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Site Suitability Assessment for a Health and Recreation Center's Public Space, Rangsit, Pathum Thani

Natthawadee Temeeyakul[1]* and Pawin Sirisali[2]
[1, 2] Faculty of Architecture and Planning, Thammasat University, Pathum Thani, Thailand
* Corresponding author e-mail: Nattemee@ap.tu.ac.th
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Abstract

The objectives of this study are to explore the site suitability for the Rangsit City Health and Recreation Center, to analyze the potentials and the limitations of the locations in identifying an appropriate site, and then finalizing a conceptual design for the Rangsit City Health and Recreation Center's Public Space in Pathum Thani province. The study methodology included a review of the literature to establish criteria for analyzing the location and developing the proposal of the concept design and a cadastral survey of two potential sites, in accordance with the policy of Rangsit City Municipality. The first site area was located in Soi Rangsit Nakhon Nayok 45, and the second was located in Soi Rangsit Nakhon Nayok 39. In analyzing the suitability of the two sites, the study considered location and accessibility, as well as environmental factors conducive to convenience and safety, wellbeing, recreation, and awareness. In comparing the two areas, the analysis showed a strong potential for Soi Rangsit Nakhon Nayok 39. to be a health and recreation center, as it met criteria regarding context of location, access, and linkage. The site can be accessed from several ways as well as easily connected to other public areas in the neighborhood. The surrounding area is open, well drained, and the rectangular area makes it easy to design and maintain safety. In terms of concept design, three main concepts were emphasized: Connect, Cool, and Clear. Connect focused on creating spaces with easy connection for either indoor or outdoor activities. Cool required the design to fit with local climate as a means of creating a comfortable state of mind. Lastly, Clear highlighted open spaces and uses shapes and lines which are easy to understand based on a concept of universal design, to facilitate access for people of all groups and ages.

Keywords

Site Analysis; Site Suitability; Site Selection; Universal design; Public space

1. Introduction and Background

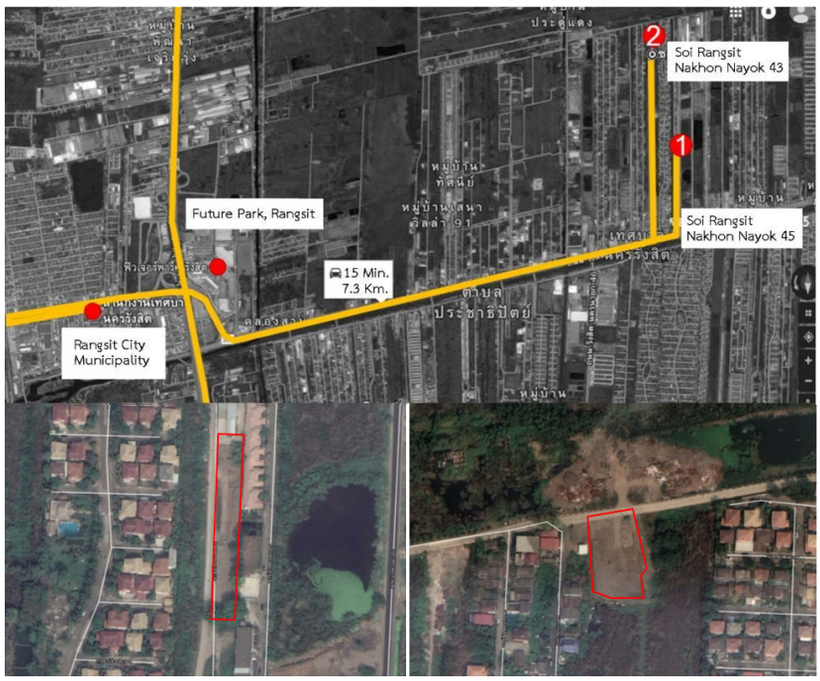
The population structure of Thailand has shifted to an aging society whereby the proportions in the younger age categories are rapidly declining, including those who traditionally are considered labor force age. On the other hand, the middle- and late-aged elderly population is increasing. For example, the elderly population is likely to rise from 10.3 million (or 16.2 percent of the total population in 2015 to 20 percent of the total population in 2021. At a level of 20 percent of elderly, the population of Thailand will be considered a "Completely

Aged Society." (Department of Older Persons, 2020) The increase of the middle- and late-aged elderly populations has resulted in a rising expenditure on healthcare. In addition to healthcare cost, the increasing elderly population is associated with greater chronic Non-Communicable Diseases (NCDs) incidence. For example, NCD incidence was 314,340 people in 2009, increasing to 349,090 people in 2013, or an average increase of 8,687.5 people per year (Department of disease control, 2019) and is likely to rise in the future. For this reason, encouragement in terms of physical activity, exercise, or other recreation is important in order to create and modify behaviors that can improve elderly health condition and reduce chronic disease. The Rangsit City Municipality is granted an authority under the Municipality Act of 1953 (mended to issue no. 13 in 2009. Section 56 (1), in conjunction with section 53 (1), section 50 (7) To promote the development of women, children, youth, elderly people, and disabled people. Section 56 (3). Other matters which are necessary to public health and the determining plans and process of decentralization to local government organization. Act 1999, Section 16 (10). Social work and development of quality of life for children, elderly people, women and unprivileged people, (19) the public health, family health and medical care. The statistics show the total population of Rangsit City Municipality is 82,153 and of these 11,351 are elderly (13.81% of the total population). Additionally, 154 elderly people are reported bedridden. Some of this latter group live alone without support from family members because the family members must live elsewhere for employment. Moreover, some families must spend money to hire a babysitter to take care of their children so that they can remain employed. The Rangsit City Municipality, therefore, needs to be ready in all dimensions of physical and mental healthcare for people of all ages in the area. Thus, a project to study and analyze the feasibility of establishing a Health and Recreation Center at Rangsit City was undertaken to support physical and mental health promotion, disease prevention, cure, and specifically promote the physical, mental emotional, and social development for young children, as well as providing holistic services and supports to the elderly population. , There is a specific focus on the physical, psychological, social, economic, and professional support for the elderly, including employment support. It is intended that these services can help the elderly to achieve a greater quality of life and live happily in society. The objectives of this study are to analyse the potentials and limitations of possible locations for a Health and Recreation Center at Rangsit City focusing on a universal design concept that would facilitate access for all people

2. Scope of the study

2.1 Scope of an area analysis

Physical analysis was undertaken for two alternative locations assigned by Rangsit Municipality: Area 1 is Soi Rangsit Nakhon Nayok 45 and Area 2 is Soi Rangsit Nakhon Nayok 39 (Figure 1). The scope of analysis included consideration of: 1. Designing area and adjacent context. 2. Context at the relevant community level in order to summarize the appropriate areas as well as analyze them for design purposes.



Area 1 is Soi Rangsit Nakhon Nayok 45 Area 2 is Soi Rangsit Nakhon Nayok 39.

Figure 1 Study area showing location of the two potential Health and Recreation Center sites.

3. Study Methodology

The methodology includes for this study included three steps: literature review, data collection, and data analysis (Figure 2). As a result, the best location for a health and recreation center will be selected, and a summary of the conceptual design will be created to study an appropriate site for the project, taking physical, social, and environmental issues into account.

3.1 Literature Review

To find out what are the characteristics of a good public space location, this study using an Integrative reviews from 13 reference document sources, all data were combine and analyzed into 5 groups as follows; the concept of public space design, activities in public space, the concept of site analysis, the concept of design for the PWDs and the older persons according to the universal design guidelines and relevant laws and regulations, where all of this information is synthesized into criteria for site suitability assessment for a health and recreation center's public space between the two areas of Rangsit Municipality.

3.2 Data Collection

3.2.1 Base maps were produced on both a macro scale (the surrounding area of the city) and micro scale (details of the designing area and adjacent contexts). Both map scales were used to overlay and analyze various geospatial and design attributes.

3.2.2 The process of cadastral survey and suitability analysis of two alternative scheme locations at Rangsit City Municipality was undertaken by observing and measuring the site characteristics, collecting extensive photodocumentation, and obtaining information from officials or staff at the Rangsit City Municipality, As noted in the previous section, the geospatial data were entered into the base maps and section drawings also were produced.

3.3 Data Analysis

Alternative sites were identified and evaluated for two locations. Each site inventory was broken down into mapping layers and different types of images and graphics. To analyze the two alternative areas, the data with overlay mapping layers break down the potential analysis issues and constraints as follows; 1. Location, accessibility, and connectivity, 2. Environment and context management, 3. Criteria for living space and quality of space, 4. Criteria for public utilities, public facilities, services and maintenance, 5. Aesthetics criteria 6. Legal criteria. An overview of the possibilities and constraints of the alternative scheme locations was produced by evaluating their suitability and the most suitable site subsequently was selected based on this analysis.

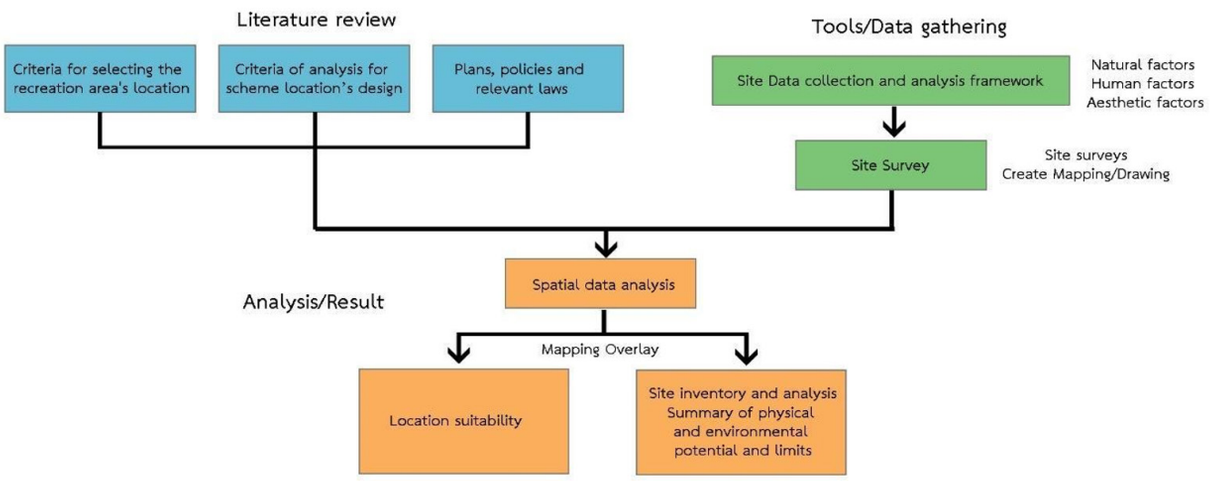


Figure 2 The conceptual framework diagram.

4. Literature review

4.1 The Concept of Public Space Design

Both potential project sites are in the neighborhood of the community and therefore have an important role in public spaces and buildings to support community recreation activities. Thus, the factors of community accessibility, shape, size, environmental suitability for recreational activities and safety must be considered in evaluating the the project location.

Klongvessa (2005) discussed the factors that would cause most users to travel to a project area, which consisted of travel and travel capacity of users. The conditions of travel time and ability to travel must be considered for the target group of users. Furthermore, accessibility is the convenience of the route to the project area and the obstacles blocking the route. Therefore, public access and connectivity should reflect a non-crowded road, so that older persons can arrive on foot, or driving for a short time. The site should support parking and be convenient to public transportation. There are basic facilities that must be considered such as sidewalks, pedestrian crossings, traffic lights with buttons for crossing the way, and range lights for long walkers for easy access and visual perception between the area and its surroundings. (Marcus and Francis,1998) Public space can represent a variety of shapes and sizes, which influences the user's feeling of comfort and the decision to choose the site. The size of the public area must be sufficiently suitable for the number of users and activities. Klongvessa (2005) stated that long and narrow site proportions create an uneasy and unsafe feeling. Extremely large open spaces, on the other hand, will be unsuitable for general activities. Newman (1927), as referenced by Klongvessa (2005), suggested that if the area is squarer, it is unsafe for users because

the inner area is a secluded area that people cannot see and if it is rectangular, it will be easier to access and create a sense of security.

The environment of public recreation areas should be a natural environment with beautiful scenery, and no pollution to interfere with recreational activities. Gallup (1999) noted that the environmental condition of the area is important to the user experience, especially as the nature of the area and the sense of place can positively impact people's mental wellbeing. Likewise, Warunakul (2020) said that the atmosphere and natural scenery, light and sound have an effect on physical and mental recovery. It can help with treatment, produce a relaxing atmosphere, and reduce stress.

In terms of safety, recreational public spaces must not be isolated. There should be enough light to ensure safety. Klongvessa (2005) concluded that access should be limited in order to control security. There also is a need to have a long term maintenance plan and ensure the site does not become a gathering place for a particular group that will cause harm to the user.

4.2 Activities in Public Space

Gehl (1987) stated that activities in public space can be divided into 3 types: activities that are necessary to carry out daily activities (Necessary Activities), which are activities that meet the basic needs of life; alternative activities or recreational activities (Optional or Recreational Activities), which arise from time and atmosphere of that place; and outcome activities or social activities (Resultant or Social Activities), which are activities that other people join in the same area. Resultant or Social Activities take place after the first two activities. This is consistent with Marcus and Francis (1998) who stated that "The frequently for public use are a desire to be in natural setting and need for human contact.", especially for the older persons who focus on doing light activities by gathering groups, talking, or sitting quietly watching people pass by. Public space becomes one's outdoor living room, these facilities become essential.

4.3 The Concept of Site Analysis

The nature of the area has a great effect on the site layout and it also affects the user experience. Thus, it is necessary to understand the nature of the area from the site analysis to select the most suitable area as the project site for effective use, aesthetics, and safety. Boonkham (2009) stated that it is a process in comprehending the condition of the area, and the surrounding environment that impacts the area, and these characteristics will influence the choice of the project area. Therefore, three factors--natural factors, cultural factors, and aesthetic factors—are included in the process used to analyze the location or site. The analysis of natural factors is concerned with geography, hydrology, climate, native flora and fauna. The analysis of societal, cultural, engineered and structural factors, will consider land use, accessibility networks, original construction, public utilities, public facilities, and culture, amongst others. The analysis of aesthetic factors includes an examination of the quality of sound, light, perception of space, and atmosphere as well as the quality of sight and smell. These three factors must be considered when planning the area for recreational activities. It may be the potential that promotes recreational activities to make them special, interesting, or it may be a limitation on use. Safety issues that may occur to users, especially children, older person, and people with disabilities (PWDs), also must be considered.

4.4 The Concept of Design for the PWDs and the Older Persons According to the Universal Design guidelines

Sawangjaroen (2022) has given the meaning of design for all, or Universal Design, as the design of product and environment without special design or modification. It is a design that everyone can use widely as much as possible without age restrictions and physical condition, consistent with diverse contexts and cultures, emphasizing the participation of everyone.

Jarutat (2015) mentioned that Universal Design consists of 7 main principles: 1) Equitable use; it can be used by anyone. All statuses in society are treated equally, and without discrimination and practice. 2) Flexibility in use; it is a design that is broadly applicable and can be adjustable. 3) Simple and intuitive use; it should be universal, understandable in all countries and languages. 4) Perceptible Information; create information that is easy to understand for people of all ages and backgrounds. 5) Tolerance for error; offer a system to protect the user from harm. 6) Low physical effort; it can be used efficiently and comfortably without fatigue; and 7) Size and space for approach and use; taking into account the proportion of users. Jarutat (2015) also mentioned the five basic facilities for PWDs are parking, ramps, signage, toilets, and information services. There should be a parking lot near the entrance to the building. There must be an empty area beside the parking of 1.00-1.40 meters, which is on the same level as the parking area. There should be a ramp with a slope of not more than 1:12 and a length not exceeding 6.0 m. The surface material should be safe for users. Signs for guidance and location signs must be installed in conspicuous locations. The Association of Siamese Architects under Royal Patronage (2008) recommended that signs should be installed at the entrance, exit, boarding and unloading areas of passenger vehicles. In terms of toilet positions for PWDs, the toilets should be additional to the restrooms for the public and have an easily accessible location. A door must be located near the entrance. The empty space inside the inner room should have a diameter of more than 1.50 meters and be equipped with facilities for PWDs. Counters that are easily noticed by PWDs and can be easily accessed without any obstacles must be included in the design.

These guidelines are for the benefit of the PWDs and older persons. The nature of the project site therefore needs to facilitate design for all people. The physical conditions within the area, such as the size and shape of the area, as well as the height of the area (e.g. walkways) will affect the walking of the PWDs and older persons, etc.

4.5 Relevant Laws and Regulations

The relevant town planning laws related to the selection of the area for the recreation center of Rangsit Municipality, include 1) Town Planning Act, 1975 as amended by (No.2) 1982 (No.3) 1992 and (No.4) 2015; and 2) Ministerial Regulations enforce the combined city plan of Tha Khong - Klong Luang - Rangsit, Pathum Thani Province, 2009. The building control laws include 1) Building Control Act 1979 as amended by (No.2) 1992, (No.3) 2000 (No.4) 2007 and (No.5) 2015, 2) Ministerial Regulation No. 55 (2000) as amended by Ministerial Regulation No. 58 (2003), Ministerial Regulation No. 61 (2007) and Ministerial Regulation No. 66 (2016)) –Characteristics of the building, parts of the building, outside space building lines and distances of buildings; 3) Ministerial Regulations, No. 41 (1994) - Parking Lot, Parking Building; and 4) Ministerial Regulations specifying facilities in buildings for the disabled or the disabled and the elderly, 2021.

4.6 Potential Consideration Criteria and Limitations to Determine the Project Site's Suitability

From reviewing relevant concepts, theory, and literature, the criteria employed for site selection and site analysis for design in this study are as follows;

4.6.1 Location, accessibility and linkage criteria

The location should be easily accessible from the city or community and should not take long to reach. Additionally, it is reachable on foot, by bicycles, motorcycles, and public transportation (Klongvessa, 2005). The routes that pass through the area connect to other major routes and are in good condition. Low-density residential areas are where the project should be located. Based on Marcus and Francis (1997), the majority of the land should be used for residential purposes, government institutions, public utilities, and public facilities.

4.6.2 Environment and context management criteria

The location should receive adequate sunlight and wind, which creates a pleasant atmosphere and well-being for the elderly (Klongvessa, 2005), and it should not be in an area prone to natural disasters such as flooding. Additionally, the area should be accessible to the elderly and those with disabilities. If there is a slope, the levels should be easily adjustable. The soil conditions at the site should be suitable for building construction and have good drainage. The location should have physical characteristics and elements that can provide comfort, and have a user-friendly image. Furthermore, there must be a secure environment in order to create a good experience and joy in doing a variety of recreational activities (Klongvessa, 2005). There should be no sights, sounds, or smells from nearby land use activities that could make people feel uneasy or uncomfortable.

4.6.3 Usable space and occupied space quality criteria

The shape of the area must be appropriate and encourage a design that connects indoor and outdoor activities and the size of the area must be sufficient for recreational and service activities (Klongvessa, 2005). These dimensions and spatial relationships should be in accordance with the principles of Universal Design (Jarutach, 2015). In addition, if there are obstacles or structures in the original area, they must be able to be moved and demolished easily (Boonkham, 2014). Moreover, the project location must have some sort of covering or shade.

4.6.4 Project public utilities, facilities, services, and maintenance criteria

The area should be accessible to basic services like roads, pedestrian walkways, water supply systems, and electricity systems, and these services should be in good working order. Other community facilities, such as fire stations, hospitals, parks, and stadiums, are nearby and easily accessible (Boonkham, 2014). The project area must include regular maintenance services, such as a waste collection system, tree care trimming, and community safety management. An emergency surveillance system also must be installed (Klongvessa, 2005).

4.6.5 Aesthetic criteria

The location is obvious from the surrounding context, both in the distance and close, and has a beautiful view of the area associated with a good surrounding context, as well as promote recreation (Waroonkun, 2020). Furthermore, the surrounding environment has a tranquil atmosphere that is not crowded and is safe to use (Klongvessa, 2005).

4.6.6 Legal criteria

The project location cannot violate the Town Planning Act or the Ministerial Regulations enforcing the combined city plan of Tha Khong - Klong Luang - Rangsit, Pathum Thani Province, 2009, which has an impact on the design and configuration of usage activities. According to the Ministerial Regulations specifying facilities in the construction for the disabled or handicapped and the elderly 2005, must accommodate signs indicating

facilities, ramps and elevators, stairs, car parks, building entrances and corridors, and the connection between the building, the door, the toilet, and the exposed surface.

5. Results of the Study

The base maps on macro and micro scale have been classified by type of site analysis, including natural factors, engineered and structural factors and aesthetic factors. The data were then processed with overlay mapping to summarize the potentials and constraints of the area (Figures 3-17).

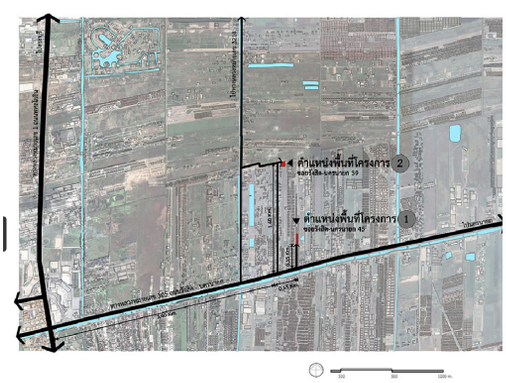


Figure 3 Site Location of both areas on macro scale.

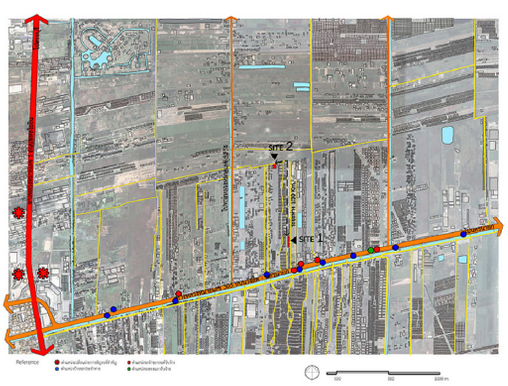


Figure 4 Accessibilites of both areas on macro scale.

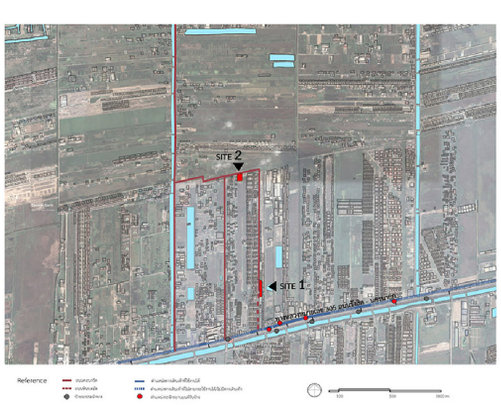


Figure 5 Footpath link abilities of both areas on macro scale.

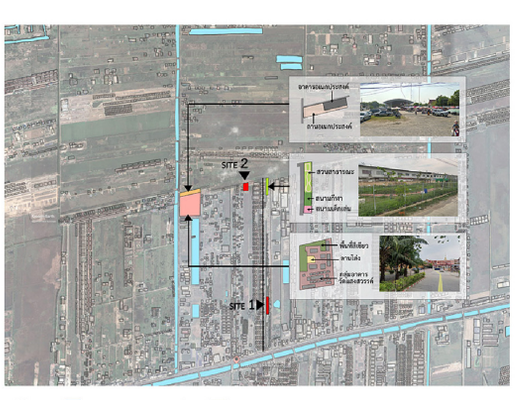


Figure 6 Public space link abilities of both areas on macro scale.

Figure 7 Site surrounding of both areas on macro scale.

Figure 8 Floodplain area of the both areas on macro scale

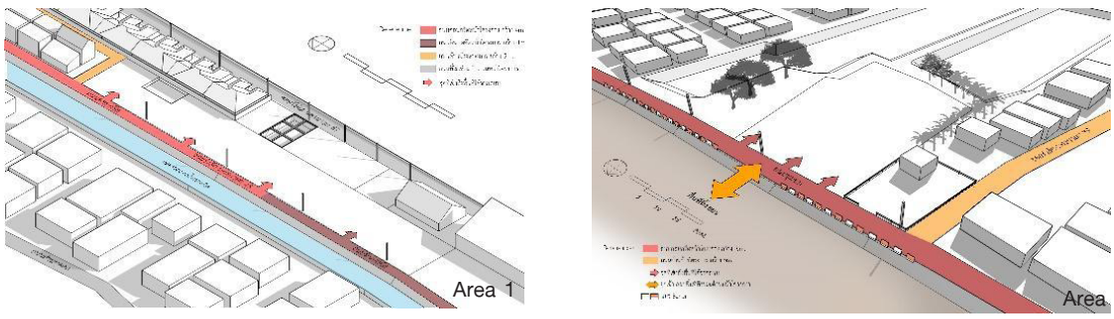


Figure 9 Diagram of circulation of both areas on micro scale.

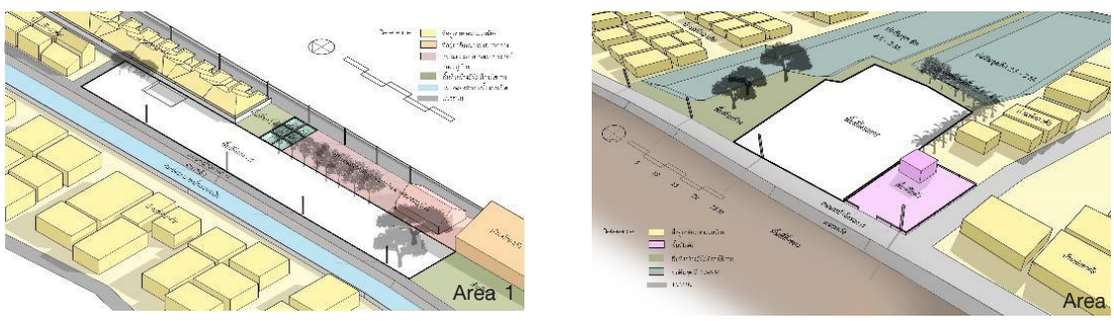


Figure 10 Diagram of surrounding conditions of both areas on micro scale.

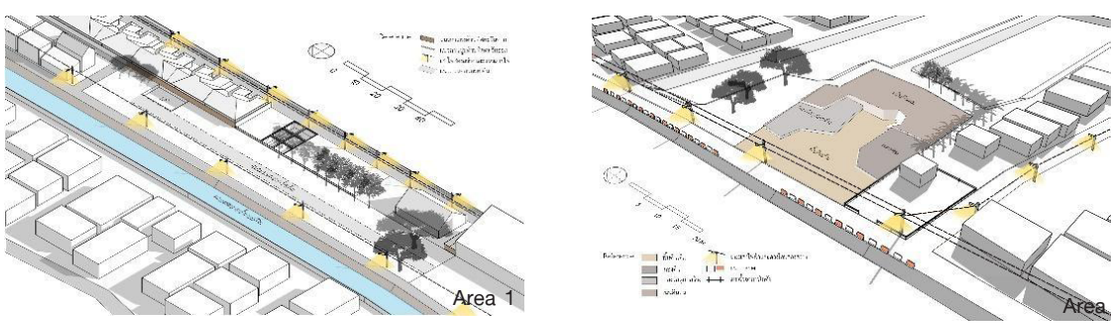


Figure 11 Diagram of existing site of both areas on micro scale.

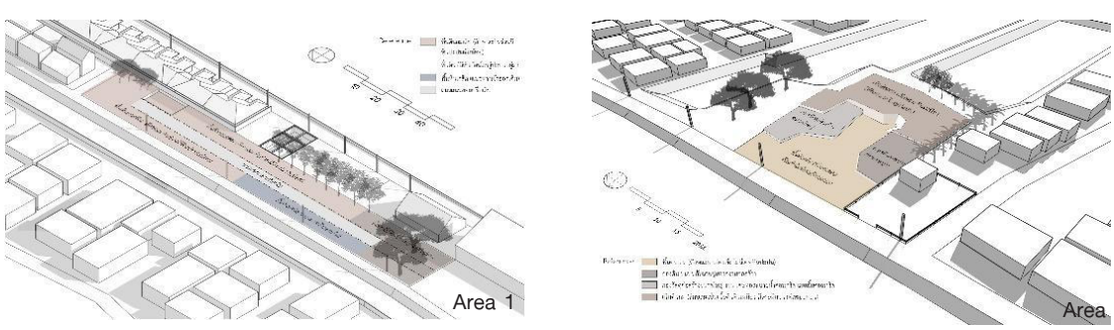


Figure 12 Diagram of soil of both areas on micro scale.

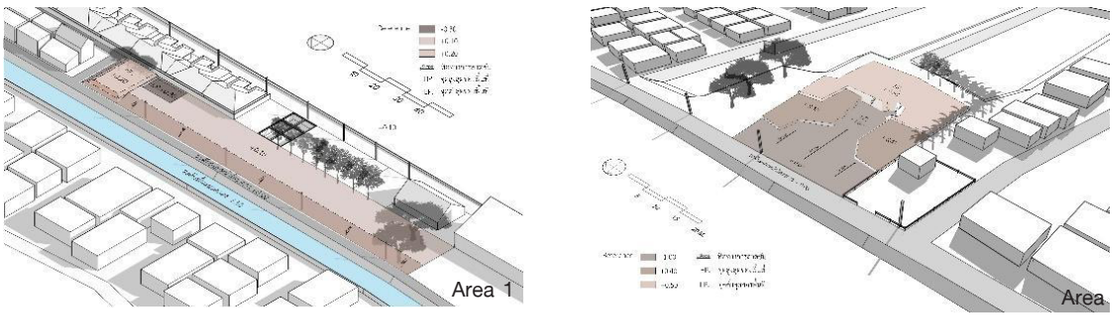


Figure 13 Diagram of landform of both areas on micro scale.

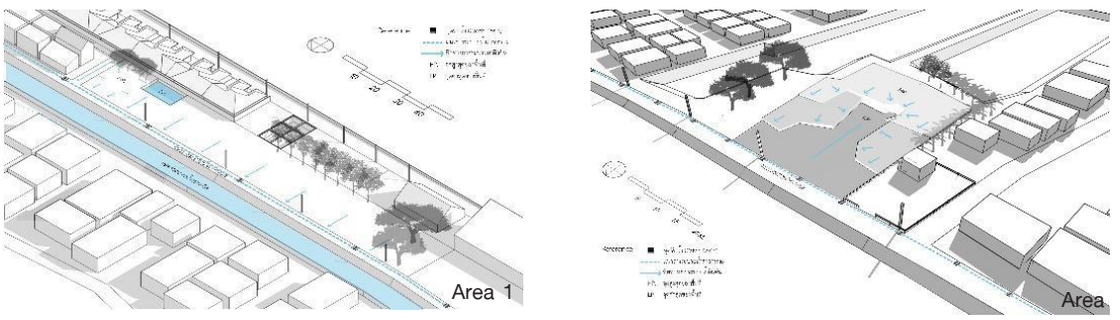


Figure 14 Diagram of drainage of both areas on micro scale.

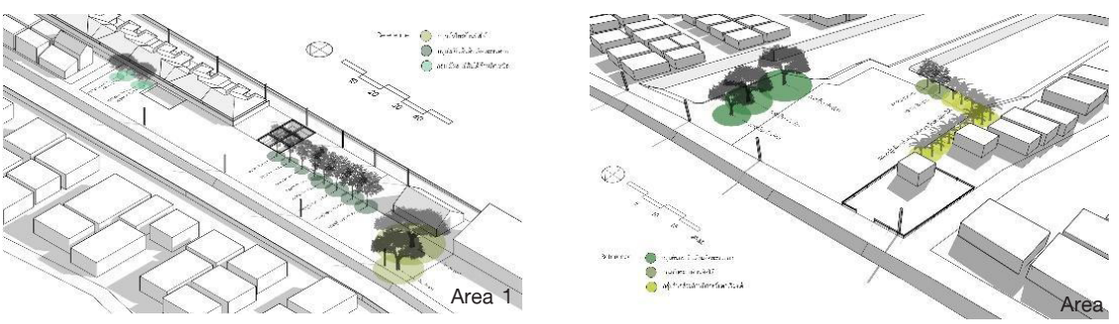


Figure 15 Diagram of existing trees of both areas on micro scale.

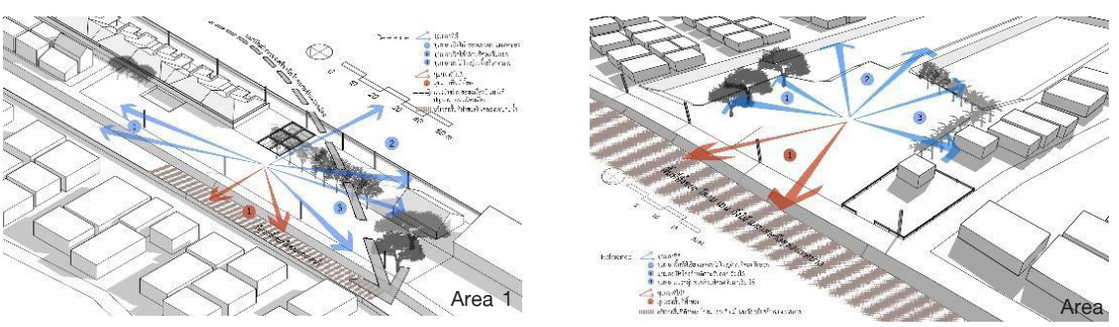


Figure 16 Diagram of view of both areas on micro scale.

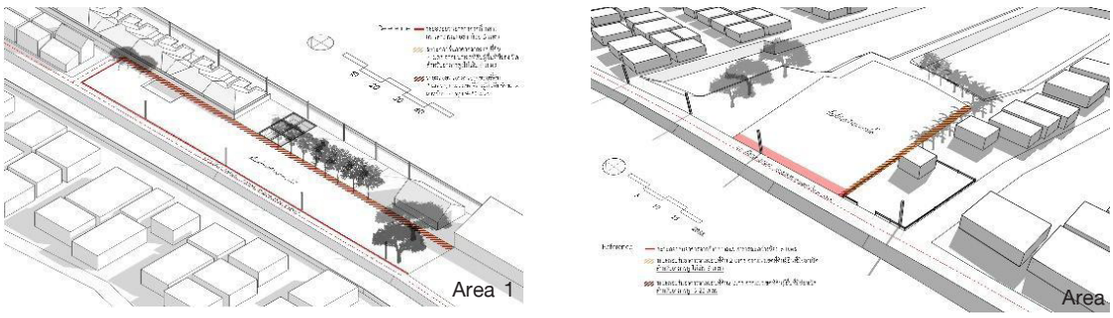


Figure 17 Diagram of law for setback of both areas on micro scale.

5.1 The Findings of the Scheme Location 1 Analysis

The potentials and constraints of the alternative scheme site 1,based on the overlay mapping of various data, are summarized in Table 1 and Figure 18.

Table 1 Summary of the Potentials and Limitations of the Area Towards the Design of the Health and Recreation Center at Rangsit City.

Analysis of issue	Potentiality	Constraints
Location, access and linkage	1. There is a convenient walking distance to access the project from the entrance of the alley, and public transport. Additionally, there is a pedestrian overpass across Rangsit Road to Nakhon Nayok into Soi Rangsit Nakhon Nayok. 2. The road adjacent to the project location is wide enough to accommodate a variety of vehicles. 3. There is a large banyan tree as a landmark point at the entrance of the alley.	1. The area is located in the alley which is at the back of the village on both sides, making the surroundings unsafe. However, it is not far from the main road, so it can be developed for safety in the future. 2. Pathway conditions are obstructed in some areas. Some parts do not have a footpath. There also is a light, but the surrounding context makes the walkway in the evening quite isolated which creates inconvenience and insecurity of access. 3. Original lighting pole position and distance setback is a restriction on the opening of a car entrance in certain positions.
Context and surrounding environment	1. The topography is mostly gentle slopes which is suitable for the elderly people to use. 2. The original soil surface can easily drain water and the existing concrete surface easily to dismantle. 3. The project area has a context and is positioned in a direction that can receive good sunlight and wind, which is good for the sanitation of the project. 4. The project area is higher than the road. and there is a drainage canal, open for water on the project side. Water-permeable soil area	1. Rain, dust and odors that come with the wind and the heat and glare in the afternoon.
Space quality and components in the project area	1. The overall area is an open area with no obstructions. 2. There is a group of trees encompassing the space on the south side. It is an area under the shade of big trees and is the first space that is accessible to the project area.	1. The project location is narrow and long, and has a wide frontage near the road. This should be taken to provide outdoor recreation areas adjacent to the road for children or elderly people who may walk out to the roadway.
Public utilities and public facilities	1. There is a cable-wire line passing through the project location, so it can be linked to the project.	1. Insufficiently accessible pedestrian lighting.

Analysis of issue	Potentiality	Constraints
Aesthetics and perception	1. The overall atmosphere is peaceful and uncluttered due to the urban context. 2. The view from inside of the area to the outside on the east side is open and unobstructed. 3. The view from the outside into the inner space has a big tree as the landmark, and shade for the southerly orientation.	1. The front view of the project location includes an open drainage canal with garbage. 2. There is an opening from the north building which can look into the project area. 3. There was some disturbance from airplane noise at certain times. 4. Air quality from the road may be impacted at the certain times.
Regulations	N/A	1. Spatially, the limitations of shortening the distance between the road and the edge of the land must be considered. Also, the land use conditions must be considered (i.e. most land use should be low-density residential, government institutions, public utilities and public facilities).

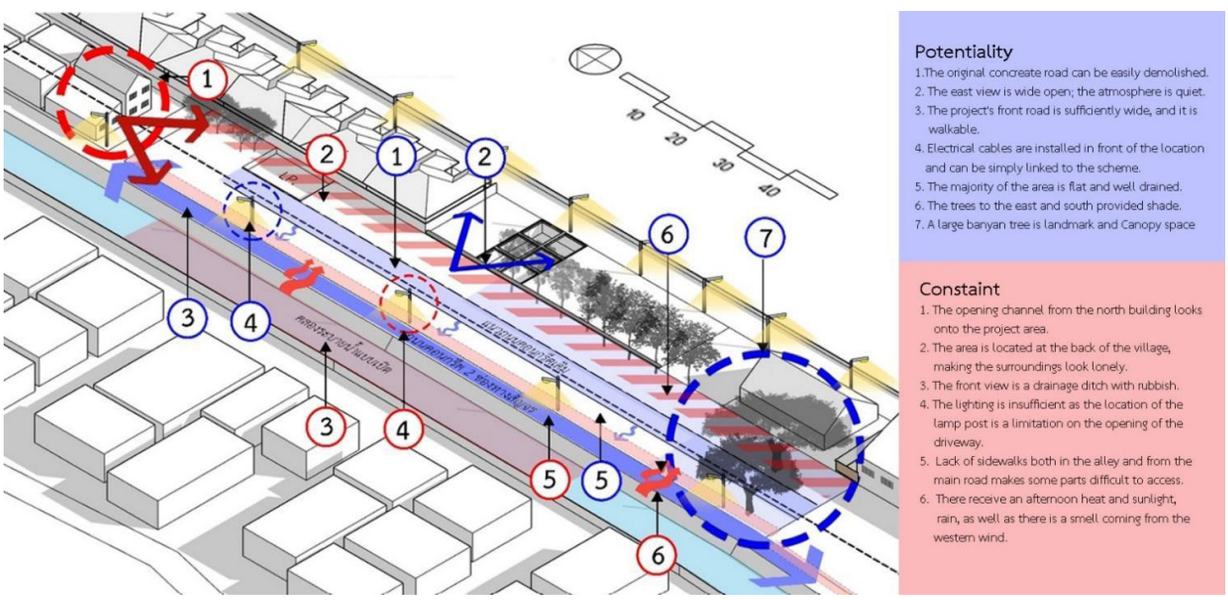


Figure 18 Summary diagram of the potentials and limitations of the project location 1.

5.2 The findings of the scheme location 2 analysis

The potentials and constraints of the alternative scheme site 2, based on the overlay mapping of various data, are summarized in Table 2 and Figure 19.

Table 2 Summary of the Potentials and Limitations of the Area Towards the Design of the Health and Recreation Center at Rangsit City.

Analysis of issues	potentiality	constraints
Location, access and linkage	1. The road adjacent to the project location is wide enough to accommodate a range of vehicle types. 2. The road in front of the project location connects to several main roads. Therefore, there are many options that avoid routes where traffic is congested. 3. The walkway from the project area can be easily connected to other public areas of the community.	1. The project location cannot be walked from the entrance of Soi Rangsit Nakhon Nayok 39 and there is no car service. 2. The front entrance position is in the same way of the entrance and exit position of the dumping area. where garbage trucks regularly enter and exit. 3. No landmark to access to the project location.
Context and surrounding environment	1.The project area has context and is positioned in a direction that can receive sunlight and wind well, which is good for hygiene in the project area. 2. The project area, if it is leveled, will be able to open several drainage paths, both to the north, draining into public sewers, and into a dug-up earthen well, which receives water from a lowland area to the southeast.	1. The topography mostly has hills and it will be necessary to adjust the level of the location area and clear away all the debris that is piled in the area. 2. Rain, dust and smell that come with the wind and heat and light in the afternoon.
Empty quality and components in the project area	1. The overall area is open space, unobstructed. 2.The northeast and southwest sides of the site have a group of trees to help surround the space, and there is an open space on the north and southeast, connecting the open space with the project area as a large open space.	1. The original group of trees which are important to the location is a group of trees that are outside of the location. This is an uncontrollable factor. Therefore, it may require a plan to build a green space along with designing the building.
Public utilities and public facilities	1. There is a line of electric wire through the project location that can service electricity.	1. There are insufficient pedestrian lights.
Aesthetics and perception	1. The overall atmosphere is quiet. Not crowded from the context of the city. 2. View from the inside of the area to the outside on the southeast and north sides. It has an open-air view, which can be seen far away.	1. The front view of the project area overlooks the mud dumping area, lanes and municipal scrap materials. 2. There is noise from the aircraft at certain times. 3. May receive dust and smoke from the road at certain times.
Laws	N/A	1. Spatially, the limitations of shortening the distance between the road and the edge of the land must be considered. Also, the ก่land use conditions must be considered (i.e. most land use should be low-density residential, government institutions, public utilities and public utilities).

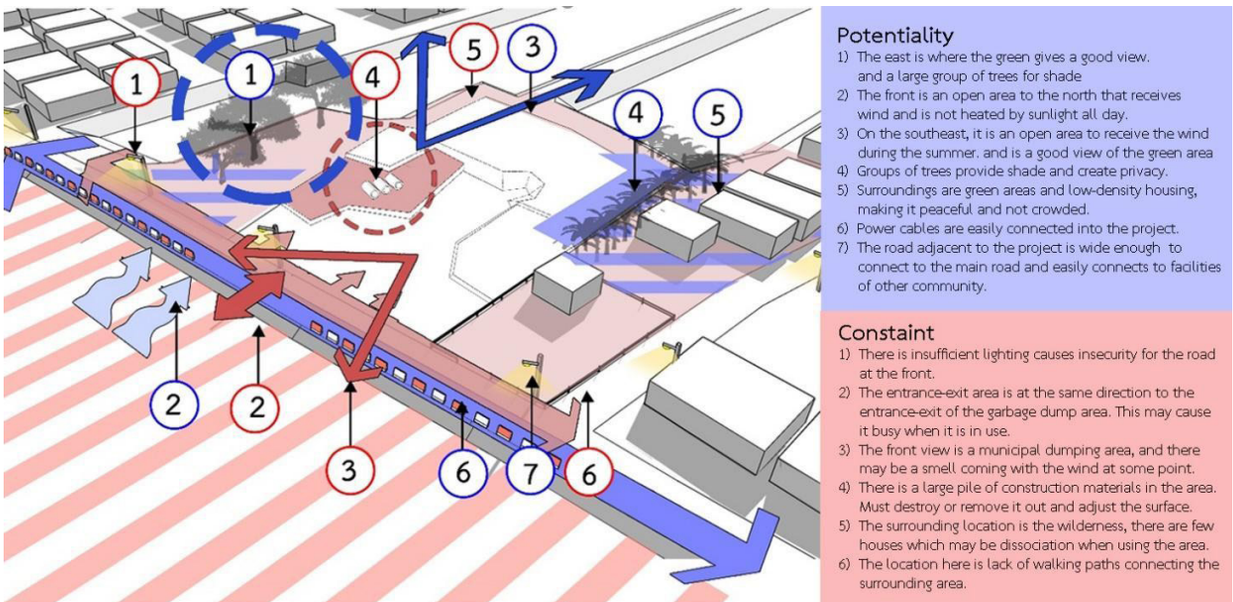


Figure 19 Summary diagram of the potentials and limitations of the project location 2

6. Discussion and Conclusions

By comparing the areas of the two study sites, plot 1 located in Soi Rangsit - Nakhon Nayok 45 and plot 2 in Soi Rangsit-Nakhon Nayok 39, the results showed that the area with the greatest potential to build a health and recreation center is the area of plot 2.

When considering location, accessibility, and linkage, all three are main factors for choosing the location of a public space. It was found that the two plots can be accessed from the main road, which is Rangsit - Nakhon Nayok Road, and then continue to Soi Rangsit - Nakhon Nayok 39; moreover, plot 2 can be connected to the secondary line, which is Soi Rangsit - Nakhon Nayok 45, and out to Liap Khlong 2 Road or Soi Rangsit-Nakhon Nayok 31 and Rangsit-Nakhon Nayok Road, which is the main road. The main line can be accessed in another way, with each road connected to the same network. This makes it possible to have options to avoid congested traffic. In addition, this plot 2's location is easily connected to other public areas in the neighborhood. It also can be connected to public parks and community sports fields, which are located in Soi Rangsit-Nakhon Nayok 45, within 300 meters. Moreover, plot 2 can be connected to the Pathum Thani Disabled Association, which is a distance of 400 meters and can connect to the Wat Saeng Sawan community activity area at a distance of 800 meters. These distances can be easily walked, thereby providing access from the community. This access characteristic provides plot 2 with the potential to create a sociability from being the center of community activities.

In terms of context and natural environment, inside the second plot area, it is open and is surrounded by open space on the east and south. The west side has a less dense residential area interspersed between open spaces which provides access to wind all year round. For that reason, the surrounding atmosphere of plot 2 is peaceful and quiet.

In the north, plot 2 has an open area for dumping debris from the municipality which can be managed and can improve the landscape to be clean and beautiful as it is under the supervision of Rangsit City Municipality. The level inside plot 2 is uneven and there are the piles of soil and construction materials that will need to be remediated to facilitate access.

For quality of space, we compare the shape of the area that affects the sense of safety of the user. The shape for plot 2 is rectangular along the north-south direction that is deep from the road. There is a side of the road for a distance of 50 meters, which is a distance that makes it easy to control access, traffic and security within the area. In contrast to the shape of plot 1, that is narrow and long, and has a distance of 145 meters from the road, which is difficult to control the traffic in and out. Furthermore, it is also more difficult to place buildings and activities within them.

With respect to public utilities and public facilities, plot 2 is located in an area surrounded by public facilities of the community which is in accordance with the preferred criteria of location accessibility and linkage. Inside the project area, there is an electric line passing through from the north side, thereby providing service to the site. However, there is insufficient nighttime lighting at plot 2 and there is a light pole only on the road in front of the project which results in solitary surroundings.

For the drainage system, the plot2 area has a public sewer to receive water on the north side and there are earthen pits dug in the east and south that may serve as an alternative option to drain and store runoff. Regarding the pedestrian network and public service vehicles, Plot 2 has a limitation that they do not exist in the area. Therefore, walking routes from the surrounding communities need to be created and extended into the project location. Additionally, a public transport need to scale up and expand to the project area, so that people in the community can come and use it more conveniently

In terms of aesthetics and perception, the second plot has an open, natural view on the east and south sides that changes seasonally, thereby adding diversity and interest. The building will become a landmark of the community. The northern view of plot 2 is limited by being a municipal construction material dumping area. Therefore, the garbage area should be removed. In addition to that, it may create a line of sight screen, or landscaping to connect with the plot 2 area because this dumping area is under the supervision of Rangsit City same the both of plots.

In terms of regulation, both plots of land fall under the same legal framework in general. There is a limitation according to the building control law on the receding distance of buildings adjacent to the road at a width of 6 meters or more. This resulted in a setback distance of 3 meters from property line . For the limitations of the first plot that is narrow along the road, it has to have a distance of 3 meters from the road to enter, which is a limitation in the construction of additional buildings. The second plot has a shorter distance to the road and as such, the design and layout of the building is not affected but can also be developed into areas such as pedestrian walkways or courtyards, including bike paths and pick-up areas that can be connected to the building.

From the results of the potentials and constraints analysis for the two plots,, we conclude that plot 2 in Soi Rangsit-Nakhon Nayok 39, would be a better location for the health and recreation center. In the follow paragraphs, we review the specific criteria for plot 2 in more detail.

Location, access and linkage: the public recreation area should be easily accessible from nearby communities and within walking distance. There are roads in the community that connect to major highways without passing through congested areas. The site adheres to the principle that public spaces should be easily accessible and connected to various modes of transportation (Marcus and Francis, 1998). However, public transportation should be available if a community is far away more than walking distance. To enable those who cannot access the project area by foot to come and use it more conveniently, road and sidewalk networks, as well as bike paths, should be developed. Public transportation routes, shuttle bus waiting points, and directions to the project area also should be added (Gehi, 1987).

Sociability: Recreational public space should be connected to public areas in other communities that are accessible by foot, creating a network of public community areas. As such, the site can be developed into a recreational area that serves as the community's focal point (Node) because it will connect people for social activities (Klongvessa, 2005), which will strengthen and create positive interactions within the community. However, in order to have good potential, beauty, convenience, and safety, it also is necessary to develop and maintain the environment of other public areas in nearby communities.

Recreational environment: The site should have an open, natural environment, both within the area and in relation to the surrounding context (Gallup, 1999). This area should have a peaceful and uncrowded atmosphere, making it suitable for relaxation and light recreational activities (Klongvessa, 2005). The area should be flat. If there are existing materials or buildings in the area, they should be easily managed and relocated. These changes do not require a lot of technical expertise or money, especially if situated in a location with little potential for land use changes. For instance, there are legal regulations that require this area to be used as a low-density residential area, or if it is a space with the same owner, they will be able to regulate the environment of the neighborhood to make it suitable for recreation.

Sanitary and safety: Public recreation areas should not have a long, narrow shape because it will be difficult to monitor activities inside, making people feel uneasy and unsafe (Klongvessa, 2005). The area should feel secure to use at night and have enough lighting. If there is a problem with dust, smoke, or other pollution caused by the wind, it must be resolved within the design's capabilities.

In terms of sanitation, the area should be well ventilated and well cooled. The area should be designed to have a comfortable climate and good hygiene. The project placement should encourage exposure to the sun in the morning and there are design elements that can be used to provide shading in the afternoon and evening. The site should have both shade and adequate lighting (Klongvessa, 2005).

Aesthetics and place: The surrounding environment should promote the project area as a prominent landmark in order to be the main area for recreational activities of the people in the community. The site should serve as a gathering spot where locals can socialize and engage in activities. This creates a sense of importance and belonging to the community (Klongvessa, 2005).

In terms of aesthetics, there should be a natural perspective. Although changing perspectives in nature are a challenge, these perspectives can be used to consider the placement of buildings and activities that require good views (Boonkham, 2014). The context should be a manageable place, or if there are management limitations, the context should be in a condition where architectural design and landscape design can be used to solve the problem .

Management and maintenance: The shape of the project area should make it easy to plan the building layout, space, and traffic routes. There should be adequate drainage in the area, or if there is a drainage problem, the community should be able to handle it and invest in a drainage system layout for long-term use by utilizing the existing drainage look (Boonkham, 2014). The project area should be directly within the scope of maintenance of the owner of the area in order to have regular and continuous care.

Regulation: Regarding the building control law, the space should not have any shortening limits that affect the creation of the design, and the shortage area should be developed to promote the use of the project. For example, develop the site to include a traffic area and landscape to promote accessibility and connectivity, as well as promoting the area's good atmosphere to encourage more usage activities (Klongvessa, 2005)

7. Future Work

7.1 Conceptual Design Suggestions

In considering the building and landscape design for the Nakorn Rangsit Health and Recreation Center, three key concepts are recommended: Connected, Cool, and Clear. Each concept is discussed in more detail in the following paragraphs and example perspectives to illustrate these key concepts are provided in Figures 20-23.

Connected: Designing living space to create a continuity of space and activities both inside and outside the building by making the common area a multi-purpose area to encourage interpersonal interaction. Furthermore, organize walking distances between successive activities that are appropriate for the elderly. Development of road and sidewalk networks, as well as bike paths, would be helpful to allow easy access to other public areas (LaGro, 2008) and to encourage sociability in order to create social and community activities together (Klongvessa, 2005).

Cool: Building design and planning and the use of landscape elements should be consistent with the direction of the sun and wind according to the local climate, allowing for the use of both indoor and outdoor spaces at all times. This includes designing in accordance with that intriguing perspective that creates a good atmosphere, comfortable, and healthy state for the user in accordance with public space design principles (Klongvessa, 2005).

Clear: The building's design should prioritize openness and use simple shapes and lines to make it simple for users to understand. In addition, it should be simple to get to and connect with various facilities from the parking lot to the primary use area. Facilities for the elderly and disabled must be provided so that they can access and use the area without difficulty. The space requires a design to have a good image. For example, open the interior view so that users can observe each other for safety, provide seating, shade, activity areas, and atmosphere so that users can feel safe entering the place. (LaGro, 2008)

Figure 20 Gardening area.

Figure 21 Recreation area.

Figure 22 Green yard, multi-purpose activity. Area.

Figure 23 Accessible parking.

Author Contributions

Conceptualization, P.S. and N.T.; methodology, P.S. and N.T.; formal analysis, P.S. and N.T.; Investigation, P.S. and N.T.; writing-original draft preparation, P.S. and N.T.; writing-review and editing, P.S. and N.T.; visualization, P.S. and N.T. All authors have read and agreed to the published version of the manuscript.

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