)

ABSTRACT

The current Mumbai airport is almost at capacity for passengers, and it is exceedingly difficult to expand the infrastructure for both passenger and cargo operations. This is primarily due to the severe land constraints in Mumbai, the city where the airport is located. However, according to the MMR's study, the demand for air travel will increase from about 30 million passengers annually in 2010–11 to 120 million passengers annually by 2030–31. If this is the case, the Mumbai airport will not be able to accommodate the enormous rise in travel demand. Building a second airport for MMR is therefore essential, and the Navi Mumbai International Airport Project (NMIA) is intended to meet the anticipated rise in air travel demand. However, the predicted cost of the new airport project is very high, especially when it comes to the environmental aspect. According to a study, more than 250 acres of mangroves and 1000 acres of alluvial plains would be permanently destroyed, resulting in habitat loss and environmental degradation surrounding the project. Additionally, a river would be diverted, a hill would be flattened, and a sizable swamp of mangroves, forest, and wetlands would be destroyed. As a result, the NMIA Project raises environmental concerns regarding the process of choosing an idle site for a greenfield airport construction project; this is exactly what the study is discussing.

Key words: Airport, Site Selection, Environment, CIDCO, Air Travel Demand

Introduction

The nation's commercial hub is Mumbai. The current airport's air traffic is quickly approaching saturation, and there is very little room for improvement in terms of passenger and cargo handling facilities, aircraft maintenance, and cityside amenities. The number of air travellers at Mumbai International Airport has multiplied, and the airport is growing closer to capacity and becoming increasingly crowded. However, because slums encircle it on three sides, it is unable to grow farther. In addition to the Santacruz airport, another airport in the MMR region had to be developed due to the growing de-

mands of commerce and servicing operations. As a result, in 2007 the government approved the NMIA project which is intended to serve as a backup facility and absorb a portion of the demand for air travel. Subsequently the steering committees of the national and state governments had to approve the Request for Qualification (RFQ) document. The Maharashtra government has designated the City Industrial Development Corporation (CIDCO), a state-run institution in Navi Mumbai, as the planning authority for the entire city and its environs and as a nodal agency for the NMIA project development. In an effort to enhance society as a whole, CIDCO has consistently worked to broaden the

scope of its operations to include all areas of municipal development. It has come up with the idea for a brand-new, cutting-edge airport in Navi Mumbai using this philosophy as the foundation for its development strategy. Around 2010, CIDCO started the project's worldwide bidding process. The airport's first phase was scheduled to open in 2012 with an annual capacity of 10 million passengers; by the time it is fully operational in 2030, it can accommodate up to 40 million people. The Project Details and Model of Contract is explained briefly.

Method of Project Procurement: Competitive Global Bidding initiated by CIDCO.

Process of awarding the Contract

Model of Contract: Public Private Partnership (PPP)
SPV: Navi Mumbai International Airport Limited (NMIAL)

Private Partner: Adani Airport Holdings Ltd (74%)
→ Design, Finance, Build, Operate

Public Partner: CIDCO (26%) → Land acquisition, rehabilitation, off-site infra

Concession Period: 30 years (+10 years extension option)

Request for Qualification (RFQ): To shortlist technically and financially capable bidders.

Request for Proposal (RFP): Shortlisted bidders submitted detailed financial offers.

Winning Criterion: The highest percentage of gross revenue shared with CIDCO.

Winner: GVK-led consortium (now controlled by Adani Group) won by offering a 12.6% revenue share.

Estimated Investment: 22,532+ Crore (initial phases)

Revenue Collection: Special Purpose Vehicle (NMIAL)

Recovery Model: Spread across 30 years concession
No fixed 'recovery year' → Long-term profitability & cash flows

As per the Environmental Impact Assessment (EIA) notification of 2006, large scale infra projects ordinarily require systematic evaluation. The EIA process is not a bureaucratic hurdle but a critical safeguard, measuring potential impacts on land use, biodiversity and community livelihoods. Importantly, it mandates public consultation (Saleem, 2025). Following this EIA act, the Ministry of Environment, Forests, and Climate Change established an expert review committee for the proposed Navi Mumbai International Airport in October 2010. The CIDCO had examined number of sites for the con-

struction of a huge airport of international standard. Approximately 2050 hectares have been set aside for airport construction, of which 1650 are designated as the exclusive airport zone and the rest portion is used for off-site infrastructure such approach roads, railroad lines, interchanges, utility lines, etc. (CIDCO, 2003). The alternative locations for the project are analysed using a variety of physical parameters. SWOT analysis and site sensitivity analysis appear to be the two methodologies used in the search for the ideal location. Ulwe village in Panvel town, Navi Mumbai, has been determined to be the ideal location for an airport. The Committee believes that the loss of mangroves and the alteration of two rivers would make the airport site a serious environmental disaster that would have long-term effects on the surrounding area and Panvel city, which is especially susceptible to flooding and heavy rains. The Ministry would decide whether to provide environmental clearance when the committee had presented its report and conclusions.

Site Selection for the Project

An obstruction-free approach, operational compatibility, little population disturbance, land availability, accessibility, and the availability of social and physical infrastructure should all be features of the ideal location for airport development and operation. Steps to remove inappropriate site locations from the study area are part of the selection criteria. The site that meets most of the selection criteria is chosen as a likely location for additional in-depth analysis as explained in Table 1. Land availability, land use, topography, hydrography, the availability of social and physical infrastructure, the environment, development costs, obstacles, air space accessibility, facility expandability, and accessibility are just a few of the numerous factors that go into choosing an airport location. Nonetheless, the following standards have been applied to choose likely locations in order to conduct a quick exercise: a) A site that is large enough to accommodate 60 million passengers annually and has two separate, 4-kilometer-long runways with instrument landings for both domestic and international operations. b) A 15-kilometer obstacle-free approach on either side of the runway's end. c) The glide slope shouldn't be more than three degrees. d) It is best to stay away from areas of historical, ecological, archeological, cultural, and Coastal Regulation Zone (CRZ) significance. e) A location that offers comparatively level

terrain with a slope of less than 2% and a level contour up to 100 meters in order to lower building costs and the impact on the environment. f) Ground transportation from the catchment region to the site should take no more than 1.5 hours. g) The accessibility of social and physical infrastructure. h) Provisions for future airport expansion must be made. I) closeness to important business and industrial areas (Khanna *et al.*, 1999).

Alternate Sites and Environmental Problems

Initially, a number of locations were taken into consideration and examined, including Mahapan in Sindhudurg District, Rewas-Mandwa in Raigad District, and Navi Mumbai, among others. Mahapan, which is located in the Sindhudurg district, is not a suitable location for the new airport because it is roughly 350 kilometers from Mumbai and would take eight to ten hours to get there by car. As a result, only the Rewas-Mandwa and Navi Mumbai sites are included in the analysis of alternative sites exercise. The Rewas location is next to the Dharamatar Creek, close to Rewas-Mandwa. The Mumbai airport is almost 120 kilometers away from this location. Two parallel runways are part of the airport's design, and between them are satellite aprons, a domestic terminal, and an international terminal. However, it is later discovered that this

specific location lacks all of the infrastructure needed for airport expansion. The other location is in Ulwe, Panvel town, Raigad district, which is roughly 45 kilometers from Mumbai's central business center, Belapur. Table 1 presented analysis of alternative sites for the project.

Environmental Concerns of the Selected Site

Panvel: After the Panvel bypass road on the route to Goa, a large expanse of green space appears at this project location, which was ultimately chosen. It belongs to farmers and fishermen. There are two rivers, 400 hectares of mangroves, and a hilltop that is almost ten meters high. The Ghadi River's estuary, which rises in the neighboring Matheran hills and flows into the Panvel Creek, makes up the majority of the area. The Ulwe Hills are the source of another river known as the Ulwe River. It is suggested that both rivers be rerouted, which would alter the area hydrology. Over 390 acres of swelling land are covered in lush green mangrove trees and plants, which are thought to preserve the delicate biological balance and safeguard the tidal wet land area. If the mangroves are destroyed, the environment is also harmed (Antiaero.org., 2018).

There is a strong belief that the mangroves can be replanted on other coastal locations. Additionally, it is claimed to serve as a natural barrier against

Table 1. Analysis of Alternative Project Sites

Sr. No.	Name of Probable Airport Sites	Distance (Km) From Old Airport	Land Availability	Environment (CRZ)	Topography	Ground Transportation	Availability of Social and Physical Infrastructure	Possible Sites
1.	Palghar	70	√	X	√	X	X	X
2.	Wada	95	√	√	√	X	X	√
3.	Virthan	55	√	X	√	√	X	X
4.	Arsoli	70	√	√	√	X	X	√
5.	Aste	90	√	X	X	X	X	X
6.	Shahapur (S)	75	√	X	X	X	X	X
7.	Kinvali	100	√	√	√	X	X	√
8.	Bhivandi (E)	85	√	X	√	X	X	X
9.	Uttan	25	√	X	X	√	X	X
10.	Balegaon	80	√	√	√	X	X	√
11.	Kalyan	50	X	√	√	√	X	X
12.	Kalyan (S)	50	√	√	√	√	X	√
13.	Navi Mumbai	35	√	X	√	√	√	√
14.	Nhava Sheva	45	√	X	X	X	√	X
15.	Uran	55	√	X	X	X	√	X
16.	Dadar	100	√	X	X	X	X	X
17.	Rewas-Mandva	120	√	X	√	X	X	X

Source: Kenche *et al.*, 2012

coastal erosion and the water. Removing it could have catastrophic effects. Elevated levels of air pollution, including particulate matter and emissions from vehicles and machines, can also result from increased building activity and airport operations. Additionally, both during construction and during ongoing operations, it will increase greenhouse gas emissions. Growing air travel contributes to global climate change by increasing carbon emissions (Nanjundiah, 1996). Because of these natural land features, the expert team had to evaluate the hydrological impact on Panvel city due to potential river course changes and the degree of mangrove and hill damage. It was necessary to conduct a thorough analysis of the surrounding regions to the west and south of the airport. A number of criteria are taken into account in the SWOT analysis.

Strengths consist of The Navi Mumbai site is accessible by all means of transportation, has all necessary supporting infrastructure, townships to accommodate airport workers, local support, an alternative airfield in MMR, a lower capital cost (a financially viable project), is appealing for development through public and private partnerships, and the CIDCO's special location would expedite the project. Zone III of seismic activity Unrestricted growth is possible, the approach road is clear of obstacles, it has hub potential, it is close to the Mumbai commercial region, it is connected via Atal-Setu, and it is close to the JNPT port.

Weakness The site also has certain flaws including purchase of 2000 hectares of land, restoration of 14 settlements with a population of 30,000, Ulwe River diversion and Ghadi River training Situated in the CRZ region, ten settlements with 15,000 residents are being rehabilitated, Lack of commuter rail connections, lack of essential infrastructure, high cost of capital, demands that a township be developed for 50,000 families, devastation of the picturesque coastline, falls in a delicate area, shutdown of the airport during naval drills, strong resistance from the local populace, Project financially unfeasible, unappealing for development through public-private partnerships, seismic zone IV C, integration with the current Mumbai airport, detrimental effects on mangroves and surrounding habitat, problems with accessibility for Mumbai suburban residents, effects on local traditional businesses, controlling public perception of displaced communities, and guaranteeing just compensation.

Opportunities

It offers enormous potential as well. It will accelerate the growth of Navi Mumbai and the main land. Encourage constructive rivalry between the two airports, reduce traffic at the current airport, improved perception of Mumbai in the aviation industry, Boost business at the state and federal levels, Possibility of growth: satisfying demand after 2030 Increase the Konkan area's growth in MMR, draw in foreign and domestic investment, generate jobs for the local population, improve the surrounding area's infrastructure, and build an airport with cutting-edge aviation, security, and passenger services technology.

Establishing a standard for contemporary infrastructure, the chance to apply sustainable practices and green technologies, like energy-efficient systems and environmentally friendly building materials, increase tourism in Navi Mumbai and the larger Maharashtra region, improve company supply chains and trade, balance the expansion of Mumbai and Navi Mumbai, ease the strain on Mumbai's current infrastructure, The addition of contemporary facilities and services to the airport region raises the level of living for locals and can act as a center for aviation technology, sustainability, and operational efficiency research and innovation.

Threats

Threats to the site include Navi Mumbai Ulwe, the need for a transharbor link with a high-speed airport road towards the main land at a cost of approximately Rs 8000 crores, Obtaining the required permits can cause delays and higher costs; environmental regulations and standards may result in higher operational and maintenance costs, strain budgets, and affect the project's financial viability; the construction and operation may negatively affect local ecosystems, such as wetlands and mangroves, potentially leading to biodiversity loss; rising sea levels Local communities' or stakeholders' opposition may result in demonstrations, legal disputes, or a bad public image. When compared to alternative locations, the Navi Mumbai site offers significant advantages, as the SWOT analysis above makes evident.

Land Acquisition and Compensation

The CIDCO owns roughly 1600 of the 2200 hectares of land needed for the green field airport; the other

600 hectares would be purchased from private individuals and the state government. The project's bottlenecks are talked about. Approximately 700 hectares of agricultural land had to be acquired for the green field project. The Project Affected People (PAP) have requested 40% of developed land and compensation of Rs. 20 cr. per acre (Antiaero.org.2018)

The PAP has reportedly agreed to accept about 22% of developed land for each hectare of land gained after multiple agreements. The requirement for cash disbursement has apparently been removed, making it a challenging aspect of the situation. However the locals' opinions of the project are divided. While some people are afraid of being displaced, young people look forward to the projects because they offer multiple more jobs. A few kilometers from the airport project site, CIDCO reportedly established rehabilitation camps.

Summary and Conclusion

Despite its difficulties, the Navi Mumbai location was chosen due to a number of considerations, including as the availability of land, accessibility, proximity, topography, and the ability to support the necessary infrastructure. Due to a number of logistical, technical, environmental, and defense concerns, other potential locations, such Rewas-Mandwa, were judged inappropriate. However, the Navi Mumbai site still needed major environmental changes, such as rerouting the Ulwe and Ghadi rivers, compensating for the environmental damage, and rehabilitating the impacted populations.

Serious environmental issues are linked to the NMIA project, including the diversion of rivers, the destruction of mangroves, the negative effects on habitat, and the flattening of hills. The local ecosystem may be threatened by these activities, including the possibility of floods in the Panvel region as a result of altered river flows. A major worry is the destruction of mangroves, which are essential for preserving the biological balance. Mangroves help defend the shoreline from erosion and serve as a significant barrier during tsunamis, high tide, and strong seas.

The NMIA project's SWOT analysis revealed positives such land availability, accessibility, favorable airport conditions, backing from the planning authority CIDCO, port proximity, and local support. The idea did, however, have many drawbacks, such

as the requirement for extensive land acquisition, a significant financial outlay, the rehabilitation of displaced people, and the environmental impact of the planned site. The potential to reduce traffic at the current Mumbai airport, draw in foreign investment, create jobs, and further the growth of the Navi Mumbai area were among the opportunities. Environmental issues, local community opposition, legal issues, high operating and maintenance costs, and the substantial financial outlay needed for infrastructure development-including the Trans Harbor Link-were the main causes of the danger. On the Regulatory and Approval Processfront the project underwent a stringent approval procedure, which included an evaluation by an Expert Appraisal Committee established by the Ministry of Environment, Forests, and Climate Change. Before final clearance could be given, a number of changes and evaluations were made due to the committee's worries regarding the environmental impact. In conclusion, the NMIA project has numerous environmental difficulties even though it is crucial for satisfying the Mumbai Metropolitan Region's expanding demand for air travel and promoting the region's economic growth. Ensuring sustainable land use techniques, resolving local concerns, and carefully balancing development requirements with environmental conservation are all critical to the project's success. The project's long-term success and regional influence will depend on how well it handles these obstacles. A significant amount of privately held land had to be acquired for the project. The proposal caused conflicting emotions among the locals, who were worried about relocation and if the compensation would be sufficient. Although economic compensation was a contentious subject, negotiations resulted in an arrangement wherein the Project Affected Persons (PAPs) would get 22% of developed land for each hectare seized.

The CIDCO owns roughly 1600 of the 2200 hectares of land needed for the greenfield airport; the other 600 hectares would be purchased from private individuals and the state government. The project's bottlenecks are talked about. The Project Affected People (PAP) have requested 40% of developed land and compensation of Rs. 20 cr. Peracre. (CIDCO, 2023). Although economic compensation was a contentious subject, negotiations resulted in an arrangement wherein the Project Affected Persons (PAPs) would get 22% of developed land for each hectare seized. The requirement for cash disbursement has

apparently been removed, making it a challenging aspect of the situation. People's Views of the NMIA Project. The initiative has caused conflicting emotions among the locals. While some people are afraid of being displaced, young people look forward to the projects because they offer multiple more jobs. A few kilometres from the airport project site, CIDCO reportedly established rehabilitation camps.

Conflict of Interest - None

References

- Asthana, D.K. and Asthana Meera, 2006. *Environment*, S. Chand, p. 336-346
- Autor Fuente: antiaero.org - <https://goo.gl/TgLXz9>(2018) Navi Mumbai Airport, 3500 families face eviction , https://esp.habitants.org/noticias/habitantes_de_asia/navi_mumbai_airport_3_500_families_face_eviction#:~:text=CIDCO%20then%20suggested%20a%20mangrove,get%20clearance%20for%20the%20project.
- CIDCO, 2003. Socio-Economic Survey of Project Affected Households In Villages of Navi Mumbai. Report by Tata Institute of Social Science.
- Hanna Ritchie, 2004. Aviation Accounts for 2.5 % of carbon emissions. But it has contributed around 4 % to global warming to date. <https://ourworldindata.org/global-aviation-emissions>
- Khanna S.K., Arora, M.G. and Jain, S.S. 1999. *Airport Engineering*. ISBN 81-85240-68X
- Nanjundiah, M.S. 1996. *Environment Sustainable Development and Infrastructure of the Future. International Symposium on Infrastructure of the Future, November 1996, Bangalore. India*
- Kenche, K., Naik, N. and Patil, S. 2012. Techno-Economic Feasibility Study & Pre-Construction Planning of International Airport At Navi Mumbai, A Post Graduate Studies Dissertation, NICMAR, Pune.
- Raja Simhan, T.E. 2025. Parandur, Hosur Greenfield airport, *Times of India*. 22-09-2025, P5 [https://www.thehindubusinessline.com/economy/logistics/parandur-and-hosur-greenfield-airports-are-growth-runways-for-tamil-nadu/article70071245.ece#:~:text=The%20Parandur%20airport%2C%20which%20will,rapid%20transit%20system%20\(RRTS\).](https://www.thehindubusinessline.com/economy/logistics/parandur-and-hosur-greenfield-airports-are-growth-runways-for-tamil-nadu/article70071245.ece#:~:text=The%20Parandur%20airport%2C%20which%20will,rapid%20transit%20system%20(RRTS).)
- Soham Shah, 2025. Purandar airport -farmers queue up to sign land acquisition consent forms on last day. *Indian Express*, 26 Sep. 2025, P3 https://www.google.com/search?q=Purandar+airport+farmers+queue+up+to+sign+land+acquisition+consent+forms+on+last+day&sca_esv=cd373399a9f9352a&rlz=
- Saleem Beg, A.M. 2025. NH 70A Highway is an Ecological Risk, *The Hindu*, 19 November 2025. Pp 5