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## **A Comparative Study on Land Use Control between selected Conservation Residential Areas (CRA) in the United States and Chiang Kham City**

**Aungwara Poupuntarugsagul, Karuna Raksawin\***

\* Corresponding Author

Faculty of Architecture,  
Chiang Mai University, 50200 Thailand

[aung.pacha@gmail.com](mailto:aung.pacha@gmail.com), [karuna.r@cmu.ac.th](mailto:karuna.r@cmu.ac.th)  
Tel: +66 954461199

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### **Abstract**

This study examines the regulation of residential conservation areas in Salisbury, Marshall, and Peters Townships in Pennsylvania, USA, to derive guidelines for Chiang Kham City. It focuses on analyzing land use activities and building density and form controls. The findings suggest that Chiang Kham City could benefit from detailed regulations on density and architectural styles, highlighting a gap in its current conservation approach. This research underscores the need for Chiang Kham to refine its conservation policies by incorporating lessons from the case studies, aiming to enhance its residential areas while preserving environmental and aesthetic values.

Keywords: Conservation Residential; Urban Planning; Urban Density; Building Style

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### **1.0 Introduction**

#### *1.1 Background and significance of the study*

Ministry regulation to enforce the Chiang Kham - Sob Bong - Ban Sai town plan, Phayao Province (2019), has designated the yellow-white diagonal area as conservation residential by specifying the control over building characteristics, only including 1) setting control of building height not to exceed 7 meters 2) architectural style to be vernacular or Thai architecture 3) roof slope not less than 30 degrees, and 4) The color of the exterior building and roof are in harmony with nature. This designation is similar to controlling conservation areas for cultural heritage. Therefore, the question arises: What is the control of conservation residential areas?

Several countries lead in the development of Conservation Residential Areas (CRAs), blending environmental conservation with residential living. The United States stands out with diverse CRAs across states, emphasizing open space preservation and sustainable living. Australia and Canada follow closely, focusing on protecting native biodiversity and integrating sustainable practices within residential developments. Scandinavian countries, particularly Denmark, Sweden, and Norway, excel in sustainable urban design, prioritizing green spaces, energy efficiency, and community well-being. These nations showcase innovative approaches to harmonizing human habitation with environmental stewardship, setting benchmarks for sustainable development worldwide. This article, therefore,

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analyzes the case study in detail, including various requirements and regulations, to summarize the issues to which Chiang Kham City should add additional requirements or restrictions in developing conservation areas for comprehensive living.

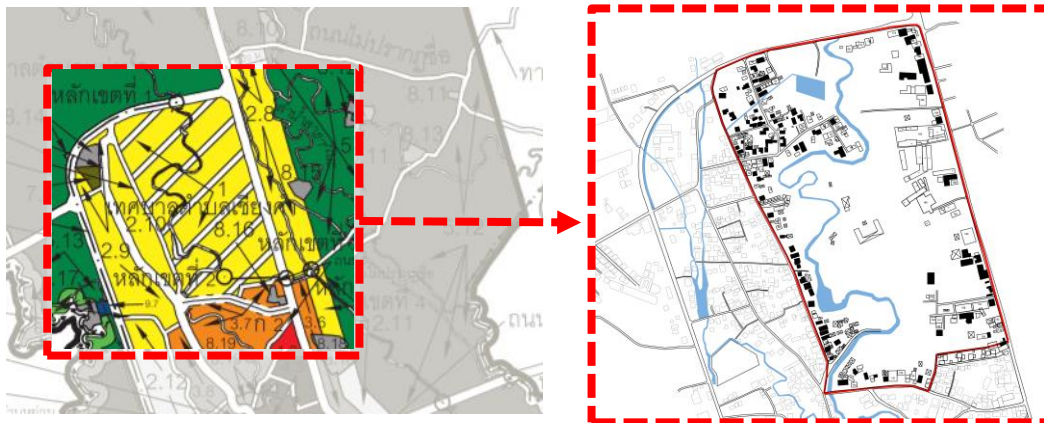


Fig. 1 shows the location of the yellow and white diagonal area specified by the ministry regulations.  
 (Source: Ministry regulation to enforce the Chiang Kham - Sob Bong - Ban Sai town plan, Phayao Province(2019).)

### 1.2 Objectives

1. To determine control factors by analyzing details of various requirements used to control protected areas for living from the case study.
2. Propose guidelines for appropriately adapting the conservation area for future living in Chiang Kham City.

## 2.0 Literature Review

### 2.1 The United States for Conservation Residential Area (McNulty&Kliment, 1976)

The development of conservation residential areas in the United States, also known as conservation subdivisions, has evolved as a response to the challenges of traditional suburban sprawl. This concept integrates residential development with environmental preservation, focusing on clustering homes to minimize ecological impact while conserving significant portions of land.

Initially emerging in the late 20th century, this approach gained momentum as a sustainable alternative to conventional development. It aligns with broader environmental and social objectives, such as protecting natural habitats, preserving open spaces, and fostering community connections.

Local governments' adaptation of zoning and land-use regulations is key to this development. Many municipalities have adopted ordinances that allow for greater flexibility in residential planning, enabling the creation of conservation subdivisions. These regulations often include incentives for developers, such as density bonuses or expedited approval processes, to encourage the adoption of conservation-oriented designs.

The concept has been furthered by the collaboration between developers, urban planners, environmentalists, and local communities. By balancing the needs and desires of various stakeholders, conservation residential areas aim to create livable, sustainable communities that respect and preserve the natural environment.

Currently, conservation residential areas can be found across various states, demonstrating a growing recognition of the need for environmentally sensitive and sustainable residential development practices in the United States.

### 2.2 The United States for Conservation Residential Areas

The United States boasts numerous Conservation Residential Areas (CRAs), balancing housing needs with ecological preservation. These areas, often encompassing forests, wetlands, and streams, promote environmental sustainability and vibrant communities.

CRAs exhibit several key features:

1. Low-density housing: Fewer homes per acre minimize development impact, fostering harmony with nature.
2. Large lot sizes: Ample space protects natural features and reduces development, ensuring a thriving ecosystem.
3. Strict building regulations: Guidelines govern building materials, landscaping, tree removal, and preserving the natural environment.
4. Protection of natural features: Buffer zones and development restrictions safeguard sensitive areas like forests and wetlands.
5. Limited commercial activity: Minimal commercial activity maintains the area's character and protects the environment.

CRAs offer numerous benefits:

1. Preserved natural resources: Forests, wetlands, and water quality are protected, ensuring a healthy ecosystem.
2. Reduced pollution: Storm runoff, construction, and traffic pollution are minimized, contributing to cleaner air and water.
3. Enhanced public health: Residents benefit from stress reduction, improved mental well-being, and increased physical activity.
4. Higher property values: Limited land supply and superior quality of life lead to increased property values.

Challenges exist:

1. Limited affordable housing: Affordable housing for young families and low-income individuals may be limited.
2. Increased development costs: Larger lot sizes and stricter regulations can raise costs.
3. Resident-developer conflicts: Balancing resident desires for environmental protection with developer interests can be challenging.

CRAs offer a promising approach to achieving sustainable development in the United States. Careful implementation, considering both benefits and challenges, is crucial for success.

*2.3 Key factors to control Conservation Residential Areas (Pioneer Valley Planning Commission, n.d.; Salisbury Township, n.d.; Dublin City Council, 2022; Huang et al., 2022)*

Three key factors contribute to the successful control of Conservation Residential Areas (CRAs):

First point: Land-use planning:

1. Zoning regulations: Define permitted uses and density restrictions to ensure compatible development and prevent over-building.
2. Open space network: Designate and protect green areas like forests, wetlands, and parks to maintain ecological connectivity.
3. Infrastructure development: Provide adequate water, sewage, and transportation infrastructure while minimizing environmental impact.

4. Visual impact assessments: Minimize the visual impact of development on the surrounding landscape.

Second point: Building codes and design standards:

1. Sustainable building practices: Encourage using energy-efficient materials, water-saving fixtures, and renewable energy sources.
2. Landscaping regulations: Promote native vegetation and minimal impervious surfaces to protect soil health and water quality.
3. Architectural design review: Ensure new construction respects the character and context of the surrounding environment.

One final point: Community engagement and stewardship:

1. Public education and outreach: Inform residents about CRAs' objectives and encourage sustainable practices.
2. Resident involvement in planning and decision-making: Foster a sense of ownership and responsibility for maintaining CRAs.
3. Volunteer programs: To foster community engagement, organize activities like planting trees, cleanups, and monitoring wildlife.

### 3.0 Methodology

This article mainly uses comparative study methods. Comparative studies of conservation residential areas have multifaceted contributions to urban planning, environmental policy, sustainable development, and community well-being. Such studies are critical for understanding the dynamics between human habitation and environmental preservation, offering insights that can lead to more sustainable and harmonious living environments. The procedures were set as follows.

#### 3.1 Setting up the framework of criteria and standards of the City Planning Office

The criteria and standards for land use prepared by the City Planning Office (2018) can be divided into controlling land use activities and building density and form. In addition, the City Planning Office (2018) analyzed samples from the case studies and found that there are controls over the primary land use types and conditional land use controls. The main land use types specified in the city plan include residential area, commercial area, industrial area, agricultural area, environmental conservation area, and infrastructure area. Each country's density control has different details. It aims to balance the needs of population and economic activity with the capacity of infrastructure and environmental conservation. So, density control must be determined, such as building mass control and controlling the number of households, including other details such as the hard surface area. In addition, some controls promote the area's identity, such as controlling building style, scenery, and surroundings, building heights, determining the setback of buildings, and controlling the size of land plots (City Planning Office, 2018).

#### 3.2 Selection of case studies

The selection of case studies began with a keyword search: Conservation/Residential District Zoning. When compiling a list of cities, the objectives of their control are examined, such as being a city that was settled by travel or migration, having elements of a historical and anthropological city, and protecting the natural environment for living (Piomruen, 2004). The selection resulted in three case studies: Salisbury Township, Marshall Township, and Peters Township, Pennsylvania.

#### 3.3 The analysis

The analysis of the case study begins by analyzing the characteristics of each case according to the urban context and the reasons that led to the designation of conservation residential. The issues of various determinations are summarized to summarize the objectives set, and a comparison table of case studies is displayed according to control issues.

### 4.0 Findings

#### 4.1 Analysis of case studies to summarize the objectives of the regulations

The three case studies, 1) Salisbury Township, Pennsylvania, 2) Marshall Township (Allegheny County), Pennsylvania, and 3) Peters Township (Washington County), Pennsylvania, can summarize the objectives of regulating residential conservation areas in the following details.

#### 1. Case Study Salisbury Township, Pennsylvania

According to Salisbury Township's zoning regulations (Salisbury Township, n.d.), the town of Salisbury is described as a community or residential building in an area with a clear identity. It is one of the smallest cities in the Commonwealth. Its current area is 11.3 square miles. It is a town with rustic charm and a significant history. Most settlements started as urban agriculture, with industry and commerce catering to people's needs, such as rice and lumber mills. Beautiful centerpiece buildings such as The Gap were the first residential buildings in the area, which was once a meeting point for early travelers and a center of commerce with the advent of the railroad. It once again became a magnet for commercial activity with the development of The Village at Gap in 1996, a small shopping mall with a wide range of shops and services. The area around The Gap has copper mines and nickel mines. It was once the only nickel mine in the United States. A limestone quarry was also discovered, which turned into a lime-burning business essential to the city's industry. The Gap Town Clock Tower is an essential tourist destination in the city. The purpose of designating a Conservation-Residential District in Salisbury Township, Pennsylvania, is to provide primarily single-family housing. The area should have low density and use land to conserve natural resources. Controls range from generality to details that are unique to each area. There is a determination of the minimum area size, the number of housing units allowed, allocation of general open space according to regulations, slope limitations of new construction areas, walkway area requirements, and the type of use of the area. Permissible in residential areas, setbacks, widths, maximum to minimum lengths, and other relevant distances are specified.

#### 2. Case Study: Marshall Township (Allegheny County), Pennsylvania

Marshall Township is in Allegheny County, Pennsylvania. The town was named after Thomas M. Marshall, a prominent figure. The city has been important since the late 1960s. It has significant research and business centers and is one of Pennsylvania's best places to live. There are two crucial colonial walking trails: the historic trail from Pittsburgh to Venango and the road that runs through the land of the very popular Marshall Elementary and Middle School. There are also many coffee shops and parks. Families living in Marshall Township enjoy not only beautiful residential neighborhoods but also the location of Knob Hill Park. It is a 157-acre public park with a pavilion, baseball field, horse track, volleyball court, nature trails, and playground (Marshall Township, n.d.). The intent and objectives of this area's habitat conservation are to conserve sensitive environmental areas. Many general character requirements were identified, including slopes, open space, wooded areas, natural waterways, sewers, natural resources, sensitive areas, and residential density.

#### 3. Case Study Peters Township (Washington County), Pennsylvania

Peters Township was one of the original thirteen towns of Washington County. It is a rural community with an ever-increasing population. The original race of the people in the area cannot be determined. It is assumed to be a group of Indians or a group of Indians based on evidence from archaeological excavations. Peters Township is 19.5 square miles. Coal has been discovered in the area as a significant industry and an important fuel source. The area has important landmarks like the Enoch Wright House, a historic residential building. This building was built around 1815. It was then donated to the Peters Creek Historical Society, now used as a museum, and was listed on the National Register of Historic Places in 2007. It is notable for its use of bricks in construction and its original architectural style (Peters Township, n.d.).

Peters Township aims to distribute population density throughout the city through amenities and infrastructure, employment areas, and reasonable population growth projections. Therefore, a highly flexible urban design should be balanced and suitable for all income groups. Flexibility in layout is required to protect community areas, open spaces, agricultural areas, forests, wetlands, and other natural features. Detailing housing types, including road-related requirements, promotes more efficient land development models to help reduce infrastructure and maintenance costs, maximizing the use of open space to prevent land subdivisions in the future. Data from the case studies of the three cities found that they are important areas in terms of locations, buildings, resources, agricultural areas, forests, wetlands, open space, and natural characteristics that they want to preserve together with living. There are guidelines for determining the nature of land use, the distribution of population density appropriate to living in the area with existing facilities, and promoting land development and land use patterns that are appropriate to the area. One must be careful about direct use of the area and prevent impacts from nearby areas from destroying existing values.

#### 4.2 Analysis of Control Requirements

Table 1 compares the three case studies' criteria and standards for conservation residential. According to preliminary conclusions, these regulations are intended to regulate land use and zoning. Table 1 shows a comparison and summary of details for each city.

From Table 1, it is found that there are many similar requirements, such as the minimum-maximum ratio of area sizes, land plot size, open area ratio, setback around the building, the distance of the building from the edge of the public road, building height, number of floors of the building, slope of the land, and façade accessories which is the part that Chiang Kham does not have.

Table 1. Comparison of Land Use criteria and standards

Case Study	Land Use Control	Building Density and Building Design Control
Salisbury Township, Pennsylvania (The Board of Commissioners of the Township,2022)	<p>It is divided into zones to determine urban development, including residential conservation zones, rural residential zones, low-density residential zones, low-medium density residential zones, medium-density residential zones, high-density residential zones, offices zones, commercial zones, and industrial zones.</p> <p>Specify the type and size of the business, with conditions for granting or not granting permission to operate a business that varies depending on the type of original activity. This characteristic affects various requirements that will be grouped according to land use activities.</p>	<p>Control building styles by setting standards for density proportions, including maximum and minimum land plot sizes, minimum width of land plot, minimum width from road distance, minimum width and length of the dwelling, building facade and accessories, controlling the amount of sunlight, and the maximum slope allowed for building construction.</p> <p>Control the building layout by setting the building setback. There are two types of building height control: building net height control and controlling the number of floors of the building. In addition, the height of the façade accessories is also controlled.</p>
Marshall Township (Allegheny County), Pennsylvania (Marshall Township (Allegheny County),2020.)	<p>Divided zones and land use patterns are divided into sub-categories in every zone, depending on the amount of space. There are five zones, including residential zones, community facilities, conservation zones, overlay zones, and zones defined in the original regulations.</p> <p>The control of single-family detached houses is divided into three main groups: Conventional SF-D, Cluster SF-D, and Country Lot SF-D, with land use conditionally determined, divided into three formats: permitted, permitted - not allowed, and conditional permission.</p>	<p>Control density by determining the ratio of total building area to land plot area. The standard density ratios are the maximum total building area ratio, maximum building coverage ratio, maximum hard surface area ratio, parking space to building area ratio, and open area ratio.</p> <p>There is a setback for buildings on each land use type, including minimum plot area, maximum bulk density, minimum width from road distance, minimum width of land plot on roadside, front building setback, side building setback, the setback behind the building, and minimum-maximum building height. Regulations also govern the maximum slope on which a building can be constructed.</p>
Peters Township (Washington County), Pennsylvania (Peters Township, n.d.)	<p>Specify land use standards by dividing design requirements corresponding to the diversity of housing into three types according to area density and classify flexible housing according to building use.</p> <p>The types of activities that are allowed and not allowed are defined.</p> <p>Focus on protecting open space by standardizing the density ratio to open space.</p>	<p>Set various standard values, including maximum and minimum land plot sizes, minimum width of a land plot, minimum setback around the building, minimum width and length of the dwelling, building exterior style, building façade accessories, sidewalks and surrounding area illumination, and the maximum slope on which buildings can be built.</p>
Chiang Kham, Phayao. Thailand (designated the yellow-white diagonal area as conservation residential areas)	<p>The settlement is a cluster of Tai Lue houses, markets, temples, and important rivers.</p>	<p>Specifying the control over building characteristics, only including</p> <ol style="list-style-type: none"> <li>1. setting control of building height not to exceed 7 meters,</li> <li>2. architectural style to be vernacular or Thai architecture,</li> <li>3. roof slope not less than 30 degrees, and</li> <li>4. the color of the exterior building and roof is in harmony with nature.</li> </ol>

## 5.0 Discussion

Although the preparation of the control is different according to the objectives and aims of each city's development, it must be suitable for the physical characteristics of buildings and the environment in the area. It was revealed that control issues could be grouped and separated into similar issues per the criteria and standards for land use developed by the City Planning Office (2018). Therefore, from the results of the case study analysis of the three cities above, when compared with the requirements of the conservation residential area in Chiang Kham City, it was found that the control details obtained through the analysis of the original area should be added first (PiromRuen, 2004).

The value of conducting a comparative study of conservation and residential areas lies in its multifaceted contributions to urban planning, environmental policy, sustainable development, and community well-being. Such studies are critical for understanding the dynamics between human habitation and environmental preservation, offering insights that can lead to more sustainable and harmonious living environments. Here are key aspects of the value derived from these comparative studies: 1) enhanced sustainable development practices, 2) improved environmental outcomes, 3) social and economic benefits, 4) policy and regulatory frameworks, 5) educational and awareness building, and 6) global and local perspectives.

## 6.0 Conclusion & Recommendations

Suppose Chiang Kham City has the same objective of conservation residential control as the case study. In that case, measures should be added to control such as the minimum-maximum ratio of area size, land plot size, open space, space in front of buildings and around buildings, the distance from the front of the building to the edge of the public road, the height of the buildings, the number of floors of the buildings, the slope of the land, the setback around the building, and other additional facade accessories.

Key findings include:

1. *Analysis of Case Studies:* The study

examines the zoning regulations of the three US towns, highlighting their approaches to preserving residential areas, balancing urban development with environmental preservation, and maintaining community character and natural resources.

2. *Comparison with Chiang Kham City:*

The analysis reveals that Chiang Kham City could benefit from the additional focus on regulating building density and architectural styles. This comparison helps identify gaps in Chiang Kham's current approach to residential land conservation.

The paper contributes significantly to urban planning, particularly in conserving residential strategies. It provides a comprehensive analysis of the control measures in established conservation zones in the US. It offers practical recommendations for implementing similar strategies in Chiang Kham City, emphasizing the importance of adapting them to local contexts.

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## Paper Contribution to Related Field of Study

The article focuses on analyzing data regarding the control of residential conservation areas, specifically in the context of Chiang Kham City, using case studies from US cities (Salisbury Township, Marshall Township, and Peters Township, Pennsylvania). The main objectives are to determine control factors by examining the regulations of these areas and propose guidelines for adapting conservation areas in Chiang Kham City. The study identifies two primary control types: land use activities and building parameters.

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