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Suitability Analysis and Site Evaluation for the Design of a Type B Football Stadium in Pasuruan Regency

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ABSTRACT

The design of the Type B Football Stadium in Pasuruan Regency is motivated by the inadequacy of the R. Soedarsono Bangil Stadium, which does not meet the standards of Permenpora No. 7 of 2021 and the FIFA Stadium Guidelines. The limitation of the existing land area of ±2.8 hectares in a densely populated residential area restricts the development of parking areas, separate circulation, and safety zones. This study aims to evaluate the unsuitability of the existing site and determine the most suitable location for a new site. The method used is descriptive-analytical with a structured criteria weighting technique that combines field observations, regulatory studies (RTRW/RDTR), interviews, and comparative site analysis. The assessment parameters include environmental conditions, spatial planning legality, accessibility, safety services, and basic infrastructure. The evaluation results designate the Gempol Bypass Road area (±19 Ha) as the selected site with the highest weighted score (2.80 out of a maximum of 3.00). Although this site lies within an agricultural subzone under the Pasuruan Regency RDTR, where stadium development is conditionally permitted subject to compliance with spatial, environmental, and technical requirements, it excels in the aspects of accessibility via a 4-lane arterial road and the potential for Type B stadium safety zoning.

Keywords: *Football Stadium, Site Evaluation, Stadium Relocation, Type B Stadium, Pasuruan Regency.*

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INTRODUCTION

Football is a global phenomenon that not only drives the industrial, social, and economic sectors, but also has a very high level of public participation and enthusiasm, both as athletes and spectators (Parengkuan et al., 2022; WorldAtlas, 2025). The existence of a stadium as an essential facility functions not only as a match arena, but also as a public space where the community's social and economic activities take place (Zainuddin et al., 2023). In the context of modern sports architecture, a stadium is designed as a "living room" for the urban community, placing spectator safety, security, and comfort parameters as the top priority (John et al., 2013).

In Indonesia, the organization of national competitions (Liga 1, Liga 2, and Liga 3) demands the availability of representative and safe stadium infrastructure. Lessons from national football tragedies confirm the critical importance of implementing strict safety standards, as regulated in Regulation of the Minister of Youth and Sports of the Republic of Indonesia Number 7 of 2021 and the FIFA Stadium Guidelines, particularly regarding the arrangement of security zoning, separation of circulation between users, and the reliability of emergency evacuation systems.

Figure 1. R. Soedarsono Stadium, main entrance
Source: Personal documentation

Pasuruan Regency, particularly the Bangil area, holds strong historical and emotional value related to the existence of R. Soedarsono Stadium as the home base of the Persekabpas Pasuruan club and the center of the community's sporting activities. However, the existing condition of this Type B stadium suffers from infrastructural obsolescence and significant non-compliance with national and international regulations. Physical problems such as structural degradation, poor drainage, and inadequate lighting are compounded by the spatial limitations of the existing site, which covers only ±2.8 hectares in a densely populated residential and public-facility area.

The highly limited land boundary condition means that the arrangement of separate circulation, the provision of adequate parking areas, and the establishment of a safety zone (both temporary and final safety zone) can no longer be accommodated through partial revitalization. These spatial constraints confirm that maintaining the stadium at its current location is no longer feasible, so a study of relocating the new stadium development to a more representative alternative location is required. Therefore, this study aims to evaluate the unsuitability of the existing site and formulate site suitability criteria using a structured criteria weighting method to determine the design location of a new Type B Football Stadium in Pasuruan Regency that is safe, inclusive, and compliant with modern stadium architecture standards.

Problem Statement

Based on the background description and the condition of existing land limitations, the design problems are formulated as follows:

1. To what extent is the infrastructure of R. Soedarsono Bangil Stadium non-compliant with the regulations of Permenpora No. 7 of 2021 and the FIFA Stadium Guidelines?
2. What criteria and site-evaluation parameter weights are needed in determining the design location of a Type B Football Stadium in Pasuruan Regency?
3. Which site alternative in Pasuruan Regency is most suitable to be recommended as the design location of a Type B Football Stadium based on multi-criteria analysis?

Research Objectives

Based on the problem statement above, this study aims to:

1. Evaluate the existing condition and the level of infrastructure non-compliance of R. Soedarsono Bangil Stadium based on modern stadium safety standards and design regulations.
2. Formulate site evaluation criteria and variables based on Permenpora No. 7 of 2021 and the FIFA Stadium Guidelines.
3. Analyze and determine the best alternative site in Pasuruan Regency that meets technical requirements, spatial-planning legality, accessibility, and development potential for the design of a Type B Football Stadium.

RESEARCH METHOD

This study uses a descriptive-analytical approach with a comprehensive site evaluation method to determine the design location of the new stadium. The initial object of study is R. Soedarsono Bangil Stadium in Pasuruan Regency, which was evaluated based on Regulation of the Minister of Youth and Sports Number 7 of 2021 and the FIFA Stadium Guidelines. The initial evaluation results show that 95.5% of the existing technical aspects do not yet meet the applicable standards. Given the limitations of the existing land, which cannot be developed to meet the safety and circulation criteria of a Type B stadium, the design focus is directed toward the selection and evaluation of alternative locations in the developing areas of Pasuruan Regency.

Data collection was carried out through two complementary approaches:

1. Primary Data: Obtained through direct field observation of the physical conditions, topography, accessibility, and utilities of candidate alternative sites, as well as structured interviews with managers and related agencies.
2. Secondary Data: Obtained from the Regional Spatial Plan (RTRW) and Detailed Spatial Plan (RDTR) documents of Pasuruan Regency, regulatory studies (Permenpora No. 7/2021 and the FIFA Stadium Guidelines), and literature studies on the design of modern sports facilities.

Data analysis was carried out using a structured criteria weighting method. The assessment parameters are divided into five main indicators according to the weighting table (B×N criteria), namely: (1) Land Use Suitability (30%), (2) Accessibility (25%), (3) Distance from the City Center (20%), (4) Area Development Potential (15%), and (5) City Utility Network (10%). The results of the comparative evaluation of several candidate sites were used to determine the selected location and to formulate a site design synthesis that is responsive to local environmental conditions.

RESULTS AND DISCUSSION

General Overview

Several definitions of land suitability and site evaluation that form the basis of this study include:

1. FAO (1976): Defines land suitability as the fitness of a given land for a specific use. Land suitability assessment is the process of determining the degree of fitness of a parcel of land based on its physical, chemical, and biological characteristics compared against the requirements of the intended land use.
2. Chapin & Kaiser (1979): State that site evaluation is a systematic process of assessing the suitability of a land location for a particular use based on physical, legal, infrastructural, and contextual criteria relevant to the needs of a building or area.
3. Permenpora RI No. 7 of 2021: Stipulates that a Type B stadium is a sports facility with a capacity of 10,000 to 30,000 spectators that must meet site requirements including minimum land area, accessibility, zoning conformity, and the availability of basic infrastructure.

The synthesis of these definitions confirms that land suitability is a scientific process that matches the physical characteristics and regulations of the land with the technical requirements of the building. Site evaluation includes multi-criteria analysis that considers aspects of spatial zoning, accessibility, environmental conditions, utility availability, as well as safety factors and critical services. In the context of designing a Type B Football Stadium in Pasuruan Regency, land suitability evaluation is key to determining a new site that can optimally, safely, and sustainably support the function of the sports facility.

Furthermore, several site planning concepts relevant to this design include:

1. Lynch & Hack (1984): Define site planning as the art of arranging structures on land and shaping the space between them—a discipline connected to architecture, civil engineering, landscape architecture, and urban planning.
2. Simonds (1983): State that site planning is the process of arranging land use, circulation, vegetation, and other physical elements to create an environment that is functional, aesthetic, and in harmony with nature.

The summary of these definitions shows that site planning is a discipline of organizing the placement of structures and the formation of space on a piece of land. An

essential aspect of site planning is the harmony between human-made interventions and the site's natural conditions. This process results in a spatial arrangement that ensures the entire functional program of the stadium is aligned with the physical characteristics of the site before construction is carried out.

External Analysis (Site and Its Environment)

External site analysis serves as the initial foundation for gaining a comprehensive understanding of the physical conditions, environmental character, and spatial context of the planning area as a basis for design decision-making. This study covers the identification of land characteristics, existing potentials and constraints, accessibility patterns, the site's connection to the city's infrastructure network, as well as its response to climatic conditions and surrounding environmental dynamics. A thorough grasp of these aspects is essential to ensure that the design concept can be developed in a targeted, adaptive manner that is in harmony with both environmental sustainability and the fulfillment of the needs of all users.

Site Review / Site Selection Study

In accordance with the provisions of the RDTR and RTRW of Pasuruan Regency, with a utilization orientation covering the organization of football activities, inter-school and community championships, and various socio-cultural activities involving large numbers of participants. The planned maximum capacity of the stadium ranges from 10,000 to 30,000 spectators, in accordance with the classification of a Type B stadium based on Indonesian National Standard T-25-1991.

Because the site is the foundation of all design decisions, the selection and assessment process must be carried out systematically and measurably. An inappropriate site selection can result in increased construction costs, difficulty of access for users, and the potential for conflict with applicable spatial planning regulations. There are several key considerations that must be taken into account in the site selection process, namely as follows:

1. In determining the site that best suits the functional needs of the stadium, a comparative assessment of several alternative locations must be carried out using a weighting table. This method allows an objective comparison between various assessment criteria for each available site alternative, so that the final decision can be scientifically justified and is not based solely on subjective considerations.
2. Before the assessment process begins, all criteria along with their threshold values must first be established. The assessment is based on the quality level of the land condition expressed in numerical units, where each criterion is given a weight reflecting its level of importance to the function of the stadium. All of these requirements will later be taken into consideration in the design process.
3. The selected site alternative is the location with the highest cumulative score after the weighting process. This result then becomes the basis for determining the planning location that will be further developed in the next design stage.

The site alternatives that have gone through the initial selection process are subsequently analyzed using an evaluative method in the form of criteria weighting. This analysis covers several aspects, including: analysis of site size and regulations, analysis of supporting functions, analysis of area boundaries, view analysis, sun orientation analysis, rainfall analysis, wind direction analysis, and noise level analysis. The location-selection study variables consist of: location function suitability, accessibility, sports-area potential, and location utilities. Meanwhile, for the site-selection study, the variables used include: land function suitability, accessibility/site reach, site utilities, land status, supporting facilities, land area, and topography. There is an evaluative (weighting) method used in the site-selection assessment as shown in the table below.

Table 4.1 Location Selection Criteria

No	Parameter	1	2	3
1.	Land Use Suitability	Less Suitable	Fairly Suitable	Suitable
2.	Accessibility	Poor	Fair	Good
3.	Distance from the City Center	Far	Moderate	Close
4.	Area Development Potential	Low	Fairly Potential	Potential
5.	City Utility Network	Inadequate	Fairly Adequate	Adequate

Notes:
Assessment Range: 0–3
Number of Criteria: 5
Calculation: B × N

Table 4.2. Site Selection Criteria

No	Parameter	1	2	3
1.	Site Function Suitability	Less Suitable	Fairly Suitable	Suitable
2.	Accessibility/Site Reach	Poor	Fair	Good
3.	Site Utilities	Inadequate	Fairly Adequate	Adequate
4.	Supporting Facilities	Low Support	Fair Support	Supportive
5.	Land Area	Less Extensive	Fairly Extensive	Extensive

Notes:
Assessment Range: 0–3
Number of Criteria: 5
Calculation: B × N

Site Alternative 1

Figure 4.1 Location Map of Site Alternative 1
Source: Google Maps, 2025

1. **Condition and Environment**

The first alternative site is located in the Jalan Raci area, Kraton Sub-district, Pasuruan Regency, East Java. The land at this location is an open area with a relatively flat surface and is generally safe from natural disaster threats such as flooding or landslides, thus technically supporting the construction process. Nevertheless, part of the surrounding area is still used for agricultural land, indicating that the soil bearing capacity needs further attention given the potential for relatively soft or loose soil due to agricultural activity.

Around the site there are already several public facilities and residential settlements, indicating that the area is already within the community service activity circle. Its proximity to public spaces indicates that the location is fairly well known and used by local residents. Nevertheless, the density of buildings around the site is still relatively low, so the environmental condition remains relatively open.

2. **Spatial Suitability / Legal and Licensing**

Based on the provisions of the Pasuruan Regency Detailed Spatial Plan (RDTR), the site location is in an area designated as a sports subzone in the form of a sports field. The development of this subzone is prioritized to support the sports-facility needs of new housing development areas spread throughout the Kraton Planning Area (BWP). Thus, the design of a football stadium at this location is in accordance with the spatial utilization direction established in the RDTR.

From a legal standpoint, the development of the stadium can be carried out while still fulfilling the applicable licensing requirements, including conformity of the space-utilization activity, building approval, and technical and environmental requirements in accordance with the applicable laws and regulations. The suitability of the site's function as a sports area is one of the factors supporting the feasibility of developing the stadium as a public service facility in Kraton Sub-district.

3. **Accessibility and Public Transportation Facilities**
   - Accessibility: The site can be reached via Jalan Raci, which is about 9 meters wide, with two lanes and two-way traffic. The site is connected to a collector road network linking the Bangil area with the Pasuruan city center and its surrounding areas.
   - Public Transportation: The nearest public transportation facility accessible from this site is Bangil Railway Station, at a distance of approximately 9.2 kilometers.
4. **Critical Services and Safety**

   For emergency handling and evacuation support needs, the nearest health facility that can be referred to is Bangil Pasuruan Regional Hospital (RSUD), which can be reached at a distance of approximately 4.8 kilometers from the site.
5. **Availability of Basic Infrastructure**
   - Electricity Network: The site area is already covered by PLN's electricity distribution network, marked by the presence of electricity poles and distribution installations along Jalan Raci. This availability allows power needs to be met without having to extend a new network from a far distance.
   - Water Source: Clean water needs at this location can be met through the PDAM distribution network that already serves the surrounding area. As an alternative, the presence of agricultural land around the site indicates that groundwater content is still sufficient, so a borehole well system can be used as a backup option.
   - Drainage: The drainage system around the site utilizes an existing agricultural irrigation channel. Rainwater is channeled through open drains at the roadside, although the capacity of these drains needs to be increased if the site is developed into an area with a high building intensity

Table 4.3 Calculation for Alternative Location 1 — Jl. Raci, Kraton Sub-district

No.	Assessment Criteria	Weight (B)	Score (N)	Result (B×N)	Remarks
1.	Land Use Suitability	30%	3	0.90	Complies with the Pasuruan Regency RDTR as a sports subzone
2.	Accessibility	25%	2	0.50	Jl. Raci is 9 m wide, 2 lanes; Bangil Station ±9.2 km
3.	Distance from the City Center	20%	2	0.40	Distance from Bangil city center is about 4–5 km, moderate access
4.	Area Development Potential	15%	3	0.45	New housing development area directed as a sports area, so it has good development prospects.

5.	City Utility Network	10%	2	0.20	PLN, PDAM, and irrigation drainage available in the area
	TOTAL	**100%**	**—**	**2.00**	

Source: Author's Analysis Data, 2026

Site Alternative 2

Figure 4.2 Location Map of Site Alternative 2
Source: Google Maps, 2025

1. **Condition and Environment**

The second alternative site is located in the Gempol–Pasuruan Bypass Road area, Gempol Sub-district, Pasuruan Regency, East Java. This site lies along the main bypass road corridor connecting various strategic areas around Pasuruan Regency, with a fairly extensive and relatively flat land condition. Topographic characteristics without significant contours give this site an advantage in terms of technical design ease. The site location is classified as safe from disaster risks such as flash floods and landslides, although the potentially loose soil texture still needs to be taken into consideration in foundation planning.

The environmental conditions around the site are still dominated by open areas with a not-too-dense settlement distribution, indicating that this area is currently in a development stage. Land that has not been massively built up provides high flexibility in the process of arranging and organizing the stadium area, both in terms of layout and facility zoning.

2. **Spatial Suitability / Legal and Licensing**

Based on the provisions of the Pasuruan Regency Detailed Spatial Plan (RDTR), the site location is in an agricultural subzone. Under the space-utilization provisions of this subzone, the construction of a stadium facility is a conditionally permitted activity. This means that stadium development can still be carried out by fulfilling the established requirements, such as compliance with spatial planning provisions, environmental impact control, and other technical requirements in accordance with applicable regulations.

From a legal standpoint, developing the stadium at this location requires fulfilling all licensing requirements, including conformity of the space-utilization activity, building approval, environmental approval, and other technical provisions in accordance with the applicable laws and regulations. Although located in an agricultural subzone, the conditionally permitted utilization status provides an opportunity for stadium development as long as all administrative, technical, and environmental requirements can be met.

3. **Accessibility and Public Transportation Facilities**
   - Accessibility: The site can be accessed via the Gempol–Pasuruan Bypass Road, which is about 14 meters wide with four traffic lanes in two directions. The width and capacity of this road support the smooth flow of large volumes of vehicles, including during matches. The site is also close to the Gempol Toll Gate entrance, which connects this area with the national toll road network.
   - Public Transportation: The public transportation facility accessible from this site includes Bangil Railway Station, at a distance of approximately 9.5 kilometers.
4. **Critical Services and Safety**

   Emergency service and medical evacuation needs can be supported by Gempol Community Health Center (Puskesmas), which is about 5.2 kilometers from the site. For cases requiring advanced referral, Bangil Pasuruan Regional Hospital (RSUD) can be reached at a distance of about 20 kilometers.

   Availability of Basic Infrastructure
   - Electricity Network: The site is located in an area already connected to the PLN electricity network, in line with the development of the surrounding residential and commercial facilities. The electrical infrastructure available along the bypass road provides ease of connection without the need to extend a new network from a distant location.
   - Water Source: Clean water needs can be relied upon from the PDAM distribution network that already reaches the surrounding area. In addition, the potential to utilize groundwater through borehole wells is also available as an alternative source, given that the soil conditions in this area are still fairly good.
   - Drainage: The drainage system at the site location has already been established, with channels reinforced by revetment construction at several points. The presence of this structured channel helps direct rainwater flow and surface runoff in a more controlled manner, while also minimizing the risk of erosion and flooding around the site.

Table 4.4 Calculation for Alternative Location 2, Jl. Bypass Gempol, Gempol Sub-district

No.	Assessment Criteria	Weight (B)	Score (N)	Result (B×N)	Remarks
1.	Land Use Suitability	30%	2	0.60	Located in an agricultural subzone; stadium construction is conditionally permitted under the RDTR.
2.	Accessibility	25%	3	0.75	Bypass road with 4 lanes, 14 m wide; close to the Gempol toll gate
3.	Distance from the City Center	20%	2	0.40	Located in Gempol Sub-district, ±15 km from Bangil city center
4.	Area Development Potential	15%	3	0.45	Area-development corridor, extensive land, potential to become a regional sports activity center.
5.	City Utility Network	10%	3	0.30	PLN, PDAM, and structured revetment drainage available
	TOTAL ✓ SELECTED	**100%**	**—**	**2.80**	**Highest score → Selected Location**

Source: Author's Analysis Data, 2026

Assessment and Determination of the Selected Site

The evaluation of the two alternative locations was carried out using a weighting method based on five criteria, namely land use suitability, accessibility, distance from the city center, area development potential, and city utility network. Each criterion is given a weight according to its level of importance, then multiplied by the score of each alternative to obtain a final score as the basis for determining the most suitable location for the stadium design.

Based on the assessment results, Site Alternative 1, located on Jalan Raci, Kraton Sub-district, obtained a total score of 2.00. This score is supported by land use suitability that already complies with the RDTR provisions as a sports subzone in the form of a sports field. However, this location still has limitations in terms of accessibility, road capacity, area utilities, and development potential that are relatively lower than the other alternative.

Meanwhile, Site Alternative 2, located on the Gempol–Pasuruan Bypass Road, Gempol Sub-district, obtained a total score of 2.80, making it the alternative with the highest score. Although it is spatially located in an agricultural subzone with a conditionally permitted stadium construction status, this location has a significant advantage in terms of accessibility because it is situated along the Gempol–Pasuruan Bypass Road corridor, which has four lanes and is close to the Gempol Toll Gate. In addition, this area is supported by a more adequate utility network, extensive and relatively flat land, and has high area

development potential, making it better able to accommodate the needs of a national-standard football stadium along with the development of its supporting facilities. Based on the weighting results, Site Alternative 2 was selected as the design location for the Football Stadium in Pasuruan Regency. This location selection is based on the highest evaluation score and the consideration that the advantages in terms of accessibility, area development, and infrastructure availability can provide greater benefits for the stadium's long-term operation. The legal aspect, in the form of the conditionally permitted space-utilization status, can be fulfilled through the licensing process and the fulfillment of technical requirements in accordance with applicable provisions.

Table 4.5 Comparison of Total Scores of All Alternative Locations (B×N Recapitulation)

No.	Assessment Criteria	Weight	Alt. 1 (Jl. Raci)	Alt. 2 (Jl. Bypass Gempol)	Calculation Method (B×N)
1.	Land Use Suitability	30%	0.90 (30%×3)	0.60 (30%×2)	B × N
2.	Accessibility	25%	0.50 (25%×2)	0.75 (25%×3)	B × N
3.	Distance from the City Center	20%	0.40 (20%×2)	0.40 (20%×2)	B × N
4.	Area Development Potential	15%	0.45 (15%×3)	0.45 (15%×3)	B × N
5.	City Utility Network	10%	0.20 (10%×2)	0.30 (10%×2)	B × N

Source: Author's Analysis Data, 2026

Site Analysis

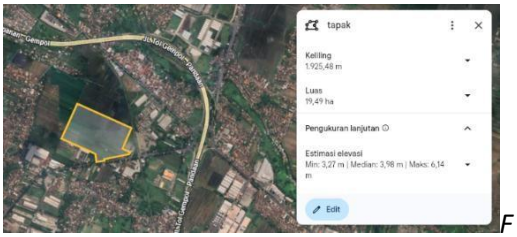

Figure 6. Boundaries, Conditions, and Regulations of the Selected Site
Source: Author's Analysis Data and Google Maps, 2025

Boundaries of the design site for the Football Stadium in Pasuruan Regency:

- East Side: Gempol Pasuruan Bypass Road (4-Lane Arterial Road)
- West Side: Vacant Land and Natural Vegetation
- North Side: Open Vacant Land
- South Side: Settlements and Semi-Permanent Buildings

The existing condition is a review of the conditions found at the planning location of the Football Stadium in Pasuruan Regency. The following are the site regulations referring to the Pasuruan Regency RTRW and the provisions of Regulation of the Minister of Youth and Sports Number 7 of 2021:

The site has the following related regulations:

- Zone: agricultural subzone
- Maximum permitted Building Coverage Ratio (KDB): 60%
- Maximum permitted Floor Area Ratio (KLB): 2.4
- Minimum permitted Green Open Space Coefficient (KDH): 10%
- Maximum permitted building height: 4 floors
- Minimum permitted building setback (GSB): 10 meters

Table 4.6 Land Regulations

Land Regulations					
Intensity					
Item	Min/Max	Land Area	Coefficient	Result	Unit
KDB (Building Coverage Ratio)	Max	190,000	60%	144,000	m2
KLB (Floor Area Ratio)	Max	190,000	2	380,000	m2
KDH (Green Open Space)	Min	190,000	10%	19,000	m2
Building Layout					
Intensity					
Item	Min/Max	Road Width	Coefficient	Result	Unit
GSB (Building Setback)	Max	190,000	50%	95,000	m
Building height	Max	4		4	m

Source: Author's Analysis, 2026

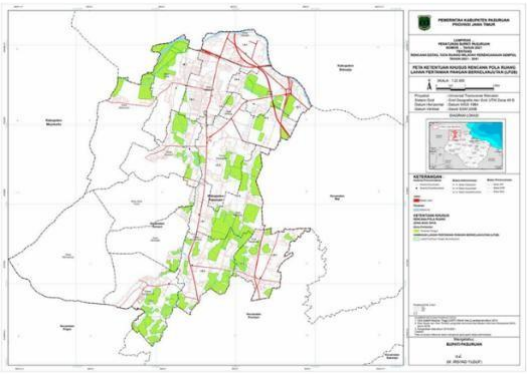

Figure 4.4 Spatial Pattern

Source: Gempol Planning Area RDTR 2021–2041

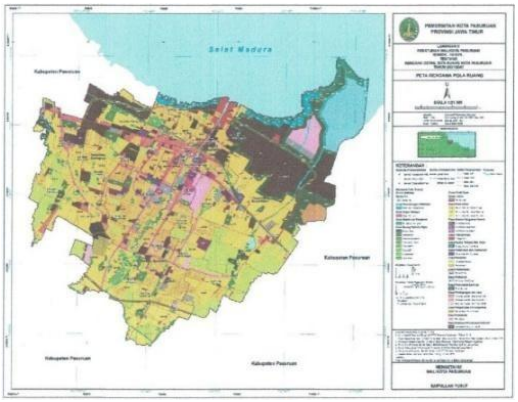

Figure 4.5 Spatial Pattern
Source: Gempol Planning Area RDTR 2021–2041

1. **Accessibility Analysis**

Access to this location is very easy because the site is crossed by the Gempol Pasuruan Bypass Road, an arterial road with a four-lane, two-direction capacity oriented east–west. This road serves as the main route connecting the site area with various regions around Pasuruan Regency and areas connected via the Gempol toll road network. Given that the site is located along a high-capacity bypass road, the entry–exit circulation system for the area is planned with two or more lanes to ensure smooth vehicle flow, especially during matches with large numbers of spectators.

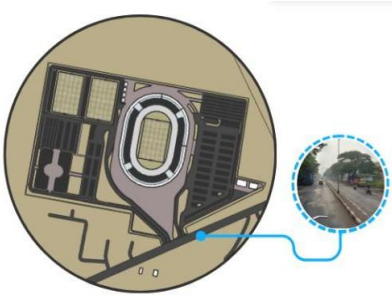

Figure 7. Site Accessibility Analysis
Source: Author's Analysis Data and Google Maps, 2025

The distance from the Gempol toll gate, which connects this area with the national toll road network, is very close to the site. Bangil Railway Station can be reached within a radius of about 9.5 km. Gempol Community Health Center (Puskesmas) is ±5.2 km away, while Bangil Pasuruan Regional Hospital (RSUD) is located within a radius of about 20 km from the site. The site area is also close to several roadside food stalls and small kiosks within a radius of 0.2 km, as well as gas stations and minimarkets within a radius of 0.5–1 km.

Table 9. Site Accessibility Analysis

Analysis	Synthesis
The Gempol–Pasuruan Bypass Road, as a 4-lane, 2-direction arterial road, supports the smooth flow of large volumes of vehicles, including during matches.	Planning a minimum of 2 entry–exit access lanes for the stadium area. Placing clear signage and road markings to direct spectators to the parking area.
Proximity to the Gempol toll access provides excellent regional accessibility for visitors from outside Pasuruan Regency.	Arranging an efficient parking system with adequate capacity, including separate parking for buses, VIP vehicles, and general parking according to their respective circulation lanes.
Bangil Railway Station, at a distance of ±9.5 km, serves as a public transportation option for spectators from outside the city.	Coordination with public transportation providers is needed to provide shuttle buses to the stadium on match days to support multimodal accessibility.

Source: Author's Analysis Data, 2026

2. Sun Orientation Analysis

This study on sun orientation aims to determine the most optimal building orientation. This is done so that building users feel comfortable and safe, while also ensuring adequate indoor lighting. Daylight duration in Pasuruan Regency is relatively consistent throughout the year, totaling about 12 hours per day. The earliest sunrise occurs at around 05:05 in mid-November, while the latest sunset occurs at around 17:55 at the end of January.

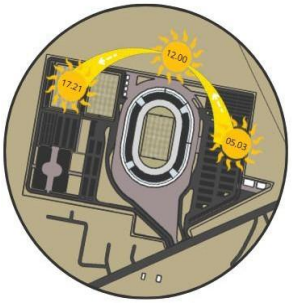

Figure 9. Site Sun Orientation Analysis
Source: Author's Analysis Data, 2026

The following are the results of the sun orientation analysis on the site:

Morning: The sun rises from the east, illuminating the eastern side of the site that directly borders the Bypass Road, with fairly high light intensity.

Midday: Between 11:30–13:00, the light intensity is quite high, causing the air to become hot, especially in open areas of the stadium precinct.

Afternoon: Between 15:30–17:30, the light intensity decreases but has the potential to glare into the stands facing west.

Table 11. Sun Orientation Analysis

Analysis	Synthesis
The direction of sun exposure moves from east to west; stands facing west have the potential to receive disturbing afternoon sun glare.	The field orientation is designed on a north–south axis in accordance with FIFA standards, to minimize the direct glare effect from both morning and afternoon sun.
Sunlight intensity is consistently around 12 hours per day, requiring an adaptive design to maintain the thermal comfort of users.	Application of anti-glare glass in the VIP lounge area and the media corridor facing east–west. Installation of shading elements on stands directly exposed to afternoon sunlight.
Pasuruan Regency has its peak temperature in October, ranging from 24°C to 35°C.	Providing a field lighting system with a minimum intensity of 1,400 lux for regular matches and 2,500 lux for television broadcasts, supporting the hosting of night matches.

Source: Author's Analysis Data, 2026

3. Rainfall Analysis

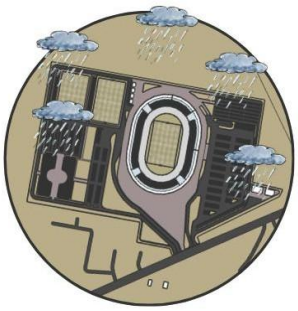

Figure 10. Rainfall Analysis of Pasuruan Regency
Source: Author's Analysis Data and id.weatherspark.com, 2026

The distribution of rainfall in Pasuruan Regency shows fairly significant seasonal variation throughout the year. January and February are the periods with the highest rainfall, with an accumulation averaging 250–300 millimeters per month. Conversely, August is the driest period, with very minimal rainfall ranging from 10–20 millimeters. This extreme difference between the rainy season and the dry season needs to receive serious attention in the design of the drainage system and building protection.

Table 12. Rainfall Analysis

Analysis	Synthesis
There is a very striking difference in rainfall between the rainy season (250–300 mm/month, December–March) and the dry season (10–20 mm/month, August).	Design of a precise field and area drainage system in accordance with national and international football stadium infrastructure standards. Construction of a biopore system and control basins as rainwater catchments.
The long dry season between June and September requires a water conservation strategy for field maintenance needs.	Utilization of rainwater harvesting technology to collect rainwater during the rainy season, which is then used for field irrigation and operational needs during the dry season.
Heavy rainfall intensity during the rainy season has the potential to disrupt the comfort of spectators in open stands.	Installation of a roof covering at least one-third of the spectator stands, especially the VIP stand and the main stand, as protection from heavy rain during matches.

Source: Author's Analysis Data, 2026

4. Wind Direction Analysis

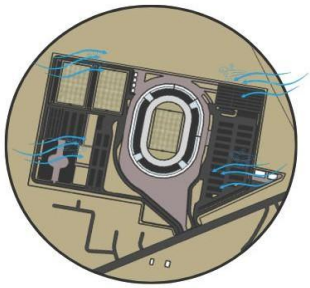

Figure 11. Wind Direction Analysis of Pasuruan Regency
Source: Author's Analysis Data and id.weatherspark.com, 2025

Wind patterns in the Pasuruan Regency area show clear seasonal variation throughout the year. The period with stronger winds lasts for approximately 3.5 months, from mid-June to the end of September, with an average speed exceeding 10 kilometers per hour.

Peak wind speed occurs in August–September, with an average speed reaching up to 12 km/h. The average wind direction shows a pattern that changes with the season; winds from the east dominate during the dry season, while winds from the west occur more frequently during the rainy season.

Table 13. Wind Direction Analysis

Analysis	Synthesis
Seasonal wind pattern with a windy period ±3.5 months (June–September) from the east, and a calmer period during the rainy season with winds from the west.	A bowl-shaped stand design that encircles the field with a planned slope functions to reduce the effect of strong winds entering the arena and the lower stands.
Peak wind speed in August–September reaches 12 km/h, classified as light to moderate, but still affects the comfort of spectators in open stands.	Planning openings around the building equipped with a secondary skin as a protective element, to channel natural air ventilation into the match arena and the stand areas.
Seasonal variation in wind direction requires the design of a ventilation system that is responsive to the dominant wind conditions from two different directions.	Planting tall, dense vegetation on the eastern side of the site during the dry season, functioning as a windbreak as well as a cooler for the surrounding environment.

Source: Author's Analysis Data, 2026

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the evaluation and design analysis results for the Type B Football Stadium in Pasuruan Regency, it can be concluded that the existing R. Soedarsono Bangil Stadium has an infrastructure non-compliance level of 95.5% against the safety standards of Permenpora No. 7 of 2021 and the FIFA Stadium Guidelines. The limited existing land area of only about 2.8 hectares amid dense settlements is the main obstacle that makes partial revitalization impossible to meet safety zoning, parking area, and circulation separation requirements. To address this issue, the evaluation for selecting a new site was carried out using a structured multi-criteria weighting method with five main indicators, namely land use suitability, accessibility, distance from the city center, area development potential, and city utility network. The analysis results show that Site Alternative 2, located on the Gempol–Pasuruan Bypass Road, Gempol Sub-district, was selected as the best design location with the highest score of 2.80, outperforming Alternative 1 on Jalan Raci. The Gempol location is significantly superior because it is supported by a four-lane arterial road access, proximity to a toll gate, the availability of an extensive flat land area of up to 19 hectares, and flexibility in developing an integrated sports facility, where its construction is conditionally permitted within the RDTR agricultural subzone. This selected site responds to the design requirements through the application of a North–South field orientation in accordance with FIFA standards, the provision of at least two main access gates to separate the circulation of spectators, VIP, team buses, and emergency vehicles, the use of a bowl shape and secondary skin to dampen strong winds, and the utilization of a rainwater harvesting system and stand roofing to cope with local climatic conditions.

Recommendations

As a follow-up to the results of this design, local governments and related stakeholders are advised to promptly process the conditional land-use conversion permit from an agricultural subzone to a public sports facility area, while also coordinating the provision of connecting transportation such as shuttle buses from the nearest transportation hub to the stadium location. For design teams or architects, the application of the Outer/Inner Perimeter concept and safety-zone boundaries must be strictly integrated into the detailed design to ensure ease of emergency evacuation, as well as to ensure that sustainable utility systems such as rainwater harvesting are genuinely realized in the technical planning.

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