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A Study of Jeju Naval Base Influence on Gangjeong village with Physical Planning Recommendation

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A Study of Jeju Naval Base Influence on Gangjeong Village with Physical Planning Recommendation

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by

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Abstract

The Jeju naval base is a huge construction project that will bring about roughly 7,000 new people to the population in the small village of Gangjeong, Jeju Island, Korea. The village population of Gangjeong is about 5,000 residents and they have relied on the local environment. Thus, the large construction project has generated several kinds of issues, including environmental, local social, economic, and so forth. Although the authorities of Jeju naval base have argued that the base should be helpful for the village in terms of local economy primarily, many experts have be concerned about the negative impacts of Jeju naval base causing problems of environment, society, and economy, especially in the tourism industry.

Therefore, in order to identify the positive and negative impacts caused by the proximity of Jeju naval base, this thesis establishes research questions: how can the relationship between Jeju naval base and the village of Gangjeong become a win-win strategy? Furthermore, this thesis will also address the flowing secondary research questions: 1. What are the negative influence of the between Jeju naval base on the Gangjeong village? 2. Where are the potential positive synergies between Jeju naval base and the Gangjeong village? The data collection and analysis are based on the information of the 2009 Environment Impact Assessment of Jeju naval base, journals, news articles, and the village homepage under the categories of environment, society, culture, economy, and transportation. Ultimately, the analysis step produces an opportunity and constraint map combined all information to reach thesis objectives and to get answers for research questions.

Finally, the thesis suggests three concept scenarios based on the data analysis step. The recommendation is to find the best optimal option to alleviate negative impacts and to increase

synergy effects generated by the Jeju naval base. Each scenario has different character in accordance with the mixed environmental factors such as society, culture, economy, transportation, and the environment of the village of Gangjeong with the Jeju naval base. Ultimately, only one optimal scenario is selected and developed to complete the scenario.

Keywords: Jeju naval base, Gangjeong village, environmental base construction, local identity, regional development.

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I would like to thank my department chair, Dr. Palazzo, for giving me the great opportunity to write a thesis and for his consistent advice throughout the writing process. I would also like to thank Dr. Chifos, helped define my thesis topic and gave direction to my thesis process. In addition, I would like to thank my friends Jongwoong Kim, Kuyshik Moon, and Heea Lee for supporting me continuously and always being there for me. Finally, this thesis is dedicated to my family and grandparents, especially my father Seungok Kang and my mother Bokseon Heo. Their endless support and dedication enabled me to complete this thesis.

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List of Symbols and Abbreviations

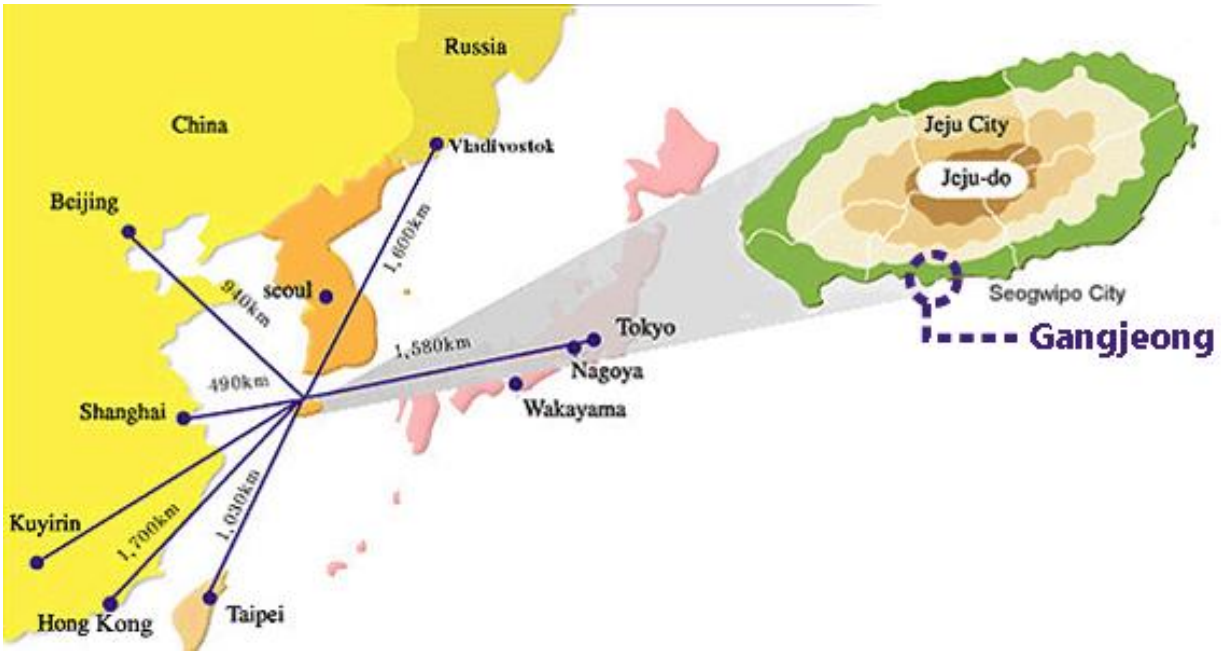
UNESCO	United Nations Educational, Scientific and Cultural Organization
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
DEIS	Draft Environment Impact Statement
FSEIS	Final Supplement of the Environmental Impact Statement

1. Introduction

1. 1. Context

Jeju Island has not only optimal natural environment and important picturesque landscape but also features of geology and topography, United Nations Educational, Scientific and Cultural Organization (UNESCO) had designated Jeju Island as the world natural heritage in 2007. However, there was a lot of construction of Jeju naval base on a natural protection district in Jeju Island emerged right after getting three titles one of which is the world natural heritage by UNESCO and declaration of the world peace island (Kang, 2008). The navy base construction is located along the south seashore line (see figure 1.1) which is near Bum Island which UNESCO designated as a natural heritage district around the area. It means that this enormous construction will have a negative impact on environmental and ecological system by eliminating unique environmental features because of scale of construction and harmfulness of the facility (Kim, 2004; Han, Ko, Jung, and Ko, 2009).

The overall history of Jeju naval base is that the necessity of the navy base in Jeju Island was first announced in 1993 by Korea Ministry of National Defense. At that time, government made a decision that the Hwasun community was a proposed site for the naval base for the first time (Hwasun community is located along same coast line with Gangjeong). However, inhabitants and peace organizations resisted the huge size construction insistently to save the village. Therefore, the Korean government had no choice but to change the navy base from Hwasun and Wimi to Gangjeong village in the year 2007 (Kim, 2012 B).



[Figure 1. 1] Location of Jeju Island and Gangjeong village. (Source: globalresearch.org)

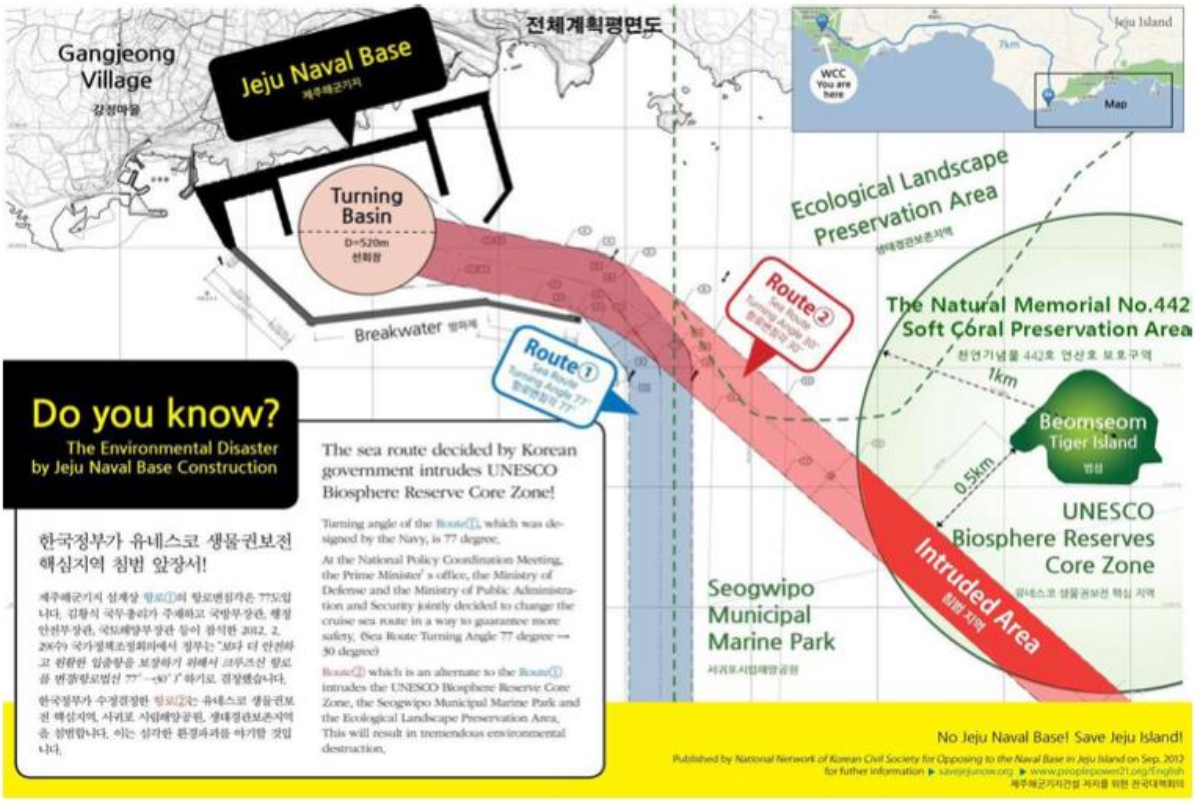
During the presidency of Mu-Hyun No, the new government announced Gangjeong was the best village for the naval base in April 24, 2007. The village chief had also supported the decision in spite of a lot of predictable problems in the environment and society due to reckless construction. Indeed, the government held local inhabitants' poll two days later on April 26, 2007, and only 87 of 1900 residents took a part in the vote for applauding assent without real poll. However, other residents who were not participating in the vote did not make decision or opposed the decision like other previous nominee communities. Eventually, this national project gave rise to divide inhabitants into two opposing sides in the small village (Cheong, 2012).

Nevertheless, the reasons for supporting construction of the Jeju naval base are national security and economic benefits for Gangjeong community through cruise tour, convenience facilities, and infrastructure development. From a national standpoint, Korea administration has

to secure national defense power on the southern oceans of Jeju Island by constructing the navy base. Korea Ministry of National Defense and government asserted that Jeju Island has being an optimal place for naval base, thus we are unable the project to be postpone the project due to the urgency of national defense reinforcement (Kim, 2012 A). Some the inhabitants expect to improve the effect of regional economy in accordance with the military construction. By building Jeju's naval base, supporters anticipate that the regional population will be on the rise (Kim, 2007). Besides, amenities for service families are expected to be shared with local residents.

On the other hand, the opinions of anti-naval base are mainly related to the environment, local identity, and doubt about peace security by the navy base. They have asserted that the economic effect will be slight and temporary; instead, they believe the military base will infringe residents' property right and right to life (Kim, 2007). In addition, the second point is that the Jeju naval base has a possibility to destroy the ecosystem and to anticipate large scale environmental contamination. Several environment experts have forecasted that naval base will cause huge construction at the costal line where bedrock must be preserved because of its unique natural value. The volcano rock area has an important role as a shelter for rare animals and corals. For these reasons, Cultural Heritage Administration had designated areas of Seopseom Islet, Munseom Islet, and Beomseom Islet within 9.19km^2 (2270.89 acre) as a natural preservation area in 2009. As I already mentioned in the introduction, these islands are being preserved by UNESCO as the world natural heritage by 2007 (see figure 1. 2). When Gangjeong naval base construction will be completed, a lot of vessel will be passing the natural preservation area (Ko, 2011). As environment issues are the most controversial, it is difficult to forecast how much the project will contaminate around soil, water, and air. Furthermore, after completion of the construction, grand scale warships and use of weapons will cause water, air, and soil pollution.

Finally, the opposing party has concerns that the naval base will encourage other military bases such as air force base, warehouse for weapons, and other. Thus, Jeju naval base tends to become a latent target of attack by surrounding nations (Bu, 2012).



[Figure 1. 2] Naval vessels pathway around nature preserve area.

(Source: image by savejejunow.org)

As a result, conflict among Gangjeong residents and organizations has come to a climax already (Oh, 2011). Now it is necessary to study the issue in terms of physical impact of the planning on the small community. Therefore, this thesis will present concerns about the Jeju Island naval base construction in order to find ways to mitigate the negative effects that are anticipated.

1. 2. Problem Statement

The navy base plan has generated two kinds of problems for the Gangjeong village: 1) social and 2) environmental. The project has been destroying the community unity in the processes of implementation, indeed the military base is bound to invade the residents' life (Cheong, 2012). Furthermore, the enormous construction will replace nature with concrete, and massive vessels and military equipment have brought nature pollution to Gangjeong village (Ko, 2011).

[Figure 1.3] The demonstrators against the Jeju naval base.

(Source: image from nobasestorieskorea.blogspot.com)

As I mentioned above, Gangjeong village has been divided into two parts of agreement and disagreement in the processing of Jeju naval base implementation from selection. Although originally Gangjeong village has been a peaceful community, now the village is so over-populated with residents, peace organizations, and policemen (Gwon, 2012). There are yes or no banners papering the entire village, and these days inhabitants never exchange greeting when they meet on the street if they have opposite opinion. Furthermore, police forces are protecting all gates in order to restrain objection protest by force. In the process of blocking, the police have been violated human rights by utilizing even private police force (see figure 1. 3) (Cheong, 2012). Besides, it is difficult to image that how much the huge scale of amenities for military families as well as local residents, such as sports facility, convenience facility, and religion facility, has an influence on the small village (see figure 1. 4). Generally, new military bases are likely to generate social agitation between the original local residents with new military population (Fois and Paragano, 2011). In addition, total activity population in the naval base is over 7,429 which are one third more than Gangjeong residents. The naval base project will require a lot of employees into the naval base for maintaining military facilities (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Only one construction project will bring about a larger population. Therefore, we will not be able to find a previous untouched look of Gangjeong village because of the Jeju naval base.

[Figure 1.4] Description of amenities for military families and local residents.

(Source: Main homepage of Jeju Island Naval Base)

Although the Gangjeong village is maintaining clean region, unfortunately large scale construction of Jeju naval base has threatened nature of water, soil, and air which plays an important role in the village of Gangjeong and Jeju Island environmentally. To begin with, the construction site is right next to two significant streams named Gangjeong stream and Ackgun stream. The both streams are the primary drinking water resource of Jeju Island south downtown as well as the surrounding Gangjeong areas since the Gangjeong village has retained fresh drinking water resources through the clean streams and some spring waters (Gangjeong village homepage). However, the huge construction project is likely to cause water contamination on nature habitat, especially sweetfish habitat during the both construction and operation periods. As large number of residents rely on the drinking water of Gangjeong village, it is directly

related to inhabitants' health. During the construction at nighttime, the construction lighting has a negative impact on wild animals' activities around the site, in particular lightning bug (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Additionally, a new major road for the Jeju naval base will cross the Gangjeong stream by having a negative influence on the stream. In addition, after construction, military activities and chemical substances are expected to generate soil and air contamination with a negative perception of people (Kim, 2004). Especially, earthwork of the Jeju naval base is a large amount which eliminates agriculture farm lands in the Gangjeong village (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009).

Therefore, the Jeju naval base has been generating negative social and environmental issues. Because the naval base project is large scale on the small community, it is likely to bring about huge changes in the neighborhood socially and ecologically. The new massive population will be an influx into the Gangjeong village within a short period, require daily-based facilities and general infrastructures, and rely on the local convenient facilities. In addition, the Jeju naval base tends to cause environmental negative effects on the surrounding areas such as soil and the streams contamination. Unfortunately, the construction site of the Jeju naval base is directly next to the Gangjeong and Ackgun stream by threatening animals and plants as well as regional residents. The construction area is 478,550 m^2 (118.25 acre) which involved large farming lands and some kinds of plants. The environmental changes will continue in a short period of time by the large-scale construction activities.

1. 3. Research Questions

The thesis will present for both military perspective and community perspective by taking a neutral attitude. Thus, before conducting research, it is useful to think that there are really possibilities and opportunities for both the Jeju naval base and Gangjeong to coexist together. Therefore, this study will address the primary research question.

- How can the relationship between the Jeju naval base and the village of Gangjeong reduce negative impacts on each other?

It will identify what strategies and which methods of design as well as land use will facilitate more positive co-existence and relationship between the Jeju naval base and the village of Gangjeong. Furthermore, this thesis will also address the flowing secondary research questions.

- What are the negative influence of the between Jeju naval base on the village of Gangjeong?
- Where are the potential positive synergies between Jeju naval base and the village of Gangjeong?

1. 4. Research Objectives

The research objectives have three goals according to process step including collecting data, analyzing, and recommending physical opportunities to alleviate negative influences on the village of Gangjeong. To begin with, data collection is the first goal to unearth compounds

related to the issues before analysis. Additionally, analysis is a second objective for alternative process by combining all data which are collected on a table, map, and so on. If the thesis reaches a first and second goal, it will show information about the issues, Jeju naval base plan, and around village in greater detail. The last goal is conducting finding alternatives for each perspective, military and community, to exist within one space. Therefore, the thesis has three objectives in accordance with each period to achieve answers and goals.

- Identify issues caused by the Jeju naval base in terms of environment, society, culture, economy, and transportation.
- Identify potential synergies that exist or can be created or strengthen between the Jeju naval base and the village of Gangjeong.
- Propose alternative environmentally sensitive physical plans that will capitalize on the assets of the area and mitigate the negative impacts of the area.

2. Literature Review

Studies regarding naval base constructions have focused mainly on the environmental, social and cultural, economic, and traffic systematic issues. Lots of experts have generally been concerned with the negative environmental impacts of naval base construction and operation on nature, humans, and the landscape. Some articles reveal social concerns such as population change, crime, and damage to local identity. On the other hand, many experts have expected economic benefits of a naval base to regional development, such as employment and social service. This topic is understudied, and therefore seven studies were used as the primary guiding literature. The first study, conducted by John M. Lowe, Jr. (1982) and titled "Trident Naval Submarine Base: Planning and Design", covers naval base design contents. The second journal article, "Fortress Guam: Resistance to US Military Mega-Buildup", deals with Guam Island, which has environmental and social conditions similar to Jeju Island. The third journal, "Okinawa and Guam: In the Shadow of U.S. and Japanese 'Global Defense Posture'" studied military bases in Okinawa, Japan and Guam, the United States. The fourth article, "The Social Impact of Military Growth in St. Mary's County, Maryland, 1940-1995", focused on St. Mary's County, Maryland, by illustrating economical positive effects of military bases. The fifth article, "'Autonomous Geographies' in the Anti-U.S. Military Base Movements", is a case of new U.S. military facilities in the small village of Vicenza, Italia. The sixth article, "Securing the U.S.-Philippine Military Bases Agreement of 1947", is about U.S. military bases in the Philippines. The final article, "Deploying Insecurity", demonstrated the negative influence of military bases on local communities by causing social and health problems.

[Table 2. 1] Literature Review of military base issues

Positive impact ⊕ | Negative impact ⊖ | Issues ✓

Journals' title	Environment	Society	Culture	Economy	Transportation	Base type
Trident Naval Submarine Base: Planning and Design (Kings Bay, Georgia, USA)	⊖	⊖		⊕	✓	Naval base
Fortress Guam: Resistance to US Military Mega-Buildup (Guam, USA)	⊖	⊖	⊖	⊕	✓	Air force | Naval base
Okinawa and Guam: In the Shadow of U.S. and Japanese "Global Defense Posture" (Okinawa, Japan & Guam, USA)	⊖	⊕ ⊖	⊖	⊕ ⊖		Air force | Naval base
The Social Impact of Military Growth in St. Mary's Country, Maryland, 1940-1995 (St Mary's County, Maryland, USA)		⊕ ⊖	⊖	⊕	⊖	Naval base
"Autonomous Geographies" in the Anti-U.S. Military Base Movements (Vicenza, Italia)	⊖	⊖				Military base
Securing the U.S.-Philippine Military Bases Agreement of 1947 (Philippine)				⊖		Military base
Deploying Insecurity (Japan, Korea, Philippines)	⊖	⊖				Military base

2.1 Environmental issues

All naval base projects have included an Environmental Impact Assessment (EIA) to figure out how much the naval project would influence the area environmentally, socially, and economically. In the case of Kings Bay, Georgia, the naval base project investigated environmental conditions through the Environmental Impact Study with a three-year selection process. In the main master planning stage, several experts such as planners, engineers, and scientist took part in a study of the existing facilities, operation requirements, and environmental constraints. The naval base project involved a waterfront, personnel support, industrial support, family housing, and recreation facilities on the area. Furthermore, the Environmental Impact Statement (EIS) included disposition of dredged materials, loss of wetlands, and impacts on endangered species, as well as forest management and sewage management. The final EIS revealed that the huge construction project led to a loss of habitat, including loss of wooded swamps, Manatees, and Indigo snakes. As a result, minimizing efforts have been conducted for the preservation of the natural habitat during the construction step and operation periods. Understanding site environmental conditions was inevitable through EIS in the Kings Bay project (Lowe, 1982).

The island of Guam, United States has a large scale of naval and military bases on the small island. According to LisaLinda and Gwyn's study, the National Environmental Policy Act had required the preparation of a Draft Environment Impact Statement (DEIS) about the environmental and social capacity of Guam between 2006 and 2009. The many environmentalists have been concerned about coral reef communities providing plentiful living

conditions for marine life, and they also have expressed warnings against huge dredging construction, which would have an influence on marine habitats (Natividad and Kirk, 2010).

According to the article of "Okinawa and Guam: In the Shadow of U.S. and Japanese 'Global Defense Posture'", Okinawa has a marine corps air station called Futenma, which has helicopters and aircrafts that create noise and pollution by flying low over the residential areas, school districts, and hospitals. In addition, though the governor, Madeleine Z. Bordallo, called sending the military base further into Guam due to some kinds of advantages, he had been concerned about possible damage to the local nature by the military base, particularly regarding the coral reef habitats (Yoshida, 2010). Furthermore, local residents and groups in Vicenza kept monitoring the negative environmental impacts from the construction of the military naval base because one of the common negative influences caused by military bases is increasing environmental contamination (Fois and Paragano, 2011). Additionally, according to Cornwell and Wells' article in 1999 related to U.S. military bases in Korea, Japan, and the Philippines, the military bases increased local health problems by causing damage to the social and natural environment due to the air pollution, toxic waste, and noise. For instance, in the Philippines, Dr. Rosalie Bertell in November 1998 disclosed that the outbreak of various kinds of illnesses, disabilities, and congenital problems emerged from the communities closest to Clark Air Base (Cornwell and Wells, 1999).

2. 2 Societal issues

Basically, the final Supplement of the Environmental Impact Statement (FSEIS) of Kings Bay project included socioeconomic impacts caused by population influx facilitated by family housing. FSEIS included efforts to mitigate identified physical and socioeconomic impacts, which would change the unique character of local identities (Lowe, 1982).

The study on Guam has been likely to approach social issues more carefully due to Guam's indigenous Chamorro people with local distinctive identity. The opponents have strongly expressed apprehension that the expansion of military bases on the small island would lead to disappearance of social, physical, and cultural features of Guam. Particularly, DEIS demonstrated that rapid population growth and change was one of the major concerns of Guam militarization. The estimated maximum influx of population is approximately 80,000, which is a 47-percent growth over the current level, including armies, family members, management staff, and construction workers. In addition, other issues relevant to society are potential increased crime rates and prostitution, and increased reliance on the U.S. central government (Natividad and Kirk, 2010).

In the case of Okinawa, Japan, the U.S. military base made a gate community called "American towns" involving schools, gyms, golf courses, shopping malls, and churches. The military base retains a fenced-in community without much social interaction between the base communities and the local residents. Another study of military bases in Guam illustrated both negative and positive social impacts by the military bases. Because Guam suffered from a deep slump in the 1990s and faltering tourism industry in the 2000s, economic leaders called for military bases on the island. This is because they expected that the new military bases and

investment would improve quality of life and infrastructure and increase population and local economy. On the other hand, the social advantages like facilities, utilities, and roads were not shared with all Guamanians, particularly native Chamorro people (Yoshida, 2010).

In the case of St. Mary's County, Maryland, while new culture and lifestyle had positive effects on the modes of dress, eating, recreation, and housing, all the new types of lifestyle caused somewhat of a confusion in the local residents due to the different mode of living. In addition, though the military bases had improved the quality of education and maintained white population, the military bases stimulated multiple problems such as social class structure changes, spreading slums, and rising crime (Hicks and Raney, 2003). Additionally, new military projects are able to cause turmoil to local communities. Through interview in 2010 with neighborhood associations of Vicenza, they considered the increase of military facilities and soldiers in their areas. This is due to the fact that they were thinking about the new soldiers as having occupied and stolen public spaces from the local residents (Fois and Paragano, 2011). Furthermore, according to a research of Okinawa Women Act against Military Violence, over 4,700 crimes were generated by U.S. military personnel, including rape, drug, and sexual violence. In Korea, an estimated 20,000 women work in the bars of *kijichon* for serving the U.S. military soldiers, leading to prostitution, sexual exploitation, and violence. Similar to Korea, a lot of women and children worked in bars, nightclubs, and parlors in the “sex tourism industry” in the Philippines. The “sex industry” serving U.S. armies had caused serious educational and health problems for women such as HIV/AIDS, unwanted pregnancies, alcohol dependency, and mental illness (Cornwell and Wells, 1999).

2.3 Cultural issues

In the studies of Guam, the military base expansion required 2,200 acres of landmass covering archaeological sites and beautiful beaches, intimidating the regional identity (Natividad and Kirk, 2010). Especially, Chamorro residents in Guam number from about 60,000 to 70,000 are concerned about damage to their regional identity and culture caused by sudden military population influx and off-island employees (Yoshida, 2010). Besides that, the new culture injection of the military population influx stimulated cultural and structural clash between the military population and local residents. Military bases were likely to lead to spoiling the peace, quiet, and sense of community (Hicks and Raney, 2003).

2.4 Economic issues

The Kings Bay project would be expected to increase new jobs by 11,500 with 21,500 additional people (Lowe, 1982). Furthermore, the residents' economic system in Guam has relied heavily on the U.S. military when it comes to supporting the armies and their families and funding education. The military bases are the major institution offering employment opportunities in which the employed residents are working for, serving, or supporting the professional soldiers and their family. Experts supporting the expansion of military bases have anticipated that construction boom has brought about economic growth with increased quality of service and amenities. The Guam Chamber of Commerce released a paper which was entitled "An Opportunity that Benefits Us All: Straightforward, Descriptive Paper on Why We Need the

Military Buildup," demonstrating that expanded military base would provide opportunities for creating employment, fostering business, creating profit, and enlarging tourism (Natividad and Kirk, 2010). The governor, Felix P. Camacho, and economic leaders greeted the Marine relocation into Guam Island passionately:

> "In a few short years, this is land as we know it, will be transformed by the work we do today. The Guam Buildup, as I like to call it, has generated much excitement and confidence in the future. The accompanying investments, construction and population growth will present tremendous opportunity for new and better jobs, higher wages and an improved quality of life for the citizens of Guam. We have only one opportunity to get it right. In this upcoming period of significant growth, we must not squander this precious opportunity. Our stewardship of the resources entrusted to us will determine the inheritance we leave future generation."

They expected the new military bases would generate growth of jobs and income, although the economic advantages were not relevant to the local economy of Guamanians (Yoshida, 2010). Besides, Van Der Merwe realized that military bases provided jobs in Namibia continuously and encouraged entrepreneurial activities. The regular income enabled local employees to have purchasing power and improve the local retail and wholesale activities. As the new populations and economic growth activities demanded more supply and services, it stimulated agricultural industry, transportation, and commercial services to grow suddenly. Moreover, the military bases improved property market conditions and land values by shifting from agriculture and fishing land to military use and middle-class whites housing (Hicks and

Raney, 2003). Additionally, an expert in the U.S. Department of Agriculture reported in 1939 that "Sugar Favors" might damage the Philippines instead of helping agriculture industry. Although they expanded and increased the sugar market, they did not share benefits with Filipinos (Shalom, 1990). Generally, the military base projects generate huge constructions and lots of facilities which tend to have a positive influence on the communities by providing opportunities for employment and service.

2.5 Transportation issues

A transportation system needs to be considered in constructing naval base projects. The influx of a large population requires a new efficient transportation system in those areas. At the Environmental Impact meetings in Guam in April 2007, transportation and infrastructure issues were one of the major discussions, such as controlling traffic flow during peak hours (Natividad and Gwyn, 2010). The Environment Impact Statement of Kings Bay project also involved mitigating elements in terms of roadways, parking areas, and railroads. To manage peak-hour traffic jams, the master plan included left turn storage, acceleration, and deceleration lanes according to design criteria made by the American Association of State Highway and Transportation Officials and Department of the Navy Design Manuals and Georgia Department of Transportation Design Standards. In addition, the transit plan covered speed design using speed bumps, pavement, and stop signs (Lowe, 1982). In addition, Clayton argued that new military bases generated suburban growth and highway development which caused highway congestion and smog (Hicks and Raney, 2003).

2.5 Regional journal literature review

[Table 2. 2] Number of articles about Jeju naval base

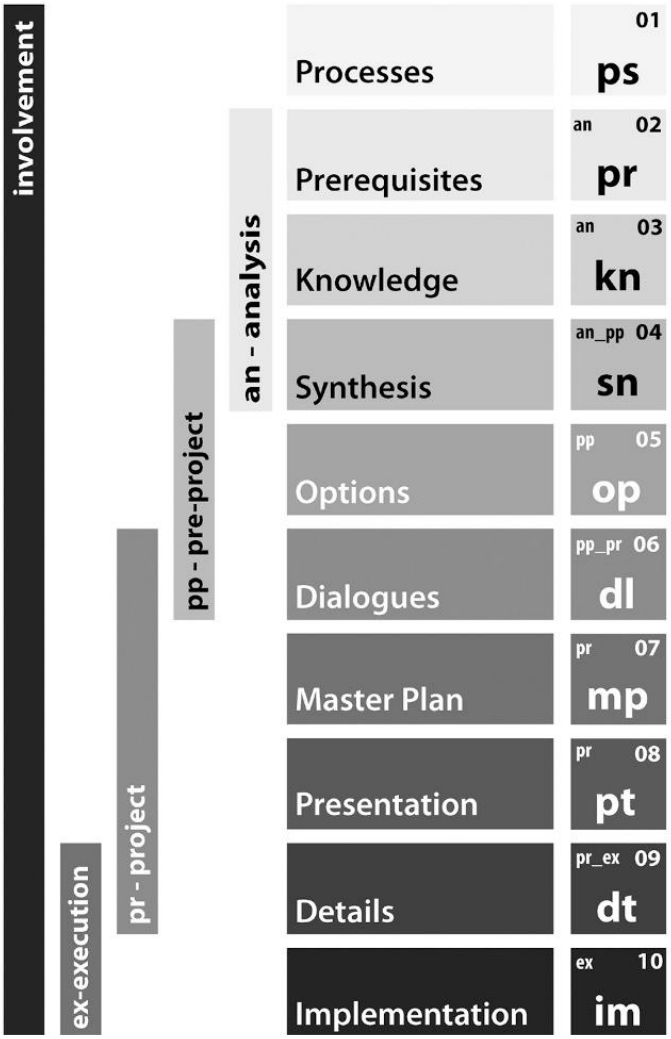
	Dissertation	Article
Political Science	9	14
Social Science	3	12
Economics	1	1
Law	1	5
Total	14	32

Basically, the Jeju naval base project gained a lot of attention on account of conflicts between the Jeju residents and government. Unaccountable political processes have been carried out, and these political decisions have been generating physical collision between residents and police force. The majority of the literature focuses on political and social science to deal with conflict between inhabitants and national administration.

Interestingly, though environmental problems are a key point of conflict about huge construction projects around the area (Song, 2012), there are few dissertations or journals relevant to the environmental impact on the Gangjeong village and their lives. In addition, although almost all articles refer to environmental problems of the naval base construction, there are no studies on how to buffer the area outside of Jeju naval base. In particular, the buffer area is the only zone in which experts will suggest social and environmental ideas in the near future. At this moment, it is the best time to peer into the buffer zone between Jeju naval base and Gangjeong village in order to judge how much Jeju naval base has an influence on the natural environment and how the navy base has an impact on local resident's lives.

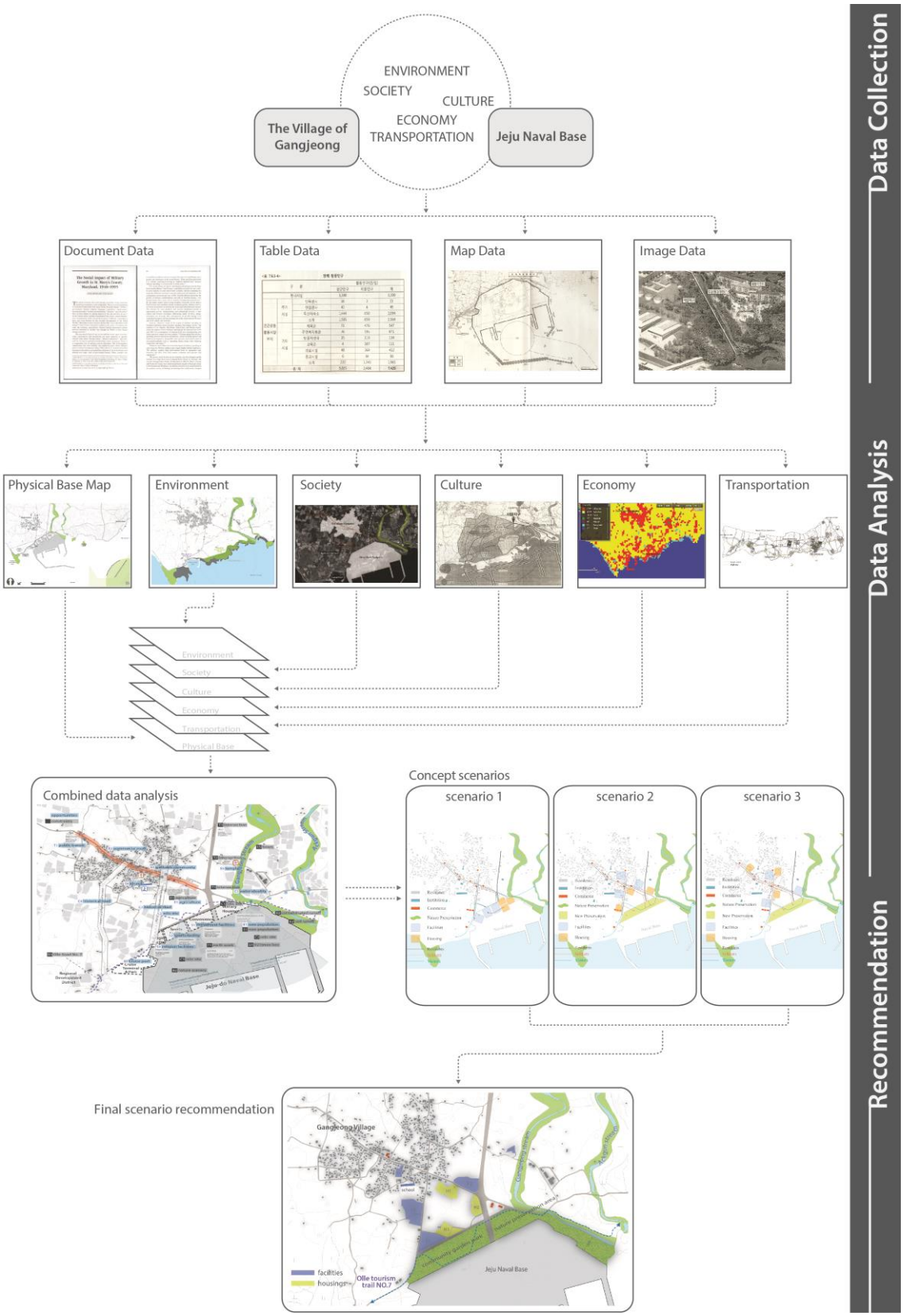
3. Methodology

The thesis methodology involves data collection, data analysis, and physical planning recommendation. The thesis will utilize primarily planning process (see figure 3.1) from a book of Urban Ecological Design 2011 by Palazzo, Danilo and Steiner, Frederick. The planning process follows each step from process to dialogues in order to figure out several elements of opportunities and constraints before suggestion of master plan. And then, the each factor is illustrated in one or several maps to understand opportunities and constraints at a glance.



[Figure 3. 1] The not-only-one solution process and its ten phases. (Drawing by Danilo Palazzo and Angela Colucci.)

Like the planning process, the research will collect data and conduct analysis in order to make a map of opportunities and constraints relevant to negative impacts and positive synergy effects generated by the Jeju naval base as a comprehensive analysis. The step of data collection and analysis will focus on environment, society, culture, economy, and transportation issues at the areas surrounding the Jeju naval base and Gangjeong village. Then, based on the information, the thesis will make a map to illustrate overall opportunities and constraints as a comprehensive analysis. According to the map of opportunities and constraints, three scenarios will be suggested to find the optimal methodology to mitigate negative impacts and increase synergy effects generated by the Jeju naval base.



[Figure 3. 2] Research plan.

3. 1 Data collection

To begin with, the first research plan is collecting data of the village of Gangjeong and Jeju naval base relevant to environment, society, culture, economy, and transportation at the areas surrounding the naval base and the village in order to figure out negative impacts and synergy effects of the Jeju naval base (see figure 3. 2). Data such as demographic, socioeconomic, environmental data will be utilized for realizing social-scientific circumstance of the Gangjeong village and the Jeju naval base. This will be retrieved from statistics, tables, graphs, maps, journals, books, and homepages of institutions. At first, the paper will include general information of Okinawa Island and Guam Island for understanding the whole Jeju Island when it comes to area size, population, and density. Then, particularly, as the project of Jeju naval base had received investigations of environmental impact assessment (EIS) under the lots of research around the construction area with experts in 2009, the EIS is informing plenty of data related to demography, society, economy as well as environment. In addition, collecting maps is important to illustrate history, spatial distribution, and transportation network at the past as well as current. Additionally, photograph is also essential to imagine the situations easily in a roundabout way.

3. 2 Data analysis

Analyzing the collected data will be carried out as a major step after getting information about Jeju naval base plan and Gangjeong neighborhood (see figure 3.2). The major performance

in the stage will transform the collected data into several layers of maps in order to analyze at a look, after gathering data in the form of text, table, and others. The data analysis step will produce the several types of maps related to natural, social, cultural, and economic environment and transportation system at the end of each field. Each type of maps involves specific fields' information. Furthermore, then each type of maps will be overlapping with each other map based on physical base map which is a current condition map of Jeju naval base and the Gangjeong village. The combined map will be utilized to explain opportunities and constraints to implement the construction and operation of the naval base at each specific area with exhibiting possibilities to mitigate negative impacts and increase positive effects. Therefore, this step will figure out opportunities and constraints elements on the buffer area between the naval base and Gangjeong village. The constraints and opportunities mapping will be utilized in order for exhibiting the map which is consolidated analysis at a look. The process will display which elements play a positive or negative role in specific spots.

3. 3 Recommendation

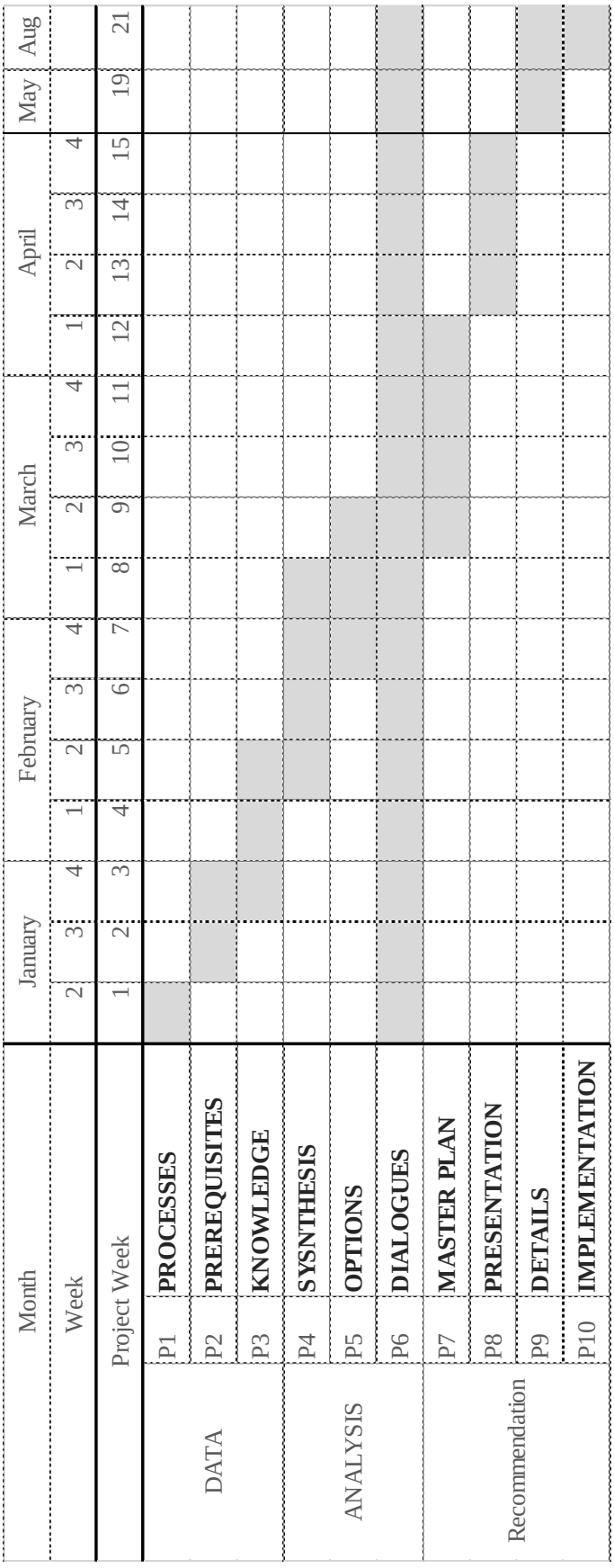
After the overlapped map exhibits opportunities and constraints at a look, the next step is to select some elements of opportunities and constraints that have possibilities to mitigate the negative effects and to develop positive impacts. In the final step, through the selection of elements, this thesis will present the three concept scenarios according to scenarios' character at the buffer zone between Jeju naval base and the village of Gangjeong (see figure 3. 2). The three

concept scenarios will have different character in accordance with mixed degree of each element selected in opportunities and constraints map. Some factors will be developed to make synergy effects and other factors will be complemented through different elements. Finally, one scenario will be developed to find the optimal relationship between the Gangjeong village and the Jeju naval base.

3. 4 Overall limitation

Because the Jeju naval base is still under construction, journals related to the Jeju naval base are based on hypotheses. As the construction process reaches roughly 60 percent, experts cannot get completed data that shows implication of the naval base after the construction and during the operation times. Thus, the great deal of data that the authors refer to in their journals came from other military projects. In addition, the experts have difficulty investigating the naval base, particularly environmental experts due to the characteristics of the military project. The construction site does not allow people who are not involved the project to visit the naval base site and the oceanfront. Furthermore, this thesis had difficulty in finding references related to the military documents, especially the Environment Impact Assessment of the Jeju naval base. Because the Plan of the Jeju Naval Base is a national secret document, this thesis had to rely on the EIA. Therefore, because of the characteristics of the military project, the secret documents could not be used as reference books.

3. 5 Timeline



Month		January				February				March				April				May	Aug
Week		2	3	4	1	1	2	3	4	1	2	3	4	1	2	3	4		
Project Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	21	
DATA	P1	**PROCESSES**																	
	P2	**PREREQUISITES**																	
	P3	**KNOWLEDGE**																	
ANALYSIS	P4	**SYSNTHESIS**																	
	P5	**OPTIONS**																	
	P6	**DIALOGUES**																	
Recommendation	P7	**MASTER PLAN**																	
	P8	**PRESENTATION**																	
	P9	**DETAILS**																	
	P10	**IMPLEMENTATION**																	

[Table 3. 1] Timeline table of methodology

4. Data and Analysis

In this chapter, data relevant to the village of Gangjeong and the Jeju naval base is collected and analyzed in terms of environment, society, culture, economy, and transportation. The data collection and analysis is to find methods to mitigate negative impacts of the naval base on the Gangjeong village as well as synergistic effects caused by living together in the same space and sharing environment, society, cultural, economy, and transportation. The information is primarily from the Environment Impact Assessment of the Jeju Naval Base in 2009, as well as journals, reports, and websites. By collecting data of each field, the analysis step figures out how each factor of the Jeju naval base affects the village of Gangjeong elements positively, and vice versa. After data collection and analysis of each field, overall information is analyzed synthetically at the end of each field with maps. The final comprehensive analysis will show opportunities and constraint factors to find synergy between the Gangjeong village and the naval base.

Before beginning data collection, it is a necessary stage to understand Jeju Island comprehensively to grasp the village of Gangjeong and the Jeju naval base in Jeju Island by comparing with Okinawa Island, Japan and Guam Island, the United States (see table 4. 1 and figure 4. 1). Interestingly, both the islands of Okinawa and Guam are military conflict islands as well similarly to the Gangjeong village. Jeju Island's area is 1,849 km^2 (456,897 acre) and is more than three times larger than Guam. The total island length is 73 km (45.4 mi) and the width

is 31 km (19.3 mi). The total population is 592,449 according to 2012 census data, and population density is about 320/km^2 (800/sq mi), which is three times less than Okinawa's population density about 1,015/km^2 (2,630.88/sq mi).

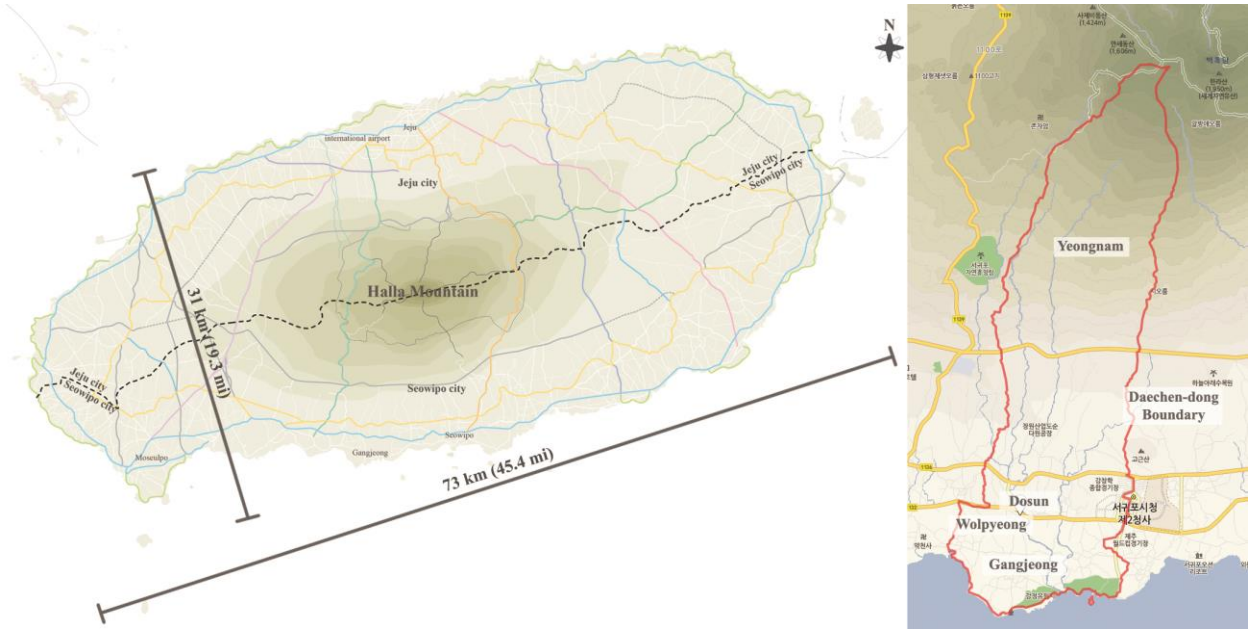
[Table 4. 1] Jeju islands comparison with Okinawa and Guam islands

	Jeju island	**Okinawa island**	**Guam island**
Country	South Korea	Japan	the United States
Area	1,849 km^2 (714 sq mi)	1,201.03 km^2 (463.72 sq mi)	541.3 km^2 (209 sq mi)
Population	592,449 (2012)	1,384,762 (2009)	159,358 (2010)
Density	320/km^2 (800/sq mi)	1,015.79/km^2 (2,630.88/sq mi)	320/km^2 (830/sq mi)

[Figure 4. 1] Maps of Jeju Island with Okinawa and Guam islands. (Source: Google map, Wikipedia, and Jeju Special Autonomous Province webpage)

Jeju Island has two cities, Jeju city at the north and Seogwipo city at the South of the island. The island capital is Jeju downtown, and Seogwipo city has one downtown called

Seogwipo (see left map of figure 4. 2). The village of Gangjeong is placed on the area to the left side of Seogwipo downtown and is included in Daechen-dong[1] in Seogwipo city. Daechen-dong has four villages including Dosun-dong, Wolpyeong-dong, and Yeongnam-dong, as well as Gangjeong-dong (see right map of Figure 4. 2).



[Figure 4. 2] Maps of Jeju Island district and Gangjeong village. (Source: Jeju Special Self-Governing Province web page and Naver Map Service)

[1] -dong means a village.

4. 1 Environmental realm

The life of Jeju Island has been heavily influenced by the large amount of natural resources such as soil, water, and wind. For example chronologically, the Jeju inhabitants had to retain community spring water areas to get drinking water before installation of infrastructure. In addition, since the agriculture industry was the major economic activity, the residents have had to be reliant on cultivating activities to harvest grains and fruits[2] through the natural fields. Besides, these days, the tourism industry has utilized the fabulous natural landscape spots located all around the island as a main resource. Therefore, both agricultural industry and the tourism activities play the most essential role in the Jeju economy currently as the top income means for each household.

As a result, the environment data is collected for the first time due to the importance of data for the residents' lives and the disputes between the Jeju naval base construction and the opposition arguments about the environmental damages. Basically, the data collection searches the features of geological, hydrological, and biological characteristics surrounding the Jeju naval base and the Gangjeong village. Additionally, environmental negative issues of nature scenery and huge earthworks by the large-scale constructions are also crucial information to comprehend the issues of the influence of the naval base. Since the inhabitants have been heavily dependent on the Jeju environment, a lot of natural features are anticipated to be related to social, economic, and cultural data. Thus, the environmental data collection is likely to be fundamental research for

[2] Because the Jeju Island has a mild climate in the southern most area of the Korean Peninsula, it is possible to cultivate subtropical fruits, in particular mandarin oranges, bananas, pineapples, and so on.

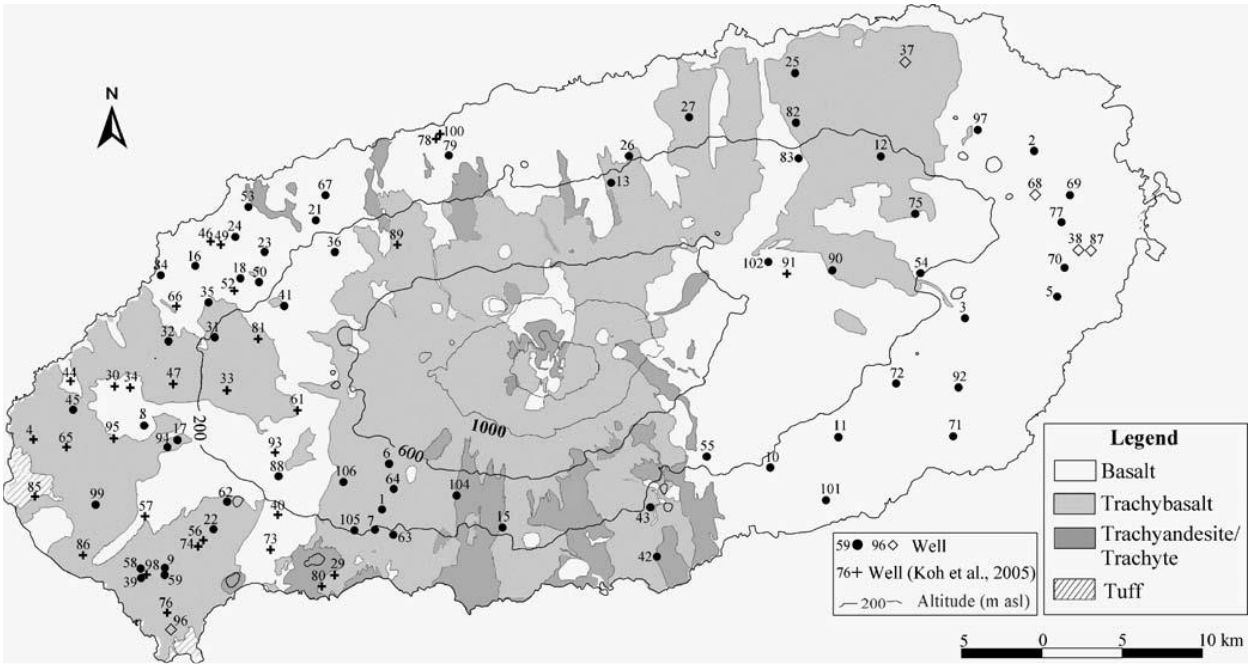
all data collection.

4. 1. 1 Geography data

The distinctive geologic feature of Jeju Island is that the Island is 90 percent basalt after volcanic activities five times during the times from the Tertiary to Quaternary period (see figure 4. 3 and 4. 4) (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). The Jeju Island was formed by volcanic eruptions 2 million years ago, and the island was formed by a lava plateau 600,000 years ago. In addition, the Baekrokdam crater was shaped in the center of the Halla Mountain which is the highest mountain in South Korea, more than 25,000 years ago. The ocean level reached the level it is still at today, and so the contour of Jeju Island retains the same form it had then. The island horizontal distance is about 73 kilometers (45 miles) from east to west, and the vertical distance is approximately 41 kilometers (25 miles). The overall slope of the island is a gentle condition within $3^0 \sim 5^0$ from the middle of the Halla Mountain (6,400 feet high) placed on the center of the Jeju Island (see figure 4. 3) (Report of Jeju Batdam Agricultural System, 2013).

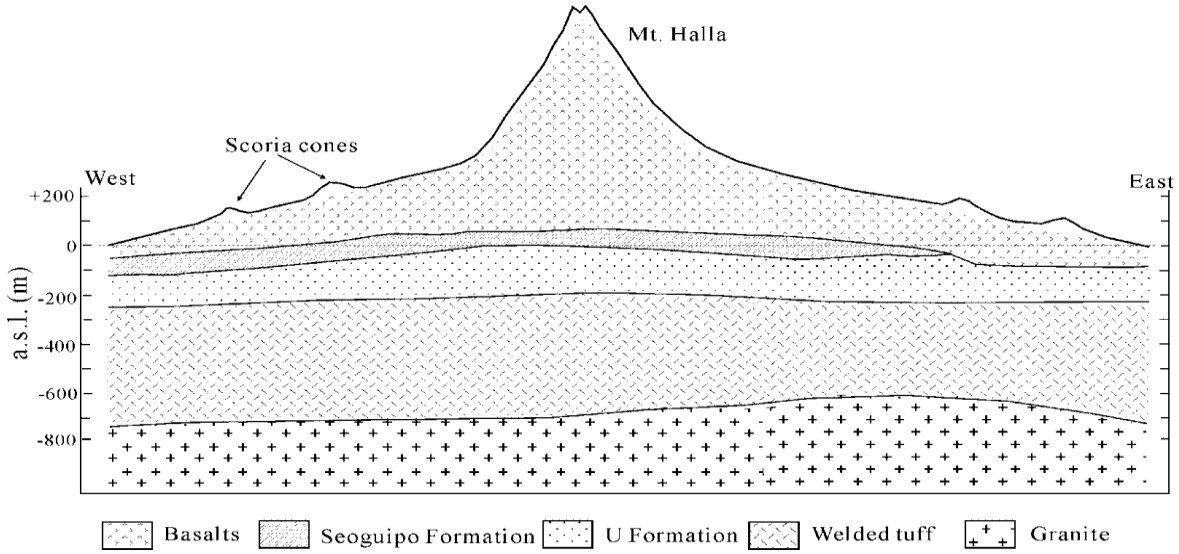
The geological characteristics are highly relevant to agriculture activity in the life of the Jeju inhabitants as well as the Gangjeong village residents. The volcanic activites created unusual different agriculture systems producing different kinds of crops and cultivation methods by adopting the unique soil condition. After five instances of volcanic activity, the volcanic ash covered 70 percent of soil on the island, and 60 percent of the land is arable fields (Report of Jeju Batdam Agricultural System, 2013). In addition, the most common agriculture type is dry-field

farming despite high precipitation. This is because the permeable basalt is comprised predominantly on the ground in which waters are easily accumulated and moving as accessible and exploitable resources (Won, Lee, Kim, and Koh, 2006). As a result, Jeju Island is mostly used for agricultural purposes and does not have many large industrial facilities. Most of agriculure land use fields are located on the coastal line areas 2000 m (1.24 miles) of less the ocean, while the mountain areas are concentrated on natural forest, grassland, and pastures with stock farming (Report of the general investigation of the mountainous area in Jeju Island, 1997). Similar to the entire Jeju Island environment condition, lots of the agricultural fields (grove: 4,969,431 m^2 / 1227.97 acre and paddy: 1,244,755 m^2 / 307.58 acre) cover the area of Gangjeong village (Gangjeong Village Website, 2012).



[Figure 4. 3] Surficial geology map of Jeju Island with groundwater sampling locations.

(Source: Effect of agricultural land use on the chemistry of groundwater from basaltic aq uifers, Jeju Island, South Korea, 2007)



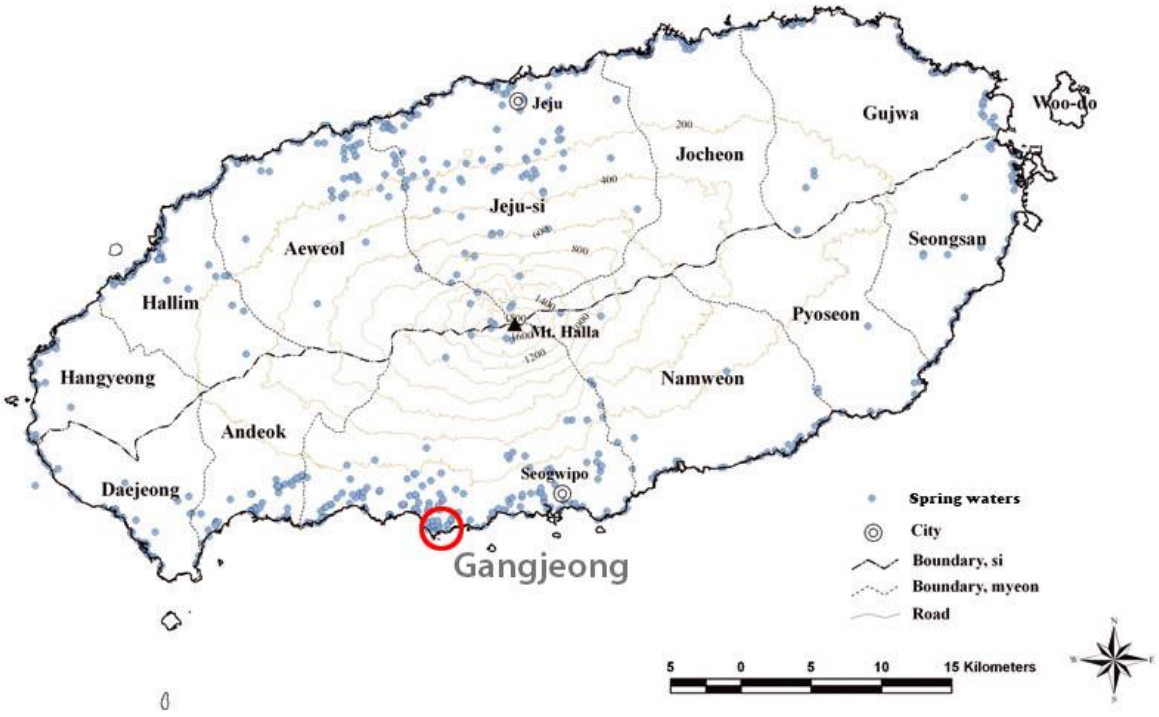
[Figure 4. 4] Lithologic cross-section along west–east direction in Jeju Island.

(Source: Hydrogeochemistry and environmental isotopes of ground water in Jeju volcanic island, Korea: implications for nitrate contamination, 2005)

4. 1. 2 Hydrologic Data

The village of Gangjeong has two valuable streams with several spring waters. In particular, the area surrounding Gangjeong village has large number of spring water spots rather than other areas, according to (see figure 4. 5). Basically, the geological feature of Jeju Island has made a unique water culture in the island. Because Jeju Island was formed by volcanic activity, the island features highly permeable ground condition and a large amount of basalt with less soil. This means that the amount of surface water on the ground is sparse and that indigenous people had suffered from the difficulty of getting drinking water. Thus, inhabitants had depended on spring waters which are generally laid along the coastlines in the island until modern infrastructure of water supply was constructed in the 1980s. Gangjeong community also had

relied on three spring waters to get fresh drinking water in the closed area. Therefore, as a volcanic island of Jeju, water culture is valuable resource and a unique feature in inhabitants' lives (Park and Ha, 2012).



[Figure 4. 5] Distribution of spring water wells on Jeju Island. (Source: Spring Water and Water Culture on Jeju Island, 2012)

The village of Gangjeong has two precious stream, Gangjeong stream and Ackgun stream, which always have water flow, while most of the streams in Seogwipo city have less water and narrow width usually. The two valuable streams are located on the right side of the village and preserved by the Jeju island government as a water source protection area. There are only four water source protection areas in Seogwipo city, and the Gangjeong village produces 25,000 tons of drinking water every day (see table 4. 2). The amount of water production is the

top level in the Seogwipo city. As the protection area is 254,000 m^2 (62.76 acre), the coverage is also far bigger than the other three water protection areas (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). As a result, the value of water is significant water resource for villages in Seogwipo city by providing the largest amount of drinking water to local inhabitants. The fresh water flow on the two streams represents the Gangjeong village worth and reveals the Gangjeong environmental value.

[Table 4. 2] Seogwipo water source protection areas in 2007

	Protection area	**Area (km^2)**	**Start date**	**Ability (ton/day)**	**Management**
Seogwipo	Gangjeong	0.254	07.23.74	25,000	Jeju-do
	Sangye	0.001	11.29.78	1,700	
	Gasimely	0.010	07.23.74	1,000	
	Hogun	0.001	11.29.78	150	

(Source: Yeongsan River Basin Environmental Office, Administration of City Water)

Due to the environmental significance, the two streams have been designated as an absolute preservation area (see figure 4. 6). The system of absolute preservation was enacted in order to preserve valuable environment areas eternally from thoughtless development activities in Dec. 1991. The areas designed as an absolute preservation area take only 10 percent of the entire Jeju Island, and the Gangjeong village has 826,194 m^2 (204.15 acre) absolute preservation areas within the two streams and the area of Jeju naval base[3] (Report of Environmental Impact

[3] Although the Jeju naval base area was designated as an absolute preservation area, the area has been lifted from the preservation area for in order to allow for the development if a national project. Kwon-il anticipated that the clearance of absolute preservation area in that area would generate opportunities to construct national projects. He thought it might be a starting point to intimidate the Jeju natural environment (Kwon-il, 2011).

Assessment of the Jeju Naval Base, 2009). This present condition exhibits that the Gangjeong village and the streams are important environmentally for the local and Seogwipo residents (Ko, 2011). Thus, because the right boundary of the Jeju naval base touches the absolute preservation area and Gangjeong stream, it is necessary to set up measures to mitigate the negative impact by the naval construction.

[Figure 4. 6] Current situation of the areas of absolute preservation areas around the Gangjeong village. (Source: Environment Impact Assessment of the Jeju Naval Base, 2009)

Just as other communities in the literature review suffered from environmental contamination caused by the military bases, the Jeju naval base could threaten the residents' health in the village of Gangjeong. Since the Jeju naval base was placed right next to the Gangjeong stream and created the huge construction and runoff, it has threatened the Seogwipo

and the Gangjeong residents' health. Although the Korean navy has tried to make a 40m (130 ft) buffer zone, it cannot recover the original clean nature and habitat. This condition would be likely to cause health problems similar to those in Okinawa, *kijichon*, and the Philippines. For example, the military bases gave rise to air pollution, toxic waste, and noise in Okinawa, kijichon, and the Philippines (Cornwell and Wells, 1999). Therefore, this naval base project relates to the clean supply of drinking water, local habitat, and the local health problems directly.

Although there are a large number of controversial issues related to riskiness on the front ocean by the Jeju naval base and operation battleships (Hwang, 2012), the issues are not mentioned in this thesis. There are two reasons; the first one is that the objective of this study is to alleviate the negative impacts by the Jeju naval base through practical measures within a spatial boundary; that is, this thesis is able to suggest methods solely for the outside of the naval base, not the inside of naval base. This is because the base was already beginning the construction after the legal construction permission, though the legal processes for Jeju naval base have been suspected of procedural justice. Consequently, the study can only touch the facilities for soldiers and the local residents at the outside of the major navy base. The second reason is related to the construction process reaching 60 percent presently (Lee, 2014). The rate of construction is passing half of construction, particularly in the ocean area. As a result, this thesis does not touch the area of the national defense project passed by law and the field constructed a lot already in order to consider more practical ways to mitigate the negative implications.

4. 1. 3 Current conditions of animals and plants

The large size of the construction area (478,550 m^2 / 118.25 acre) has 921 trees of many kinds of that should be implanted from the construction fields temporarily into other areas. Although the project district involves green space (65,013 m^2 / 16 acre, 13.58%) and landscape fields for each building, it is difficult that most of the trees will be transplanted in the green spaces within the construction period. Even though many trees have no preservation value because they are afforestation tree species, exist only as a windbreak forest, or were damaged by humans consistently, some trees that have good growth conditions and are easily planted will be implanted into the project area. Due to the current lack of plans for tree implantation, henceforward, the plan should suggest measures to implant the trees (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009).

The grand scale construction has an influence on the animals and their habitations during the construction and operation periods. Because lands surrounding the construction fields are agriculture farms mostly, the valuable wild animals do not live in the area. Additionally, it is also difficult that the new introduced species flow in and out of the surrounding plan area because they have no suitable place to live. However, the construction work tends to threaten the lightning bugs and sweetfishes owing to construction lighting at nighttime and soil runoff made by the construction work. Basically, the activity time of lightning bugs is night, and their activities are hindered in light. Thus, the night construction work and buildings' lighting at evening could play a negative role in the activities of lightning bugs. Moreover, the soil runoff may become a threat to menace to sweetfish habitation in the Gangjeong stream, especially during summer rain season (Report of Environmental Impact Assessment of the Jeju Naval Base,

2009). This situation is very similar to Kings Bay Project and the case of Guam in that the military base constructions threaten the local animals and habitats. According to the final Environmental Impact Statement, the massive construction generated a loss of habitat such as wooded swamps, threatening Manatees and Indigo snakes. Thus, efforts to preserve the natural habitats have been conducted during the construction and operation periods (Lowe, 1982). In the case of the Guam naval base, many environmentalists had warned that the huge dredging construction was having a negative influence on the coral reef communities and marine habitat (Natividad and Kirk, 2010). Therefore, during the operation period, the naval base will be likely to give rise to contaminated runoff, which would flow into the Gangjeong stream and the ocean.

4. 1. 4 Natural scenery issues

The large scale construction project has brought about natural scenery issues because the naval base occupies the fabulous view spot at the edge of the oceanfront (Ko, 2011). Basically, Jeju Island is very sensitive to scenery issues as the island has been keeping beautiful landscape, unique village scenery, and symbolism of Halla Mountain[4]. Building design is influenced by the natural situation, local building scale, and height relationship with Halla Mountain according to architecture law. Due to the scale and location of the Jeju naval base, the construction also has an impact on the natural landscape. In order to reduce the scenery damage by the large base construction, the project includes a scenery plan with local trees, a water park space at the coastline inside of the naval base, and the greenway area 40m (131 ft) wide where the project

[4] Halla Mountain is a landmark in Jeju Islan because the mountain places on the center of the island and its scale is large enough to be observed at the almost all points in the island.

meets Gangjeong stream (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009).

The naval base, however, blocks the sea view from the hinterland and Gangjeong village. In addition, the base construction fences hindered coastline pathways and Olle Roads course 7[5] already by having a negative effect on the tourism industry in terms of physical and perceptual view. In particular, the local streets and Olle Roads course 7 meet the naval base 5 times. Consequently, local residents and tourists will meet the naval base fences instead of fabulous ocean landscape at the points and the hinterland.

4. 1. 5 Earth work issues

[Table 4. 3] The amount of earth work on the ground and ocean

	Total	**Ground**			**Dredge**	**Reclaiming**	**Riprapping**
		Cutting	**Mounding**	**Total**			
Amount (m^3)	4,726,227	415,670	437,267	852,937	1,524,048	1,246,769	1,102,473

(Source: Environmental Impact Assessment, 2009)

The earth work has brought about a large amount of cutting and mounding of the ground on the naval base. As mentioned in the end of hydrology data, the rate of naval base construction is approximately 60 percent at this point, particularly in the oceanfront area. The groundwork has required 4,726,227 m^3 earthworks totally on both sides of the ground field and ocean area (see table 4. 3) (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). The

[5] Olle Roads: This is a new type of tourism that enables visitors to walk through several coastline courses in order to experience the Jeju nature and life in person. The new type of tourism is explained in the economy field.

much larger amount of earthworks has been carried out on the ocean rather than ground area. On the ground, the earthworks have required a total 852,937 m^3 of construction which means that the large amount of earthworks transform the ground shape from the original form in the short period from about 2010 to 2015. The large amount earthwork conducted rapidly on one site would lead to risk environmentally.

Furthermore, the earthwork on the ground will eliminate farming areas and greenhouses, and orchard fields. Except for the rocky terrain, which was an absolute preservation area before the Jeju naval base occupied, most of land use is agriculture fields which are about 276,420 m^2 (68.3 acre). Consequently, the gross earthworks have caused loss of agricultural land use and negatively impact farming lands surrounding the naval base, and so the naval base plan has to suggest measures to improve agricultural industry according to a review of the Ministry of Agriculture (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009).

4. 2 Societal realm

The second stage of collecting data is on characteristics of parts to society including organization of space, demography features, land use, and new civilian-military facilities in the village of Gangjeong. In the society part, current societal features are collected, and another societal feature, expected social aspects under the influence by the Jeju naval base, is also gathered. Understanding spatial composition of the study area is the basic first step for explaining the social phenomena as well as situations within the area. Additionally, the Jeju naval base will bring about 7,429 new people to the population including soldiers, their family members, facility workers, and others, although the population of the Gangjeong village is just about 5,366 (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). The new population is expected to rely on local services like fundamental convenient facilities and education. The large population change also will have an influence on the village of Gangjeong. Furthermore, current land use of the area is explaining the space organization characteristics of each specific area spatially. The land use data is necessary to identify spatial composition and order of the community. Therefore, society data relevant to organization of the village space, demography, land use, and the civilian-military facilities are collected in order to comprehend current social situations, anticipate future changes by the Jeju naval base, and produce the social opportunities and constraints map.

4. 2. 1 Society spatial composition

Within the village of Gangjeong (see Figure 4, 7), there are some local streets connecting two areas of Gangjeong village and Jeju naval base, and the distance is approximately 300m (1000ft). When using the shortest local roads, people can walk the 600m (2000ft) to the village center of Gangjeong from the Jeju naval base in eight minutes. Because of a new street installation for the Jeju naval base, the number of connection options through streets is six within the area. The major commercial street is passes the middle of the village, crossing the new main naval base street, and reaching at the downtown named Seogwipo city. The new main street for the naval base will reach a highway connecting another military base in 30 minute and the Jeju international airport within 1 hour through a vehicle.

[Figure 4. 7] Current organization of space in the village of Gangjeong (Source: Daum satellite map_www. http://map.daum.net)

4.2.2 Population influx and social changes

As [Table 4. 4] represented new population, the project will bring about 7,429 new people to the population (estimated by the naval base plan) in the site area from outside of the Gangjeong community. The new population includes 3,300 inside military members and 4,129 people outside of the base such as soldiers, facility users and managers, and service providers. The outside populations within both housing and facilities for civil and military purposes are approximately 2,404 including military family members and users and managers of the facilities who will commute from around cities to the military base and vice versa. The military families are expected to go to business in the downtown area as well as Gangjeong village and to surroundings of schools. Additionally, the facility users, totally about 1,745 people (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009), are anticipated to stimulate more pedestrians, traffic, and activities on the surrounding streets.

[Table 4. 4] Total active population of the Jeju naval base

			Active Population		
			Stationed People	Users	Total
Inside of the Base			3,300	-	3,300
Outside of the Base for Civil and Military	Housing	Single House	18	3	21
		Row House	43	6	49
		Apartment	1,444	650	2,094
		Total House	1,505	659	2,164
	Facilities for Civil & Millitary	Sport Facility	71	476	547
		Community Center	76	595	671
		Visitor Center	15	119	134
		Education Center	4	107	111
		Medical Facility	48	364	412
		Religious Facility	6	84	90
		Total Facility	220	1,745	1,965
Total Population			5,025	2,404	7,429

(Source: Environmental Impact Assessment of the Jeju Naval Base)

The other cases of military bases in the literature review expressed caution against new population influx into the local communities. The Final Supplement of the Environmental Impact Statement of Kings Bay Project made an effort to minimize the negative impact that the new population had on the local residents (Lowe, 1982). In the case of the Guam military base, the new population of 80,000 , approximately 47 percent, was made up of off-island people, including soldiers, their family members, management staff, and construction workers. Thus, indigenous Chamorro people had to try to maintain their social, physical and cultural features (Natividad and Kirk, 2010). Because the number of new population generated by the Jeju naval base will be more than twice the number of Gangjeong residents, both the local residents and the Korean government should be concerned about great changes, that the brand-new population could have a negative influence on the local residents.

The new influx of population will use the local accommodations as needed daily-based amenities such as commercial, public, and educational facilities. The distance between the center of Gangjeong village and the Jeju naval base is a walkable length of eight minutes. The primary commercial street has 15 daily convenience facilities such as grocery stores, restaurants, banks and so on, while the village of Gangjeong has 33 amenities. Since the 33 conveniences are based on current surrounding residents and tourists, kinds of convenient facilities on a larger scale are anticipated to emerge in order to support the new incoming population as a new commercial supremacy. Although the Jeju naval base is composed of sports, convenience, and religion facilities next to the outside of the base, the new population should rely on the local services to live better lives outside of the military base. The demand for basic amenities is expected to help the regional neighborhoods socially and economically by bring about increases in sales in the

local facilities with new customers and new types of convenient stores. On the other hand, the frictions between local residents who hold unfavorable opinions of the Gangjeong naval base and the new military population are expected to increase when they utilize the local convenient stores.

The brand-new population of about 7,429 is over one third the number of the Gangjeong village population which is about 5,366. The large population will flow into the area during a short period of time. Because the neighborhood infrastructure and daily services are based on current residents of the Gangjeong village, the new population and Gangjeong inhabitants could suffer from shortages when it comes to traffic congestion, education services, and daily services provided by the neighborhood. Basically, almost all local streets have only two-lane roads based on the present local residents. Even though the project considered the new broad traffic street connecting the naval base with the downtown area, the local airport, and other military bases, they had less consideration for solution methods for induction traffic by the new population influx on the local roads around the navy base. According to the master plan of the Jeju naval base, the solution to the new induction traffic is that the new population can use the new wide street with the expectation that they will rarely drive the local roads. Even if the new population just use the new huge street, the large-scale road is likely to lead to more vehicles to three intersections with the local roads. Moreover, the increasing need for education services is expected to emerge with the new population and facilities staff. Though most housing units are for single families, some housing provisions are for the whole household. Additionally, facilities managers are likely to bring about their families within the surrounding area. Therefore, the large-scale project should bring about the new population influx and the new households with requirements of educational service.

4. 2. 3 Land use

[Table 4. 5] Gangjeong village land use composition in 2008

	Grove	Paddy	Forest	Vacant lot	Road	Stream	Others	Total
Area (m^2) / (acre)	4,920,000 / 1215.75	1,080,000 / 266.87	3,570,000 / 882.16	680,000 / 168.03	740,000 / 182.85	730,000 / 180.38	3,930,000 / 971.12	15,650,000 / 3867.19
Percentage (%)	31.44	6.90	22.81	4.35	4.73	4.66	25.11	100.00

* Others: orchard, industrial land, school, parking lot, parks, cemetery, and so on

(Source: Seogwipo statistics annual report 2008)

The large amount of land use surrounding of the village Gangjeong is the agriculture land (see table 4. 5). Almost 31 percent of dry farming land covers the village of Gangjeong currently. Since the mandarin orange industry is one of the most productive industries on Jeju Island, Gangjeong village also has many mandarin orange fields around their residential area. Interestingly, the village has some paddy fields, while the entire Seogwipo city has only 0.54 percent paddy field. The figure of 6.90 percent, roughly 12 times more than the Jeju Island, represents that the village of Gangjeong is a water plentiful community and the water resources play a significant role in the farming industry. In addition, 22 percent of the village land use is woodlands, although the surrounding study area has no forest land. Generally, almost all woodlands are located on the northern mountain area of the village. Besides, because the category of others includes orchard land, the land use for agriculture should be higher rather than the table 4. 5 figure. Therefore, according to the current land use composition of the Gangjeong village, agriculture plays an important role in the village industry both economically and socially. The spatial distribution of the large agriculture fields has an influence on the landscape of Jeju Island as well as the village of Gangjeong by enhancing local culture and maintaining their society.

[Figure 4. 8] Current land use map surrounding the village of Gangjeong.

(Source: Environmental Department of spatial information service)

The above current land use map exhibits coverage of agricultural land use spatially and visually (see figure 4. 8). According to the map, the Gangjeong residential zone is surrounded with farming land uses including orchard, greenhouse, and dry agriculture as well as paddy fields (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Organizationally, the orchard lands and greenhouse fields are permeating into the residential area. Furthermore, the construction site of the Jeju naval base encroaches not only on the oceanfront area but also on grove lands and paddy fields a great deal, which is about 276,420 m^2 (68.3 acre). Additionally, the hinterland between the Jeju naval base and Gangjeong village is used in agriculture lands including greenhouses, dry agriculture, and orchards.

4. 2. 4 Military facilities for the local residents

The naval base plan involves civilian-military facilities for the soldiers and the local residents in the scheme of the Jeju civilian-military complex port. The overall scheme is that they will try to develop the village of Gangjeong and mingle with the local residents by supporting agriculture and providing welfare facilities (Report of Drawing Gangjeong Green, 2010). The list of facilities is sports facility, welfare hall, education center, medical facility, visitor center, and religious facilities including Buddhism, Catholicism, and Christianity. The area of the welfare facilities is 27,198 m^2 (6.72 acre) which is 5.68 percent of the entire naval base, and the area of the religious facilities is 6,885 m^2 (1.7 acre) which is 1.44 percent of the whole area (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Through these strategies, the Jeju navy is expecting that the naval base including the welfare plan for the Gangjeong village should help the local residents' lives (Han, Ko, Jung, and Ko, 2009).

However, there are still many discussions about operating the military-civilian complex port successfully. Although the Republic of Korea Navy proposed facility programs, they did not explain how the local residents would utilize the facilities in detail. The facility programs are based on the necessities for a general military base, such as sports facility, religion facility, medical facility, and visitor center. Additionally, the facility buildings will be located right next to the Jeju naval base boundary. Though the local residents will be able to walk there in 10 minutes, they could feel as if the facilities just belong to the naval base. The "American towns" in Okinawa Island is a good example that the Jeju military-civilian complex port has to avoid. Although the "American towns" have useful facilities involving schools, gyms, shopping malls, and churches, the regional residents cannot access the facilities (Yoshida, 2010). Therefore, to

become the military-civilian complex port, it is necessary to consider more how the Gangjeong and Seogwipo residents would share the facilities easily.

4. 3 Cultural realm

It is expected that the cultural phenomena will be influenced by the project of the Jeju naval base since the naval base will cover a large amount of the area in the Gangjeong coastal region and bring about a great deal of the new out-of-town people. As illustrated in the literature review chapter, the islands of Guam and Okinawa tried to maintain their unique local identities. The military base expanded and covered archaeological sites and natural beaches in Guam Island, threatening the local cultural inheritance (Natividad and Kirk, 2010). Chamorro residents had to make an effort to preserve their identities from sudden population influx caused by the military base (Yoshida, 2010). According to Hicks and Raney's article in 2003, the cultural injection is inevitable and the new population could cause cultural and structural clashes with the local residents (Hicks and Raney, 2003). Therefore, this cultural realm collects data related to the local identity and historical features in the area of the Jeju naval base.

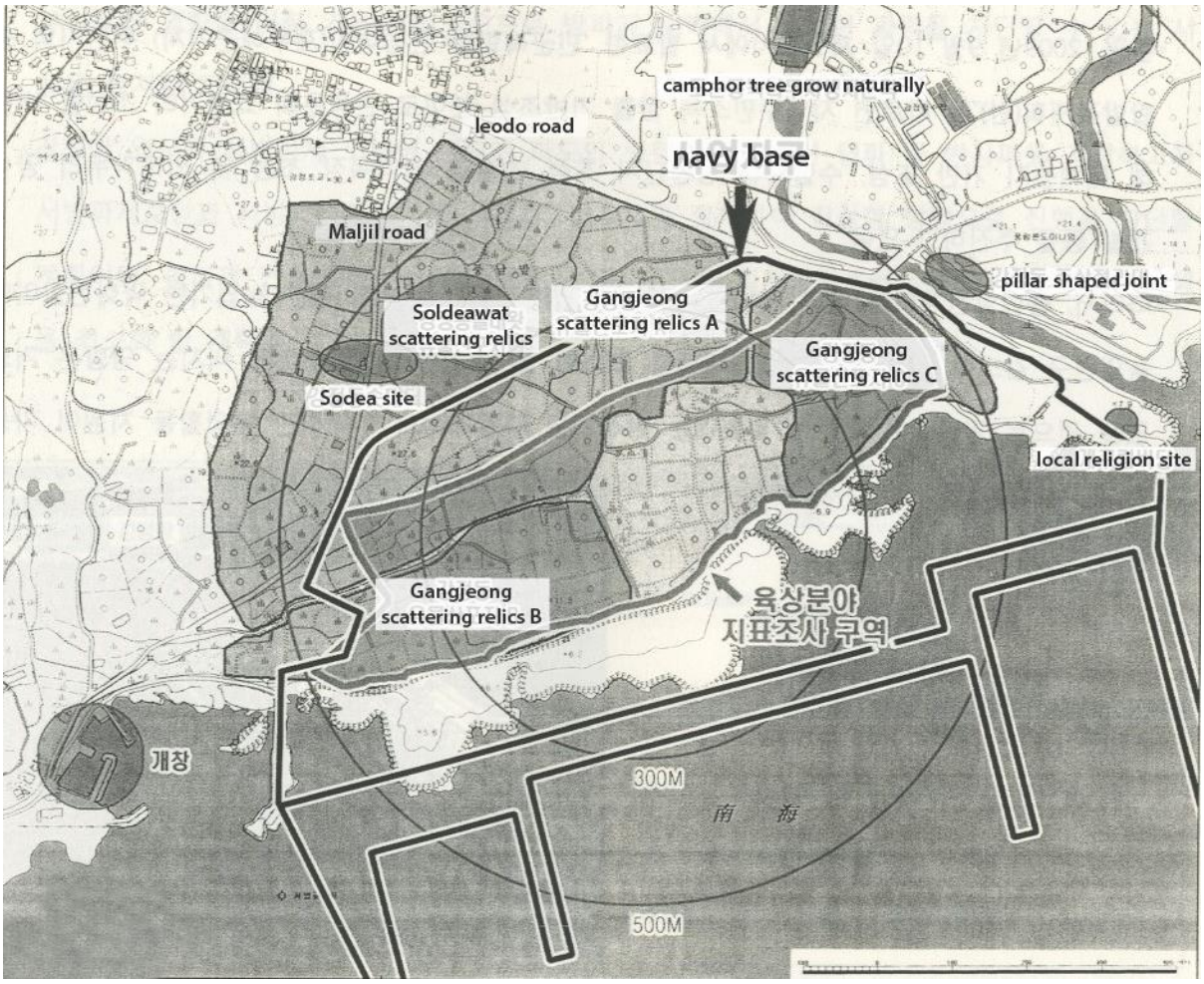
4. 3. 1. Gangjeong cultural identity

To begin with, the village of Gangjeong has a deep relationship with water resource through spring waters and streams. The name Gangjeong (江汀) means 江 (Gang) is an enormous stream and 汀 (Jeong) is a fresh water along a small stream. The name reveals the community characteristic, water, as one of the most significant identity element for the Gangjeong village. There have been many water resources surrounding the village area for quite a long time, and the water quality has value because the water is naturally cleaned and emerges

at the end of island areas still. Seogwipo city, the southern area of downtown Jeju Island, has been relying on a large amount of drinking water (80 percent) from the Gangjeong stream which is placed on the immediate right side of the Gangjeong village (Gangjeong Village Website). Therefore, the water resources have to be preserved as a valuable natural source in order to maintain the identity of Gangjeong village.

4. 3. 2. Gangjeong historic sites

As figure 4.9 exhibits the distribution of historical sites surrounding the area, there are some historical sites that have a preserved value around the construction area. The several historic sites are placed on the naval base site directly, including the Gangjeong scattering relics A, B, and C. The Gangjeong scattering relics B and C sites are located on the inside of the Jeju naval base. On the other hand, the Gangjeong scattering relic A is located on the edge of the civilian-military facilities construction site (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Thus, the apartment site plan at the Gangjeong scattering relics site A was changed by revealing some area (2370.2 m^2 / 0.58 acre) and covering the remainder of the site (1157m^2 / 0.28 acre). Additionally, there are some valuable historical and natural sites that should be preserved surrounding the Jeju naval base along the Maljil road and the Gangjeong stream.



[Figure 4. 9] Distribution of historical sites surrounding the Gangjeong village.

(Source: Environment Impact Assessment of Jeju Naval Base, 2009)

The village of Gangjeong has two valuable historical roads named the Maljil and Gangjeong Tongmul roads. The history of Maljil expresses that the way was used as a pathway for horses because there is a spring water for residents and horses at the end of the road. The word “Tongmul” means a drinking water well, which was used as a pathway for residents who wanted to get drinking water (Gangjeong Village Website). Both roads have treasured the local histories and the village’s original physical form along the roads by illustrating the local identity. Fortunately, the Jeju naval construction does not touch the two roads, and the Maljil road is

brushing against the naval base. Due to it being the second most bustling street, the Maljil road and its connection with the naval base plays a useful role in improving the relationship between them.

4. 4 Economic realm

The Jeju naval base project has a deep relationship with the Gangjeong village economy during the construction as well as the operation period. The large-scale construction has required a large number of employees such as construction workers and facility managers. The large-scale construction project requires roughly two years, 4,726,227 m^3 earthworks, and needs a great amount of construction work and construction materials. The naval base community includes many types of facility programs, such as medical, educational, and sports programs that should lead to special employees (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). In addition, the navy base project plan should bring about the new population influx that is approximately 7,429 soldiers and military family members who are likely to depend on the region services and amenities. Due to the brand new population, other kinds and sizes of convenient facilities will emerge in order to support them and create benefits. This will be a good source of business. Furthermore, the navy authorities prepared a cruise port with 150 thousand ton cruise ships in order to bring about many visitors from outside the country into the village of Gangjeong. Despite this preparation, many experts have been doubtful about the possibility of the implementation of the cruise port in terms of the environment and economy. If the naval base carries out the role of the cruise port moderately, it will help the village of Gangjeong economically by bringing about more visitors.

There is a large number of pros and cons of economic effects on the village of Gangjeong. Generally, residents' opinion, environment groups, and non-governmental organizations (NGO) have a negative view of the economy, while the Jeju naval base has

claimed economic advantages with statistical data (Roh, Koo, and Kim, 2008). The Jeju naval base has argued that this naval base project will create negative consequences for local economy growth through the regional development plan. The plan illustrates that the large-scale construction will have a positive effect on the construction industry and the employment field during the construction period. After the construction of the navy base, the large military base is expected to circulate a large amount of funds among the local economy through employing the local employees, bringing about tourists, and providing daily facility services. The new population will play a positive role in increasing tax revenue for the local government. In terms of inducing more tourists, the project will attract visitors like family members and friends through conferences, cultural events, and cruise ships. Additionally, the project has prepared facilities relevant to education, convenience, and welfare for the local residents. However, the opposite position has estimated that the naval base will have a negative influence on the local economy. They use example data of other cities which have military bases leading to the decrease of real estate value and population. In addition, they have claimed that the operation funds will be used for the military personnel, not infusion into the local economy circulation. Besides, the naval base placed on the fabulous coastline will have a negative impact on nature tourist attraction (Han, Ko, Jung, and Ko, 2009).

Therefore, the economic data includes the industry data, agriculture data, tourism industry, commerce, and influences of the naval base facilities and the cruise port. Basically, agricultural industry plays a significant role in the Gangjeong village economy, like the social data explained above. Tourist industry data is required as the Jeju Island makes a great deal of profit through the tourism industry which is also affecting the Gangjeong village. The village has

an obvious major commercial street supporting the current local residents. Some studies, including the Environment Impact Assessment of the Jeju naval base in 2009, illustrate economical influences on the village through facilities and the cruise port of the Jeju naval base.

4. 4. 1 Industrial data

Fundamentally, according to the Seogwipo city[6] statistical annual report in 2008, business of Seogwipo city has 11,776 stores by employing 45,758 employees. For the number of stores by industrial size, the wholesale and retail trade has 3,362 stores (28.6% of total) accommodation and food service activities has 2,927 stores (24.9% of total) and membership organizations, repair and other personal services has 1,265 stores (10.7% of total). Additionally, the for number of workers by industrial divisions, accommodation and food service activities employs 8,746 employees (19.1% of total) the wholesale and retail trade employs 8,438 employees (18.4% of total) and education business employs 4,007 employees (0.8% of total) (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). The business of accommodation and food service activities has an influence on the entire Seogwipo city. This is due to the fact that the Jeju service industry is supporting tourists as well as the Jeju residents. Consequently, the tourism industry has a value to be developed and preserved because it plays an important role in Seogwipo economy.

[6] Seogwipo city: Seogwipo city includes Daechen-dong involving Gangjeong village as it embraces the southern half area of the Jeju Island.

[Table 4. 6] Daechen-dong[7] number of workers by industrial divisions in 2012

Unit : Person **2012 year**

Industrial classification		Daecheon-dong	Percent
A	A. Agriculture and forestry Fishing	68	5.6%
B	B. Mining and quarrying	-	
C	C. Manufacturing	24	2.0%
D	D. Electricity, gas, steam and water supply	6	0.5%
E	E. Sewerage, waste management, materials recovery and remediation activities	18	1.5%
F	F. Construction	47	3.9%
G	G. Wholesale and retail trade	208	17.1%
H	H. Transportation	89	7.3%
I	I. Accommodation and food service activities	215	17.6%
J	J. Information and communications	59	4.8%
K	K. Financial and insurance activities	120	9.8%
L	L. Real Estimate and rental house	13	1.1%
M	M. Professional, scientific and technical activities	3	0.2%
N	N. Business facilities management and business support services	13	1.1%
O	O. Public administration and defense ; compulsory social security	28	2.3%
P	P. Education	102	8.4%
Q	Q. Human health and social work activities	51	4.2%
R	R. Arts, sports and recreation related services	95	7.8%
S	S. Membership organizations, repair and other personal services	60	4.9%
Total		1,219	100.0%

(Source: Seogwipo City Statistic Office, 2012)

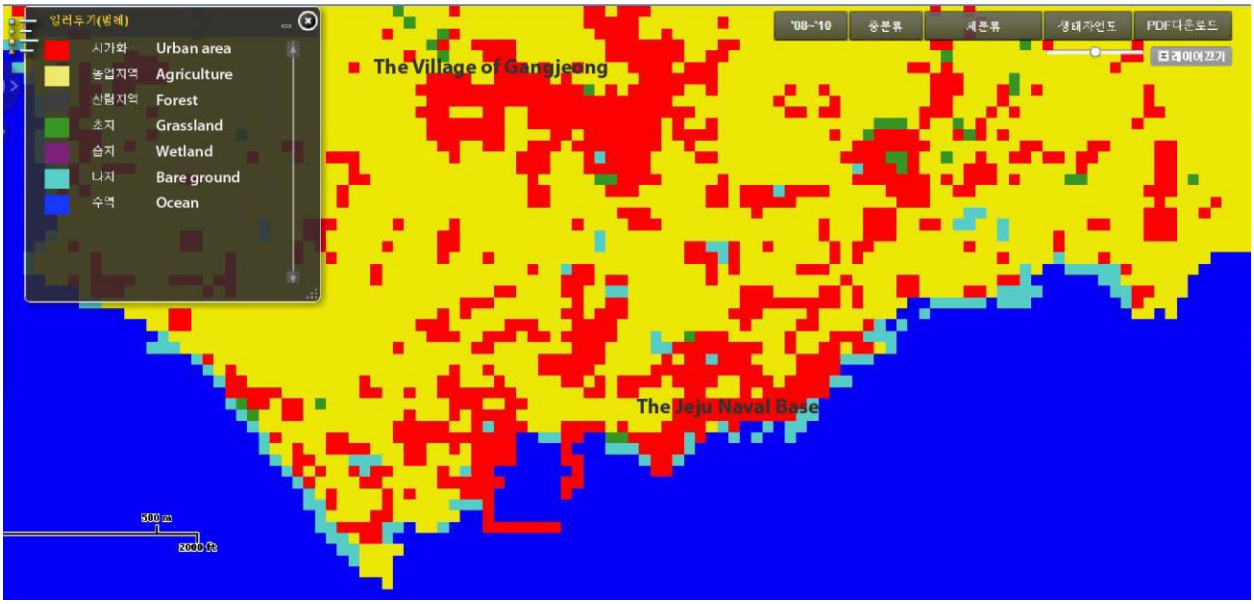
[7] Daechen-dong: The village of Gangjeong is included in the Daechen-dong community which has Dosun-dong, Wolpyeong-dong, and Yeongnam-dong, as well as Gangjeong-dong.

To comprehend the Gangjeong village economy characteristics specifically rather than the broad Seogwipo data, Table 4.6 provides a breakdown of the number of workers in each industrial classification in 2012 for the district of Daechen-dong, which is used as index of the Gangjeong industry. According to table 4.6, the largest employment business is accommodation and food service activities, employing 215 employees (17.6% of total). The second largest employment field is the wholesale and retail trade, with 208 employees working in the area (17.1 % of total). Third is financial and insurance activities employing 120 residents (9.8% of total). Similar to the Seogwipo city economy data, the Gangjeong village economy is also relying on the accommodation and food service business as well as the wholesale and retail trade commerce. The village of Gangjeong and the area surrounding of the village have many tourism resources like Bum Island, Gangjeong stream, and ocean landscape with warm weather. The natural resources bring in many visitors who are looking to enjoy the natural environment. Several accommodations provide room and board for visitors near the coastline. From the viewpoint of the wholesale and retail trade business, the major commercial street placed in the middle of Gangjeong is the most important district to maintain the Gangjeong village economy.

4. 4. 2 Agriculture industry data

The importance of agriculture is illustrated through the table 4. 7, Gross Value Added and Factor Income by Economic Activity in 2010. An overall land use map is provided in figure 4. 10. As social data explains the significance of agriculture spatially, the map illustrates the large area agriculture land occupies in the village of Gangjeong. Except for some red color areas, green color dots, and sky-blue color dots, almost all the land use are agricultural fields the

surrounding village and naval base. This means that the community utilizes most the land for agricultural industry except for residential and commercial areas. This industrial and spatial feature is influenced by the environmental characteristics of soil condition and the climate that makes Jeju Island able to grow subtropical fruit, in particularly mandarin oranges. Consequently, like Jeju Island, Gangjeong village also depends on a large amount of fields in order to nurture agriculture industry.



[Figure 4. 10] Current land use map surrounding study area broadly. (Source: Environmental Department of spatial information service)

The agricultural industry has produced a large amount subtropical fruit every year in the Seogwipo city, representing a significant amount of the industry showing table 4. 7 (Report of Gross Regional Domestic Product by si, 2012). According to the report of Gross Regional Domestic Product based on 2010's statistics in Jeju Island, although the industries of agriculture and fishing, human health and social work activities, and mining and quarrying decreased in a

2010, the total gross value of agriculture and fishing represents a large portion of Seogwipo city industry (about 34 percent). The real rate of growth of the agriculture and fishing is -8.6 percent in Jeju city[8] and -11.9 percent in Seogwipo city. The real rate of growth of service activities is 4.6 percent in Jeju city area and 10.2 percent in the Seogwipo city area. In overall industrial structure service activities represents 51.7 percent, agriculture and fishing represents 34.6 percent, and construction represents 8.1 percent in Seogwipo city. The agriculture and fishing industry produces 10,240 hundred million won (1 hundred million dollar) which is roughly 34.6 percent of gross regional domestic product in Seogwipo city, while the industry produces 7,778 hundred million (0.76 hundred million) won representing 11.4 percent in Jeju city. The service activities industry produces 15,303 hundred million won (1.4 hundred million dollar) which is about 51.7 percent in Seogwipo city. The industry makes 50,981 hundred million won (4.9 hundred million dollar) taking 74.6 percent in Jeju city (Report of Gross Regional Domestic Product by si, 2012). Compared to the Jeju city data, the agriculture and fishing industry is a more important economic factor for Seogwipo city. As a result, the agricultural industry is nurtured in the most land fields of the Gangjeong village and has produced a large amount of benefit.

[Table 4. 7] Gross value added and factor income by economic activity of Jeju Island in 2010

(Unit: 10 hundred million Won = 10 million dollar)

	Agriculture & Fishing		Mining & manufacturing		Electricity, gas, water supply		Construction		Service activities	
Jeju city	777.8	11.4%	330.3	4.8%	85.0	1.2%	541.6	7.9%	5,098.1	74.6%
Seogwipo	1,024	34.6%	94.8	3.2%	73.9	2.5%	239.2	8.1%	1,530.3	51.7%

(Source: Gross Regional Domestic Product by city 2012)

[8] Jeju city: Jeju Island has two districts that one is Jeju city placed on north and another is Seogwipo city placed on south. The village of Gangjeong is located on the Seogwipo city.

4. 4. 3 Tourist industry data

The tourist industry has great and diverse effects on Jeju Island in terms of economy, society, and environment. When compared to other industries, the tourism industry has had a positive influence on employment, income, earning in foreign currency, and expansion of provincial finance. Moreover the tourism industry has played an important role in preserving the environmental of Jeju Island, because the primary resources of the tourism industry are the natural environment such as picturesque beaches, the coastline, Halla Mountain[9], good weather, and so on. Jeju Island is plentiful in the natural resources relevant to tourism, so all areas are able to generate unique local tourist products and services (Yang, 1997).

[Figure 4. 11] Jeju Olle Roads routes current. (Source: Jeju Olle_www.jejuolle.org)

[9] Halla Mountain: The mountain was shaped by volcanic activities in the Cenozoic era and covered overall area of the Jeju Island. The mountain is located on the center of Jeju Island and the highest mountain in South Korea.

Table 4.8 shows the number of users of Jeju Olle Roads trails in 2011, accounting for the fact that the area surrounding Gangjeong village is a great tourist attraction for hikers. The Olle Roads is a new type of attraction in which tourists are able to walk all around areas along the Olle Roads since the route opened in September 2007. While previously tourists had to drive between locations, the trails enable the tourists to stop by each village and to experience Jeju nature and the local people in person as an eco-friendly tour (Kim and Cho, 2011). In the first year course 1 opened in 2007, there were only about 3,000 tourists, but 594,000 people visited between from January to October 2010, with a rate of revisitation at 98.6 percent (Yoon, 2013). Currently, Jeju Olle Roads permit visitors to take a walking tour almost all around the coastline where most of the major villages and cities are located (see figure 4. 11). Once the last route is completed, the Olle Roads will connect all coastline areas. This new kind of tourism has brought about a lot of visitors on the trails every year.

The Olle course 7, including the Gangjeong village, was the most popular route of the all Olle courses in 2011. The number of visitors that year was 405,837 people which was about four times the second popular, course number 10 (101,057 people) and over ten times the third popular course, number 6 (94,154 people). Definitely, the Olle course 7 has attracted many visitors who have stayed and passed the Gangjeong village along the route. According to the questionnaire by the Yoon, Jyo Hun study in 2013, the reasons that visitors choose Olle course 7 are because of the beautiful natural landscape (53.8 percent) and following recommendations from friends (26.9 percent). Furthermore, the purpose of visiting the Olle Roads 7 course is to appreciate the fabulous natural landscape and to relieve stress by walking through the nature. The outcomes of the questionnaire explain how much the natural condition functions as an important

factor for attracting visitors, and the Olle course 7 has impressive natural landscapes all over. Additionally, 67.3 percent the visitors of responded that they purchased the local agricultural and marine products in course 7. In particular, as the Gangjeong village is located on the end of course 7, visitors tend to stay near the village. However, 23.2 percent the walkers of selected the Jeju naval base as a negative factor in the routes when it comes to natural landscape and route. The author argued that it is needed to alleviate the negative recognition surrounding the Jeju naval base in order to reduce damage to the course 7 by the base (Yoon, 2013).

[Table 4. 8] Number of users of Jeju Olle Roads Course in 2011

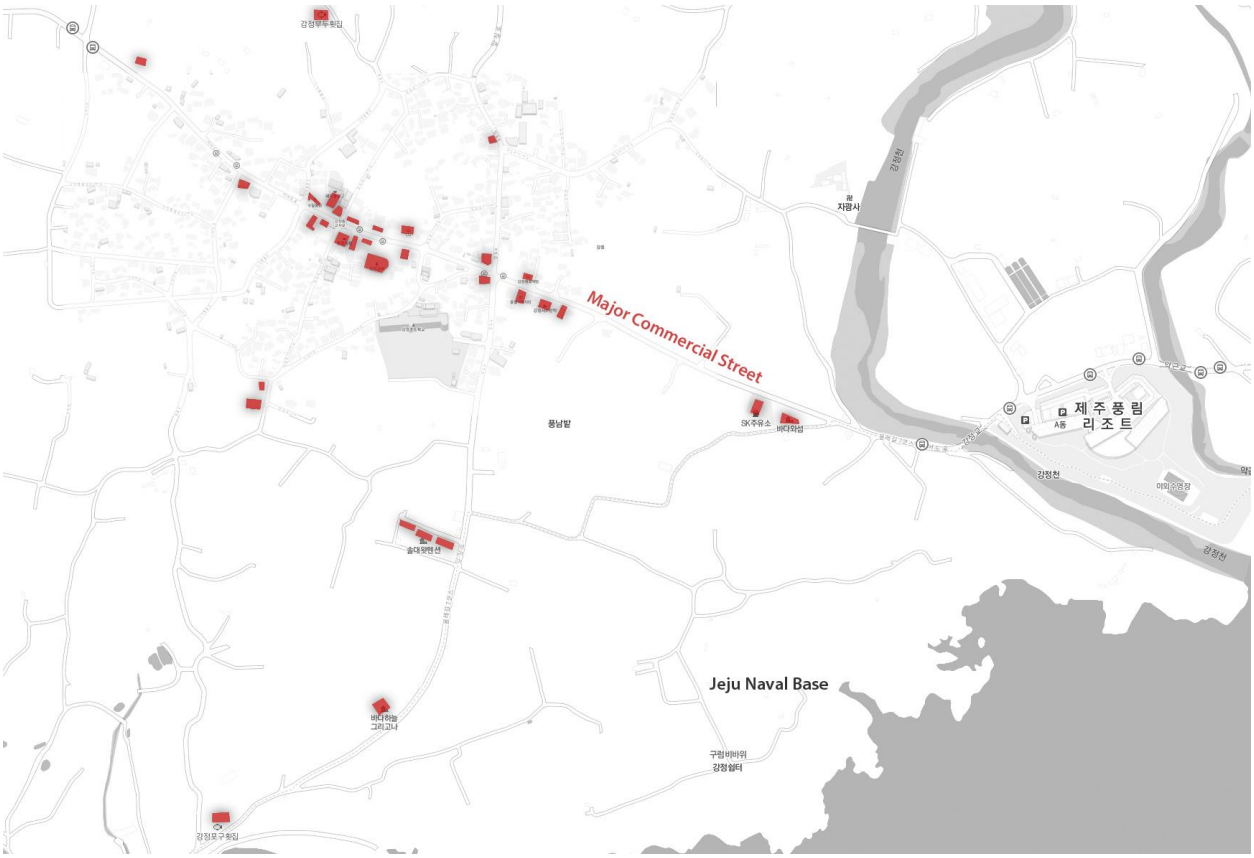
Couse	**User**	**Couse**	**User**	**Couse**	**User**	**Couse**	**User**
Course 1	89,753	Course 6	94,154	Course 10-1	44,846	Course 15	6,895
Course 1-1	19,501	Course 7	403,837	Course 11	27,099	Course 16	9,428
Course 2	16,640	Course 7-1	9,272	Course 12	24,833	Course 17	9,380
Course 3	24,184	Course 8	63,952	Course 13	7,705	Course 18	7,640
Course 4	31,243	Course 9	24,060	Course 14	7,913	Course 18-1	21,641
Course 5	34,828	Course 10	101,057	Course 14-1	7,365	Course 19	6,650

(Source: Jeju Olle_www.jejuolle.org)

4. 4. 4 Commerce spatial distribution

The Gangjeong village has an obvious major commercial street located on the middle of village (see figure 4. 12). The main commercial street is connected to Seogwipo downtown and

other two villages near the Gangjeong village directly. The main street is passing the north of the Jeju naval base and crossing the major new street for the naval base. The service activities are focused on the street with the most daily stores and facilities such as grocery, restaurant, bank, education, religion, and accommodation. Moreover, the major commercial street enables the village of Gangjeong to be a walkable village in that the distance from the street to the edge of the village is 350m (1150 ft) and a 5 minute walk and to the Jeju naval base is 500m (1640 ft) and a 7 minute walk. Along the street connecting the center of the village with the naval base, several accommodations are located. Consequently, the major commercial street functions as the local service industry essentially by uniting the community spatially and economically.



[Figure 4. 12] Current commercial stores distribution on the Gangjeong village.

(Source: Daum map_www. http://map.daum.net)

4. 4. 5 Influences by the naval base

According to the literature review (chapter 2), the military bases generally had positive effects on the local economy. Through the Kings Bay project, employment opportunities of the local community increased (Lowe, 1982). In the case of Guam military bases, the local economy relied heavily on the military bases by supporting the soldiers and their family members. The military bases were one of the major institutions providing job opportunities. The military base brought about economic benefits, including increasing construction activities, fostering business, enlarging tourism, and improving quality of the local services (Natividad and Kirk, 2010). In addition, Van Der Merwe found out that military bases generally improved the employment environment, entrepreneurial activities, and purchase power. Since the new population was dependent on the local facilities and services, it encouraged agriculture industry, transportation, and commercial services. As they searched real property and increased demand, the situation improved property market and land values (Hicks and Raney, 2003). Generally, in most cases, experts expected that military bases would have positive impacts on the local communities.

The large-scale Jeju naval construction has a positive influence on the local employment during both the construction and operation period. Generally, the military base project is likely to promote industries in financial and insurance activities, wholesale and retail trade, real estimate and rental house as well as construction. The large amount construction work is expected to require 6,061 employees during the construction, while the military facilities for the local residents and military family members should hire approximately 2,795 employees during the operation times. In the process of the construction period, the economic ripple effect is likely to be generated through the construction industry into other types of industries, during the operating

period, the investment tends to have on economic ripple effect on the local economy (Roh, Koo, and Kim, 2008).

The new population influx by the Jeju naval base is expected to have an influence on the local economy. A study explaining the average soldier's expenditure based on the current propensity to consume is calculating the purchasing power. According to the study, based on 66.7 percent of the average propensity to consume, the solders should spend 537 hundred million won (529 million dollar). Besides, the Jeju naval base estimates that 5,700 people, so 1,400 households (based on 4 family members) will try to find housing units within the local areas. This means that the new households are likely to encourage the construction industry and real estimate industries (Roh, Koo, and Kim, 2008). In addition, many more visitors are expected to stop by the Gangjeong village through the cruise port and the naval base. The diverse military events, cruise ships, and the new population should attract other visitors into the Gangjeong village (Han, Ko, Jung, and Ko, 2009).

4. 5 Transportation realm

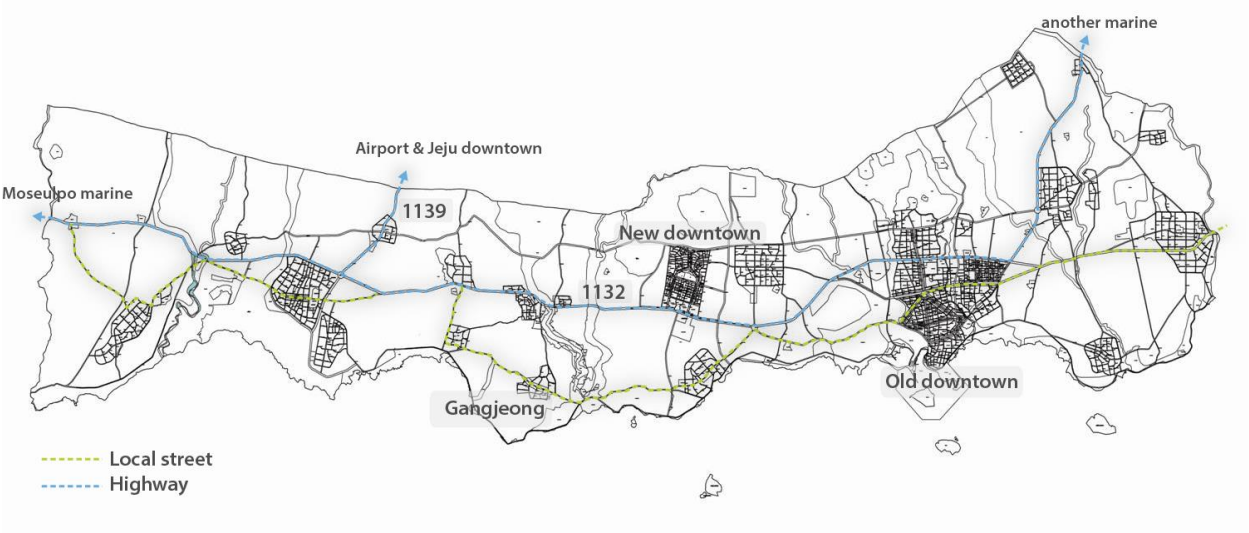
It is necessary to analyze the transportation systems because of the new population flux by the Jeju naval base, especially during the operation period beginning 2015. Almost 7,429 new residents should have their own public and private transportation systems, and roughly more than 5,700 people (estimated by the Korean Navy) of 1,400 household units (4 family members standard) should commute from the outside of the naval base to the Jeju naval base through their own means of transportation. Besides, as the Jeju naval project has a plan to employ the local residents in the convenient facilities, they should also commute from the outside of the naval base. Additionally, the cruise port and naval events are likely to increase traffic surrounding the local streets.

All of these factors of the new population, commuters, employees, visitors, and tourists will change the traffic situation according to tidal flow. Especially, it is estimated that there is more traffic on the local street at commuting hours, events days, and cruise port entry times. According to the estimation, the Jeju naval base project prepared a plan for the new major road in order to decrease traffic jams. As a result, many changes of the Jeju naval base tend to have an influence on the local transportation system. In the transportation realm, current transportation systems data are analyzed widely and thoroughly. Finally, the new street for the Jeju naval base is illustrated with other alternatives.

Based on the cases of the literature review, the transportation field is one of the primary issues when it comes to operating military bases successfully. In Guam in April 2007, there was

an Environmental Impact Meeting to discuss the transportation and infrastructure issues generated by the military bases, such as managing traffic flow during peak hours. (Natividad and Kirk, 2010). The Kings Bay Project also included plans to mitigate traffic jams. The master plan had accelerations and deceleration lanes, speed bumps, pavement, stop signs, and parking areas (Lowe, 1982). According to Clayton, new military bases could normally create suburban growth and highway development, traffic congestion, and smog (Hicks and Raney, 2003). This project should bring about new population, including soldiers, their family members, off-island employees, and visitors. Some soldiers will commute from the village or other areas to the Jeju naval base every day. The civilian-military facilities and the naval base should require staff who could commute from the outside Gangjeong village. Therefore, it is necessary to prepare methods managing traffic flow efficiently like in other cases of the literature review.

4. 5. 1 Transportation system of Seogwipo city



[Figure 4.13] Seogwipo city urban and street structure currently. (Source: Jeju National University, the Department of Architecture)

Basically, like other villages in Jeju Island, the southern area of Jeju Island has one old downtown, one new downtown, and 12 villages along the coastline horizontally. Thus, the transportation systems connecting the entire Seogwipo city are stretching from west to east, while connection with the northern area links downtown Jeju, that is a major downtown in Jeju Island, and the Jeju international airport (see figure 4. 13).

The Gangjeong village is connected to Seogwipo downtown, other military bases, and villages through a horizontal street system. In addition, the village links Jeju international airport through the mountain road crossing the Halla Mountain in the north. The distance of the local street from the Gangjeong village to Seogwipo downtown is about 8.7km (5.4 mile) and 20 minutes to drive. The Jeju naval base reaches the Moseulpo marine base[10] about 50 minutes, 25

[10] The Moseulpo marine base: It is a small marine base and the second nearest distance from the Gangjeong village.

km (15.5 mile). The distance between the Gangjeong village and the Jeju international airport is about 40km (24.8 mile) and 1 hour 20 minutes to drive. The Maljil road reaches the 1132 highway connected to Seogwipo downtown and the 1139 highway going the airport and Jeju downtown within a 50 minute drive. Therefore, the Maljil road is used for a broad connection system, and the major commercial road is used for a local connection system.

4. 5. 2 Transportation system of the Gangjeong village

The overall transportation system is composed of two major roads named the Maljil road, which is the Gangjeong historical road, and Ieodo road, which is the main commercial street. The Maljil road connects from north to south vertically, while the Ieodo road connects from west to east horizontally in the Gangjeong village. As the historical road, the Maljil road has played an important role in broad connection from the Gangjeong village to other villages, cities, and public facilities. The Ieodo road connects the Gangjeong village with other local villages like BubHwan and enables the Gangjeong residents to mingle within a walkable distance. The residents are able to walk to the main commercial street within 5 minutes. There are two kinds of public transportation in the Gangjeong village: bus and taxi. The bus only passes the Ieodo road in the period of 20 minutes, and there are 8 bus stations in the section of major commerce. The width of the two roads is within 12m (40ft) and 2 lines way. Because cars are generally parking on the street, the Maljil road and Ieodo road are crowded with traffic. Furthermore, both roads touch the Jeju naval base one time at the corner of east and west (seeing figure 4. 14). As both roads are the most crowded streets, the pedestrians and vehicles are likely to meet the naval base through the two streets. Additionally, Olle Road course 7 passed the inland between the main

residential area and the naval base through a local pathway and brushes the naval base four times.

[Figure 4. 14] Street system surrounding the Gangjeong village.

4. 5. 3 New access road for the Jeju naval base

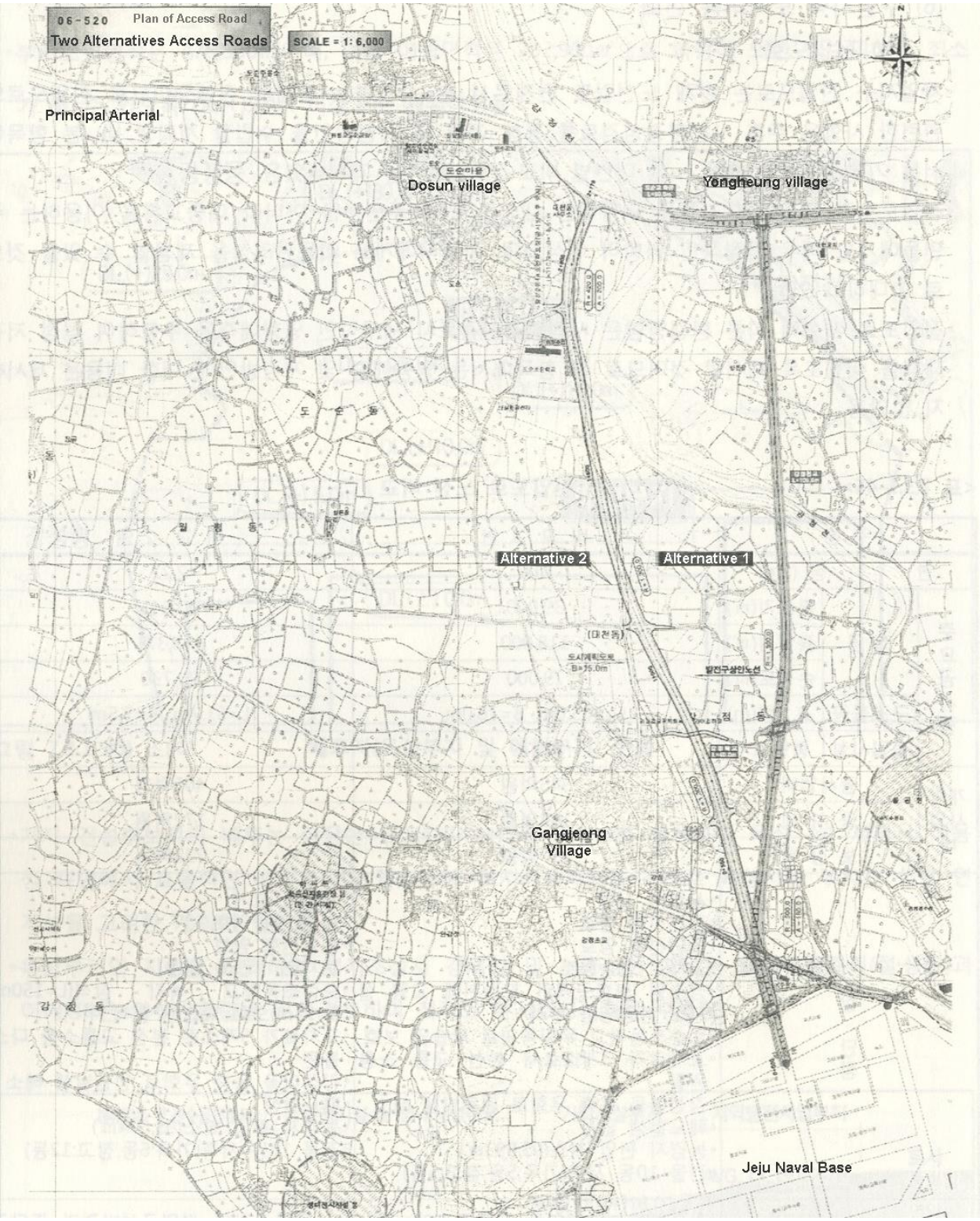
The Jeju naval base project prepared a plan for the new street construction connecting from the naval base to the highway 1132 in order to control the traffic generated by the new population influx. There were two alternatives for the new street, which had few differences (seeing table 4. 9). The alternative 1 was finally selected because the alternative 2 passed the elementary school by infringing on the right of learning and was expensive, although the alternative had an advantage at the access point of highway 1132. Besides, the alternative 1 was

inexpensive and satisfactory at the cross section with highway 1132, and had just three intersections with local streets (see figure 4. 15).

[Table 4. 9] New access road alternatives for the Jeju naval base

			Alternative 1	Alternative 2
Distance (km)			2.03	2.22
Amount of Construction	Earthwork	Cutting soil (m^3)	39,000	90,641
		Piling soil (m^3)	118,000	118,371
		Filling soil (m^3)	79,000	20,730
	Viaduct structure(m^3)		L=105.0m, B=26.0m	L=61.7m, B=3.5m
	Number of Intersection		3	5
Cost of Project	Total Cost of Project		$ 32.5 billion	$ 38.1 billion
	Cost of Construction		$ 17.7 billion	$ 16.2 billion
	Cost of Compensation		$ 14.7 billion	$ 21.9 billion
Advantage & Disadvantage			- Cost: inexpensiveness - Intersection condition: good - Negative environmental impact on Gangjeong stream with Viaduct - Preservation of elementary school - Smoothness of main trffic owing to only three intersections - Assuaging complaint by detouring right - None cul-de-sac - Minimum of invasion of farmland (95,593m^2) - Passing 10 buildings (house:5, warehouse:5)	- Cost: expensiveness - Intersection condition: good - Intervention of elementary school green (L=150m, B=15) - Traffic congestion on main trffic owing to five intersections - Assuaging complaint by detouring right - Occurence of cul-de-sac - Minimum of invasion of farmland (95,574m^2) - Passing 18 buildings (house:9, warehouse:12)
Evaluation			- Alternative 2 is fine when it comes to intersection parts, especially with the main principal arterial, but is considered interfering right of elementary school and an expensive project. - Alternative 3 is worried about occurance of complaint due to the access point at south, has not good entrance condition at Gangjeong port, and is an expensive project due to requiring a lot of private lands. -Therefore, alternative 1 is the best choice because it is an inexpensive project, has a good condition in intersection at the main principal arterial and only three intersections.	
Choice			○	

(Source: Environment Imapact Assessment of Jeju naval base, 2009)



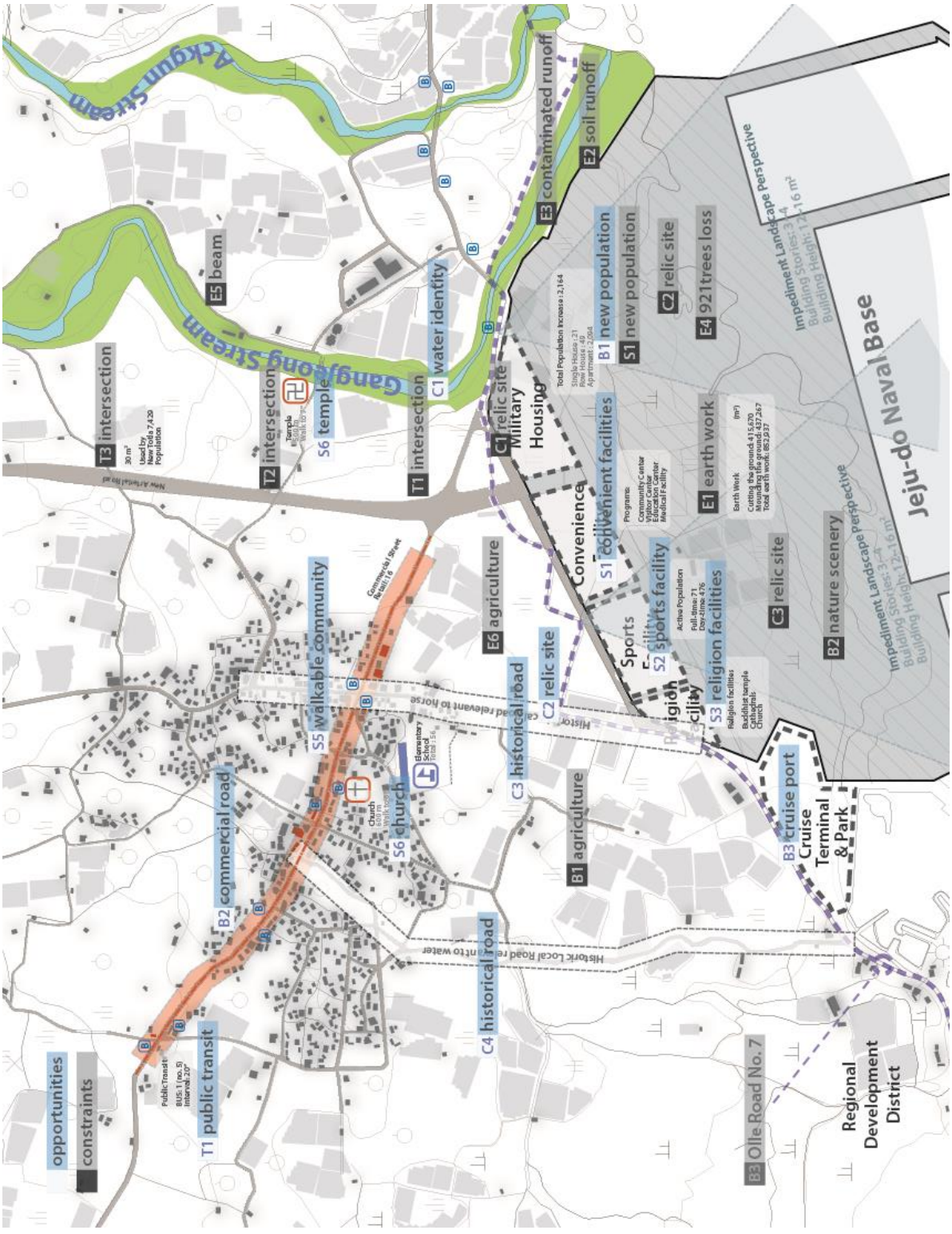
[Figure 4. 15] New access road alternatives for the Jeju naval base.

(Source: Environment Impact Assessment of Jeju naval base, 2009)

On the other hand, except for the new construction road, the current local roads are based on the rate of local population approximately 5,366 people. Even though the project prepared a new large width road for the new population movement, the new large number of commuters should pass the local roads before arriving at the new street and the Jeju naval base. Based on the current local street system, it is doubtful that the local streets are able to handle the new vehicles. Additionally, the new street should make 4 intersections, where three intersections have minor traffic and one intersection is the local major commercial street. If each intersection has traffic lights, drivers have to pass five traffic lights in about 2 km (1.2 mile).

Furthermore, the new traffic will be generated by the inside of the naval base, the outside of the naval base commuting from local communities, and new facility employees, visitors, and tourists of the cruise port. It is anticipated that they will occupy the local streets with their own transportation means during different times, rush hours in particular, port entry times, and naval event days. Besides, it is expected there will be a lot of traffic on the street between the main gate and the intersection crossing the major commercial street because of the short distance of about 150m (490 ft) and a feature of guardhouse relevant to safety. In addition, based on the naval base plan that civilian-military facilities place next to the base, the local residents should walk on the Maljil road to use the facilities by generating one direction of flow from the Gangjeong village toward the naval base.

4. 6 Overall data analysis



[Figure 4. 16] Opportunities and Constraints map.

[Table 4. 10] Overall impacts generated by the Jeju naval base

	Environment	Society	Culture	Economy	Transportation
positive		⊕ facilities		⊕ local business tourism	
negative	⊖ pollution	⊖ new population	⊖ relic water		⊖ traffic

4. 6. 1 Environment data analysis

The geological feature has had a great influence on the Jeju life when it comes to agriculture industry. This is because the major composition of volcanic ash has enabled inhabitants to work on agriculture, especially dry-field farming. Since the mandarin orange product became a high value product in the 1950s, many more residents have been dependent on the agriculture farms in Jeju Island. Only Jeju Island was able to provide mandarin orange cultivation due to the features of the soil and wide temperature at that time. The geological history has allowed residents to be dependent on unique agriculture in the Gangjeong village like other areas of Jeju Island in the Korean Peninsula. On the other hand, the large scale earth work (E1 as a constraint) eliminated some amount of agriculture farm area which urged other alternatives for the loss of farming lands. The earth work should also change the earth surface in

a short period time, although the amount of area is not significant to the entire Gangjeong land. Additionally, 921 trees (E4 as a constraint) will be eliminated by the construction (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Therefore, the feature that almost all land use is farming land is one of the opportunities because many residents have relied on the agriculture industry, and the naval base project has to prepare alternatives in order to develop the farming and to save some of the trees. The effort of the Jeju naval base to improve agriculture (E6 as a constraint) with Gangjeong inhabitants will become one great source to mitigate the conflicts between them.

The village of Gangjeong has two precious streams that have played an important role in providing drinking water resources to surrounding residents. Both streams have been protected by the absolute preservation area because they maintain clean water flow always and offer the largest amount of drinking water for the Seogwipo downtown residents as well as the Gangjeong people. Thus, the streams represent the Gangjeong village as the water important valuable area. The Jeju naval construction site, however, meets the Gangjeong stream and threatens the environment. To reduce the negative environmental impact on the streams, the Jeju naval base plan suggests a 40m (131 ft) green buffer zone between the base and Gangjeong stream, but it still has negative consequences including soil runoff (E2 as a constraint) during the construction period, contaminated runoff (E3 as a constraint), and scenery form. The soil and contaminate runoff tend to threaten the sweetfish habitat. The construction and buildings beams are likely to disrupt lightning bugs' activities during the construction and operation period (Report of Environmental Impact Assessment of the Jeju Naval Base, 2009). Consequently, it is necessary to consider more meticulous measures to preserve water and surrounding habitat that rely relied

on the water, as the issues have many conflicts between the residents and the Jeju naval base.

4. 6. 2 Society data analysis

It is a useful advantage that the Gangjeong village is a walkable community (S5 as an opportunity) with a major commercial street in that people are able to get to the village center from the Jeju naval base within at least 10 minutes. The commercial road named Ieodo road and the historical road named Maljil road reach the base. Thus, soldiers can get there through both streets and utilize the local convenient stores such as grocery stores and restaurants. They are able to use the regional facilities (S6) including banks, libraries, schools, churches, and temples along the commercial street as well. Although the plan of the naval base will provide convenience facilities for the new population, they are likely to rely on the local facilities to get daily supplies and to spend their spare time. Therefore, the village spatial structure should encourage the new population to use local facilities along the major commercial street (Ieodo road). In addition, the new population who stride down the local street and utilize the local facilities should help make a more animated village.

To create the Jeju civilian-military complex port, the plan suggested several kinds of facilities (S1) such as a sports facility (S2), education center, medical facility, and religion facility (S3) for the local residents and the military family members. Additionally, the naval base argues that the base should encourage the soldiers to support agriculture and volunteer work for senior citizens (Report of Drawing Gangjeong Green, 2010). The facilities and support for the local residents tend to be useful factors in terms of improving life quality and social cohesion

between residents with the new population.

The new population influx (S1 as a constraint) has double-sidedness when it comes to society due to the scale of population and artificial migration in a short time. Though the new population is expected to be helpful for the local commercial street, infrastructures and local facilities based on the current the regional population, which is about 5,000, have limitations to accept the new population which is over 7,000 people. Furthermore, it is a major increase that will influence the local residents wan now they mingle with the new population without the past emotion.

4. 6. 3 Culture data analysis

As the name of Gangjeong (江汀) explains, water (C1 as an opportunity) plays an important role in the village identity. The name of Gangjeong represents that the village is retaining fresh water resources and spring waters. The water resources provide a large amount of drinking water for the downtown Seogwipo as well as the local village. The village has two significant streams preserved by government as an absolute preservation area due to its importance. In addition, the area of the Jeju naval base construction involves three historic relic sites (C1, C2, and C3 as constraints), which two are inside of a major construction site and one is located on the boundary of the outside construction. Other two historic relic sites (C2 as an opportunity) are placed along the Maljil road before touching the Jeju naval base. Besides, the village of Gangjeong has two historic local roads that have treasured the village history. One (C4 as an opportunity) has been used as a pathway for residents who go to a spring to get drinking

water. Another (C3 as an opportunity) one has been used as a pathway for horses that go to a spring as well.

4. 6. 4 Economy data analysis

Generally, the Jeju naval base is expected to be helpful for the local economy in terms of employment, commercial business, and tourism. The new population (B1 as an opportunity) is roughly 7,000 people, and the new employments will be generated in order to support the new military families through civilian-military facilities and the naval base. During the construction period, the naval base project should require construction workers, while during the base operation times, the navy base should bring about facility staff from the local communities. Additionally, the new population should be dependent on the local facilities including convenient stores, business facilities, and education institutions. Especially, there are some kinds of convenient shops and institutions that support daily activities along the major commercial road (B2 as an opportunity). Therefore, the new military households are likely to benefit the local business. However, the Jeju naval base had encroached on some agriculture fields (B1 as a constraint) which required alternative measures to save the agriculture industry. It is a good change to improve agriculture industry with the local communities because a large number of residents lean on the industry.

When it comes to tourist industry, although the Jeju naval base has argued that they should help develop the tourists through the cruise port (B3 as an opportunity), the naval base has had a negative impact on natural scenery (B2 as a constraint) and the Olle Road course 7 (B3

as a constraint). The cruise port is expected to carry many tourists to the Gangjeong village through 150 thousand scale cruise ships, although it is doubtful the scale cruises are able to pass through the front sea of Gangjeong. Nevertheless, the Jeju naval base should be a wall of natural scenery due to the placement of the naval base. The naval base is placed on the Gangjeong coastline by obstructing fabulous ocean views from the inland and the Gangjeong village. Because one of reasons that visitors try to stop by the Gangjeong village is to watch the beautiful natural scenery and ocean, the huge fence of the naval base should play a negative role in bringing about visitors who want to see Jeju nature. Additionally, the route of the Olle Road course 7 had been changed by the construction of the Jeju naval base already, and the route has to detour another local road that brushes the naval base fence. This situation tends to give rise to negative images in terms of the Gangjeong village to visitors.

4. 5. 4 Transportation data analysis

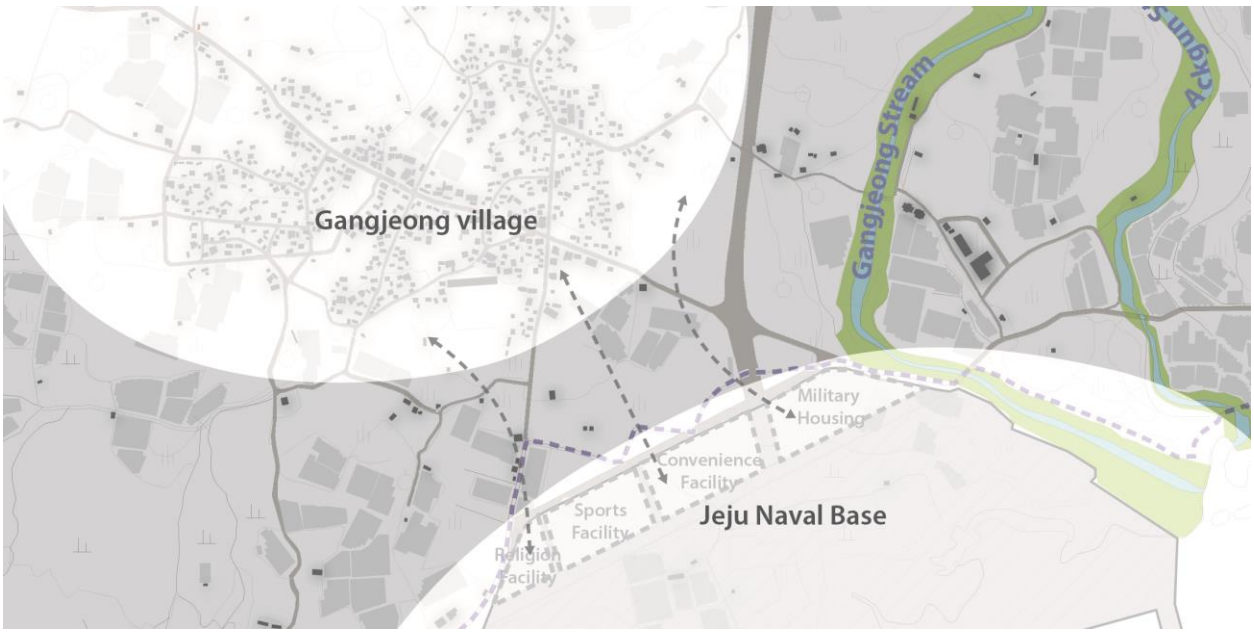
As explained above, the walkable community is a good opportunity for social cohesion between the Gangjeong village and the new population. In addition, the bus (T1 as an opportunity) connected to downtown Seogwipo and other villages passes the major commercial street in middle of the Gangjeong village. Thus, the soldiers are able to get to downtown Seogwipo and other villages through the public transportation when they get the local main street. Furthermore, the two historical local roads, Maljil and Tongmul road, exist and form the Gangjeong village like a natural stream. The two streets also have an influence on the entire transportation system of the Gangjeong village by vertically connecting the main residential area to the ocean front and springs.

By contrast, the new street with the new population will probably generate more traffic on the local streets as well as the new street. The current transportation infrastructure is based on the present Gangjeong village residents. But the new population is approximately 7,000 people who will require their own transportation systems. Moreover, the new wide street should cross local streets four times, therefore generating intersections (T1, T2, and T3 as constraints). It is expected to lead to traffic congestion at the intersection points along the new street.

5. Recommendation

5.1 Social cohesion

Since the Jeju naval base project began to construct and acquire legal approve, anybody can no longer desperately oppose the naval base construction. It is time to focus on how to reduce the negative impacts of the naval base construction on the small village, how to stimulate the positive factors of the new community on the Gangjeong village, and how to fuse the two different communities as one neighborhood. This is due to the fact that cohesion of two societies is hope for everybody. According to the literature review (Chapter 2) and this thesis data and analysis (Chapter 4), the Jeju naval base has several advantages, and social cohesion of both communities is an objective of this thesis through enhancing synergy effects.



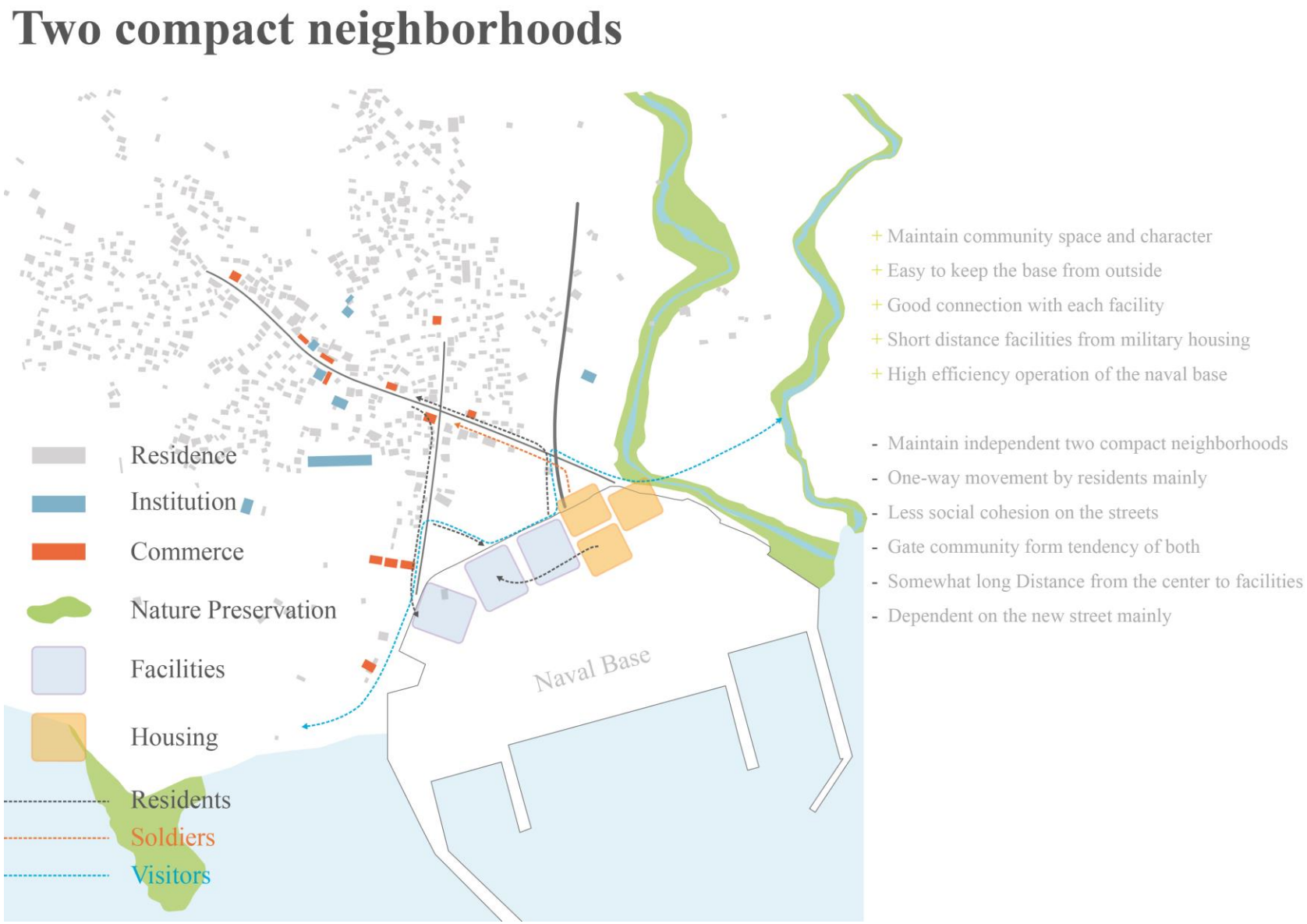
[Figure 5. 1] Invisible boundary of current Jeju naval base plan.

The current plan of the Jeju naval base, however, does not help to integrate the local community with the new population of the naval base socially and spatially (see figure 5. 1).

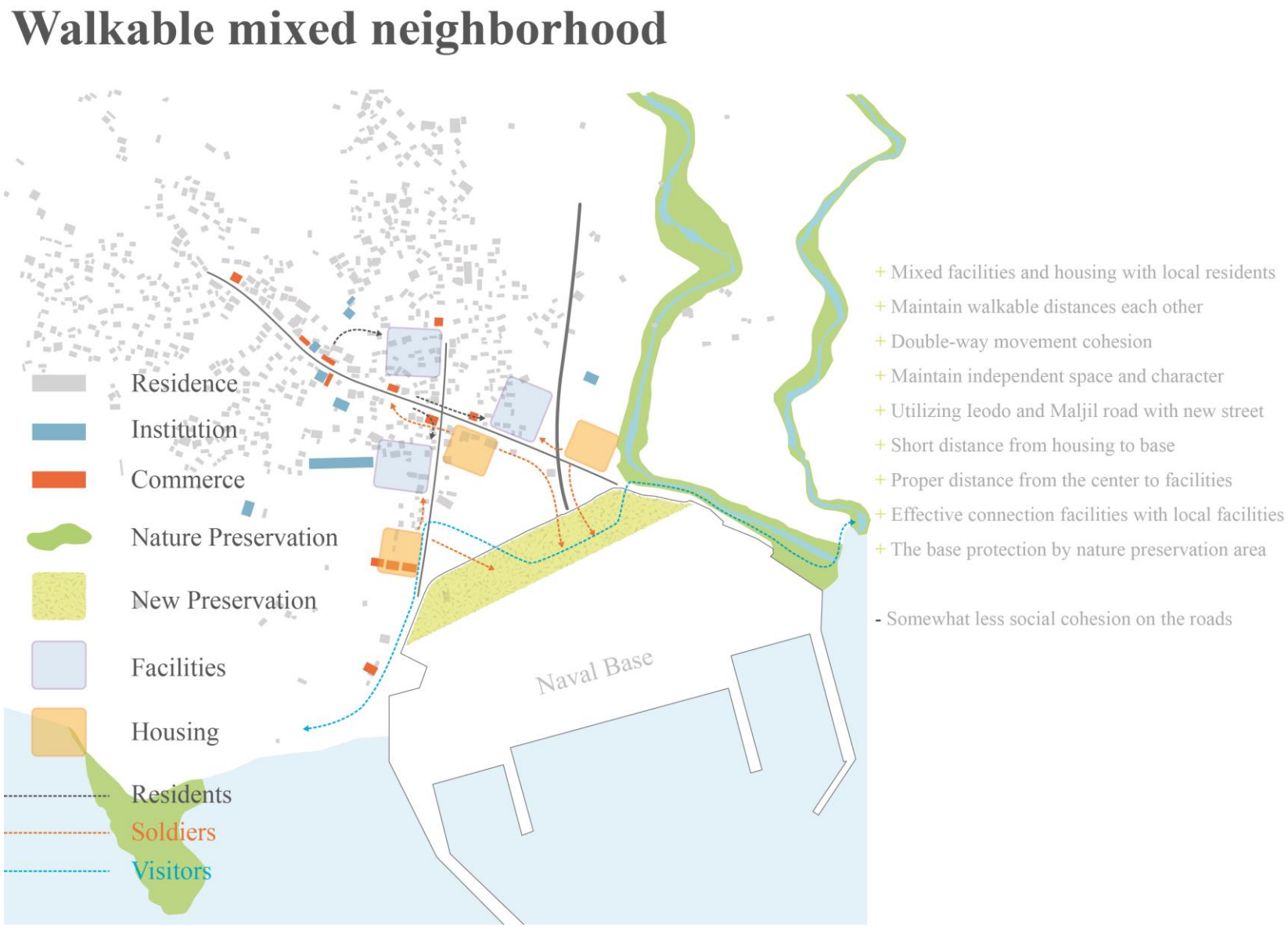
There is an invisible boundary between the Gangjeong village and naval base community physically. This gated plan of the Jeju naval base could follow the situation of the Okinawa military base called “American towns”, which the military base did not share their advantages such as good facilities within the base boundary (Yoshida, 2010). Consequently, to mingle local residents with the new population, it is recommended to express volition of the Jeju naval base of being fused with the local community and helping them spatially through physical activeness. The plan to remove physical boundaries and to interact with the local village spatially should be another measure to bring about social cohesion by overcoming the limitation of the existing naval base.

5. 2 Concept scenarios for social cohesion

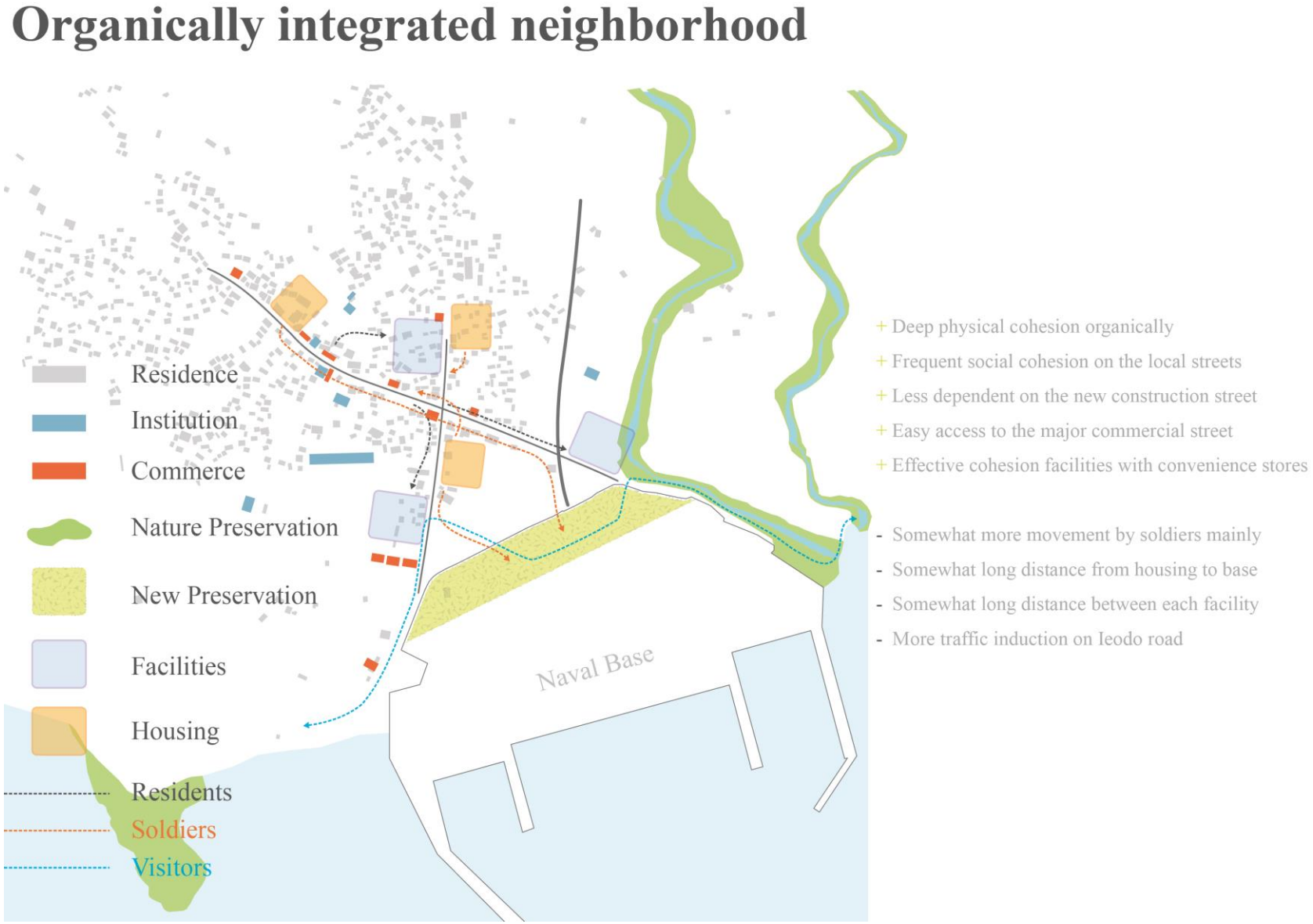
Therefore, the recommendation suggests three concept scenarios according to different types of physical interaction of the Jeju naval base with the local facilities, housing units, and environment (see figure 5.2, 5.3, and 5.4). The first concept scenario is the existing naval base plan in that all facilities and housing units are located next to the naval base. This form is still maintaining the rigid base boundary, and does not express an intimate relationship with the Gangjeong village. The second concept scenario is that the facilities and housing units are generally placed in between the primary residential area and the naval base. This form is suggested as one type of expression breaking the naval base boundary spatially and physically by stimulating the residents and soldiers to walk on local streets. The final concept scenario is to interact civilian-military facilities with local residents organically on the major residential area. This concept illustrates more deeply organized form rather than concept scenario 2 by encouraging the new population to wander around the Gangjeong village.



[Figure 5. 2] The first concept of three concept scenarios.



[Figure 5. 3] The second concept of three concept scenarios.



[Figure 5. 4] The third concept of three concept scenarios.

As illustrated in chapter 4 of the data and analysis, the Jeju naval base has several advantages like other military bases. As with the explained social benefits in the case of St. Mary's County, Maryland, such as improving quality of education and maintaining the wealthy class (Hicks and Raney, 2003), the civilian-military facilities of the naval base could follow this good example through an educational facility, community center, and so forth. Like in the case of the Guam military base, which gad economic such as employment opportunities, growth of business activities, and construction boom (Natividad and Kirk, 2010), the Jeju naval base could create economic advantages, including job opportunities, growth of entrepreneurial activities, improvement tourism, and so on. Therefore, the recommendation enhances these social and economic benefits like the Kings Bay Project, Guam, and St. Mary's County.

However, the recommendation concepts suggest some methods to mitigate the negative influences generated by the Jeju naval base. Like other military bases such as the Kings Bay Project, Guam, Okinawa, kijichon, and the Philippines, the Jeju naval base could damage the natural environment during the construction and operation period. Because the huge construction located immediately next to the Gangjeong stream and eliminate the nature preservation area, the recommendation tries to recover these negative impacts. Although the naval base has useful civilian-military facilities, the facilities are placed next to the base boundary and it could follow "American towns", which do not share their facilities and advantages in Guam (Yoshida, 2010). Even though the naval base project includes the new street for the new population influx, it is expected to generate traffic jams. Thus, other methods are required to manage the traffic like the Guam military base and the Kings Bay Project.

The first concept scenario (see figure 5.2), the two compact neighborhoods, represents each separated community of the Gangjeong village and the Jeju naval base like the current Jeju naval base plan. Basically, this form of naval base is better to operate a military base systemically than other two concepts. Because all of the facilities and housing units are placed next to the naval base, moving distance of soldiers is short and useful during emergence times. As facilities cluster within one place, users are able to enjoy several kinds of facilities at a place efficiently. Moreover, this scenario is keeping each community, though it means that there are less mutual social interchanges between them.

On the other hand, the concept scenario shows general less interaction than the other two scenarios by generating mainly movement of residents. It means that there are fewer opportunities to interchange between the residents and the military families on the streets and open public spaces along the local roads. Additionally, when compared to the other two scenarios, the distance from the military housings to the local facilities is greater. Thus, overall the scenario is not helpful to stimulate social interaction between them by simply preserving each community from neighborhood fusion.

The second scenario (see figure 5.3) is based on the current Gangjeong village situation of a walkable neighborhood and the advantages of the Jeju naval base. Because the facilities provided by the naval base are a useful factor to improve the local village and relation with them, the helpful facilities should encourage interaction with the local residents and facilities and institution spatially. Thus, the concept is to place the facilities and housing mainly on the hinterland between the major residential area and the naval base by removing the military boundary. Besides, the concept shows a physical scenario to motivate intimate relation between

them by placing the military housing units on the areas more nearby residential and commercial. Thus, the military family members are able to use the facilities of the naval base and local facilities easily due to the short distance from the housing to the village center. The Gangjeong inhabitants can also easily get the facilities offered by the Jeju naval base, as the buildings are located nearby the major commercial street. In addition, the scenario increases possibility for interaction between them on the public spaces, especially on the local streets. Unlike the first scenario which forces residents to walk more on the streets primarily, the second scenario results in motivating both to residents and the new population walk on the streets. Furthermore, if the area that was supposed to be constructed of facilities and housing can be used as a buffer zone and environment restoration zone, this zone should protect the naval base from strangers, preserve the environment by keep the trees, and provide walkable pathways instead of dull local streets and the naval base fence.

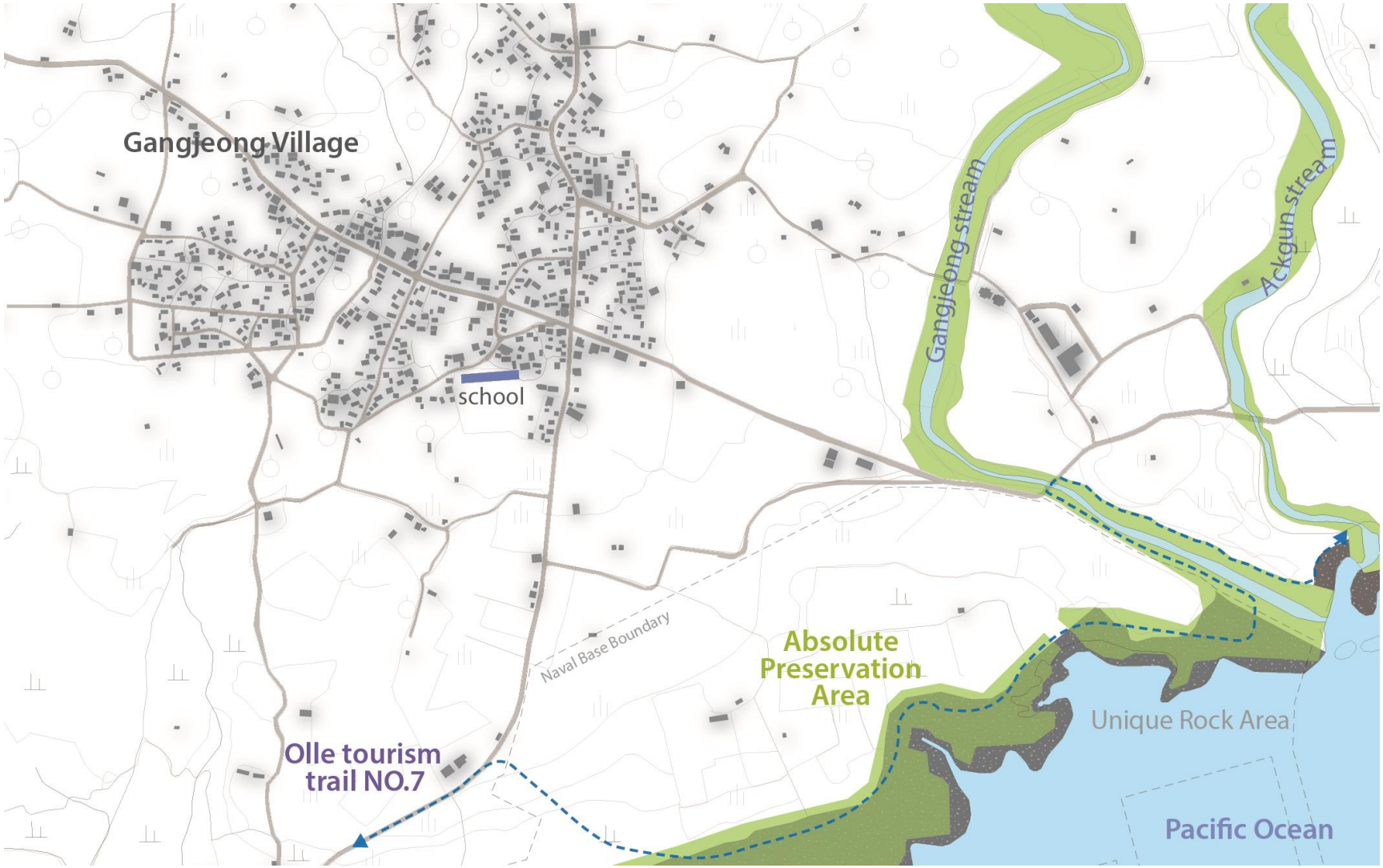
The third concept scenario (see figure 5.4) is to interact the military families with the Gangjeong residents, similar to the second concept scenario. The difference to the concept 2, however, is that the major stage of interaction is the local center, not the hinterland. This form shows more deep social cohesion physically with the local community. The scenario stimulates military family members to establish friendly relations with the Gangjeong residents in depth. The housing is in the major local residential area, and the facilities are also placed near the main community area. Thus, a lot of military families should meet the residents on the local streets and public spaces more than second scenario. The scenario three would likely benefit the local commercial stores. Moreover, this concept allows a buffer zone and environment restoration zone at the boundary of the Jeju naval base.

On the other hand, the scenario tends to induce more traffic congestion on the local streets. This is because current transportation infrastructure is based the present local population. The housing located on near the major commercial street would likely encourage more traffic on the street that has only two ways. Additionally, as the distance from the military housing to the Jeju naval base is somewhat long, it is not effective to operate the naval base. Because the distance between facilities is somewhat long, efficiency of operating facilities is low.

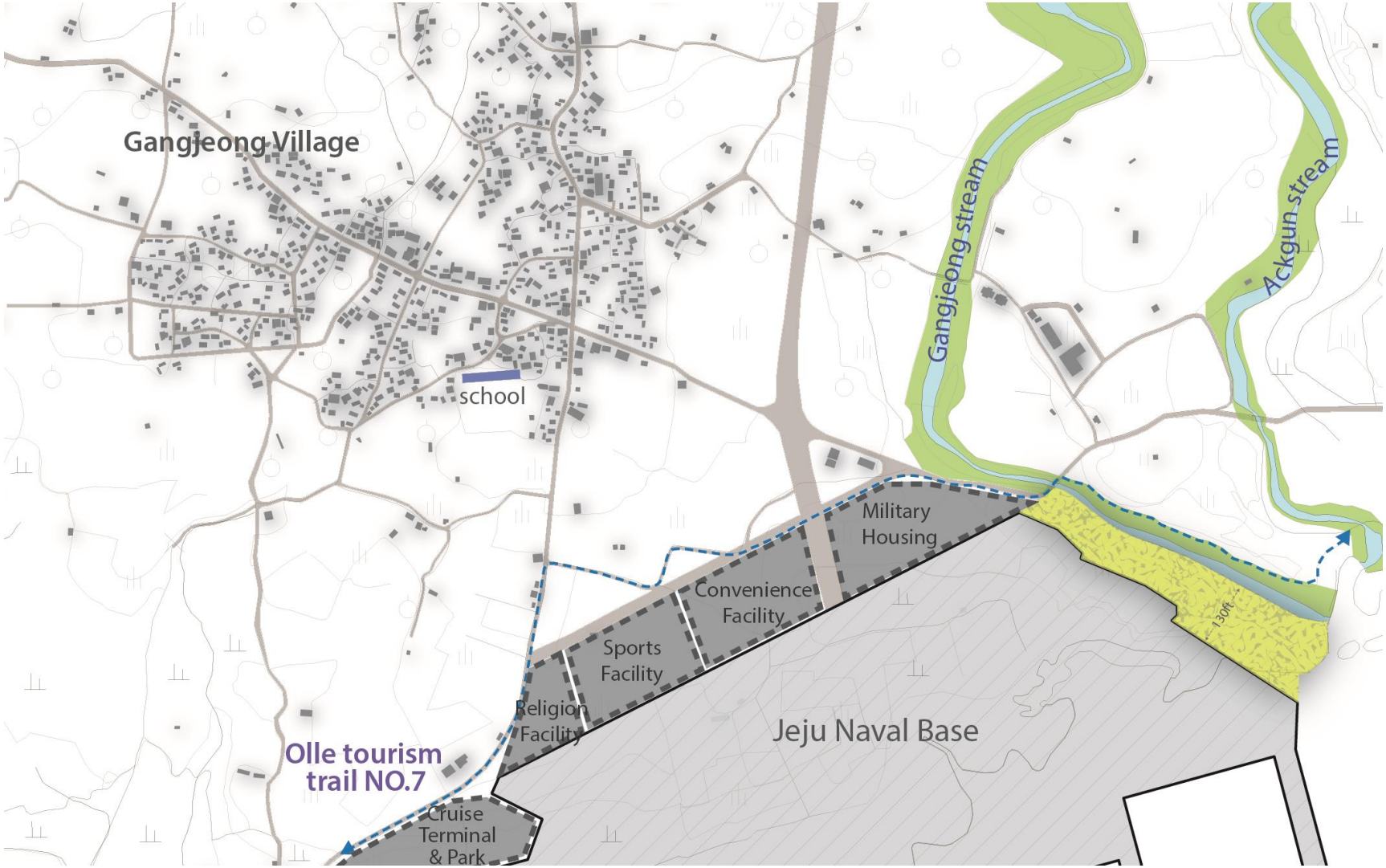
5. 3 Final scenario of concept 2

To compare the recommendation map (figure 5.7) with the Jeju naval base plan effectively, the original Gangjeong village map (figure 5.5) and the current naval base plan (figure 5.6) are displayed simultaneously. Previously, the village of Gangjeong was a very peaceful community with valuable nature characteristics. The Gangjeong stream provides a large amount of clean drinking water for the local residents. The areas in the Gangjeong village are designated as absolute nature preservation areas partially including the two streams and the coastline. Besides, the village of Gangjeong is a small village, which only about 5,000 residents live in. They have relied on the mandarin orange agriculture because the village of Gangjeong has a good condition and resources to cultivate the fruit.

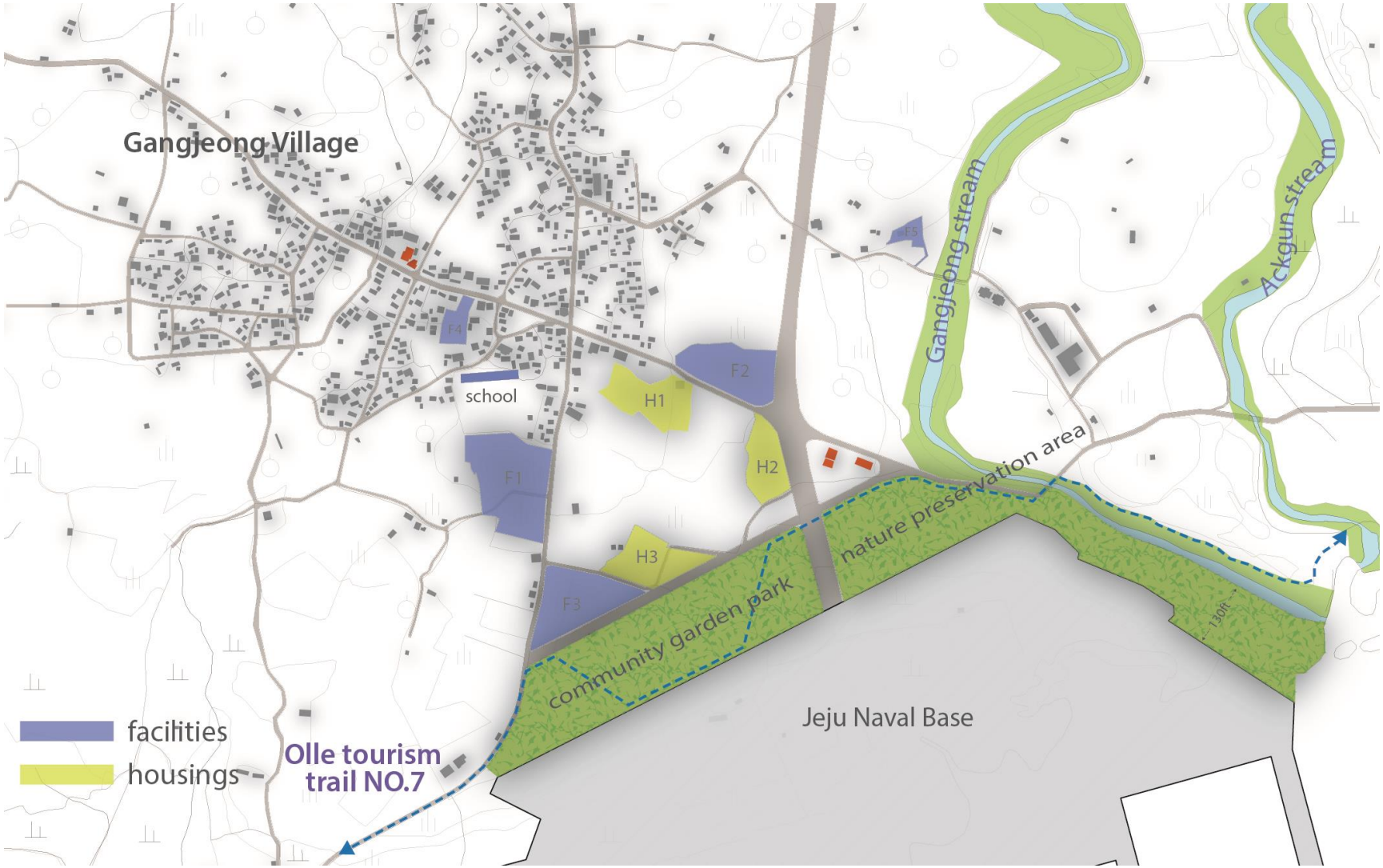
However, since the Jeju naval base started the huge construction, the naval base is likely to change many situations of the Gangjeong village. As illustrated in the figure 5.4, the naval base is placed on the absolute nature preservation area exactly and next the Gangjeong stream. This position and size is threatening the nature environment and residents' health. Because the new population influx is huge, social and economic changes are inevitable. The local residents have to share their infrastructure such as streets, convenience facilities, and so on. Cultural clash and traffic congestion are expected. The visitors can enjoy the beautiful coastline, ocean, and nature no longer. Therefore, to coexist between the village of Gangjeong and the Jeju naval base peacefully, concept scenario 2 is recommended as a final alternative (see figure 5.7).



[Figure 5. 5] Map of Original Gangjeong village.



[Figure 5. 6] Map of the Jeju naval base plan.



[Figure 5. 7] Map of final concept scenario 2 recommendation.

The civilian-military facilities are placed near the major residential area in order to increase accessibility of both the residents and military families from the residential areas, the naval base, and military housing. F1 and F2 is about 5 minutes to walk and 400m (1300ft) from the center of Gangjeong village. F3 is about 8 minutes to walk and approximately 570m (1870ft) from the center of Gangjeong village. The distance from convenience facilities to the Jeju naval base and the military housing is shorter than the distance from the village center to the facilities. So, military personnel and their families also can easily walk to use the facilities. However, the civilian-military facilities are not located on between residential areas and on the left areas of the village. This is due to the fact that the configuration tends to generate some problems such as traffic jams and long distance from the facilities to the naval base. If the facilities are placed on the middle and the left of the village, it is likely to stimulate traffic jams on the major local streets in the center area. Besides, the distance from the naval base to the facilities is somewhat long--about 800m (2600ft) and 12 minutes. Therefore, the civilian-military facilities are located on the areas between the main residential area and the naval base to become a walkable community.

The civilian-military facilities, including sports, community, visitor, educational, medical, and religious, are located on the areas according to the facilities' characteristics. To enhance educational synergy effects, educational facility (F1) is placed immediately next to the area of the local elementary school. The community center is placed on the F1 spot as well, the center area between the residential area and the naval base. The activities like community meetings, lifelong educations, and recreation could gather both the local residents and military personnel. The medical facility plays a useful role in the local residents--particularly because many residents are old and there are no medical service facilities in the Gangjeong village. Thus, the

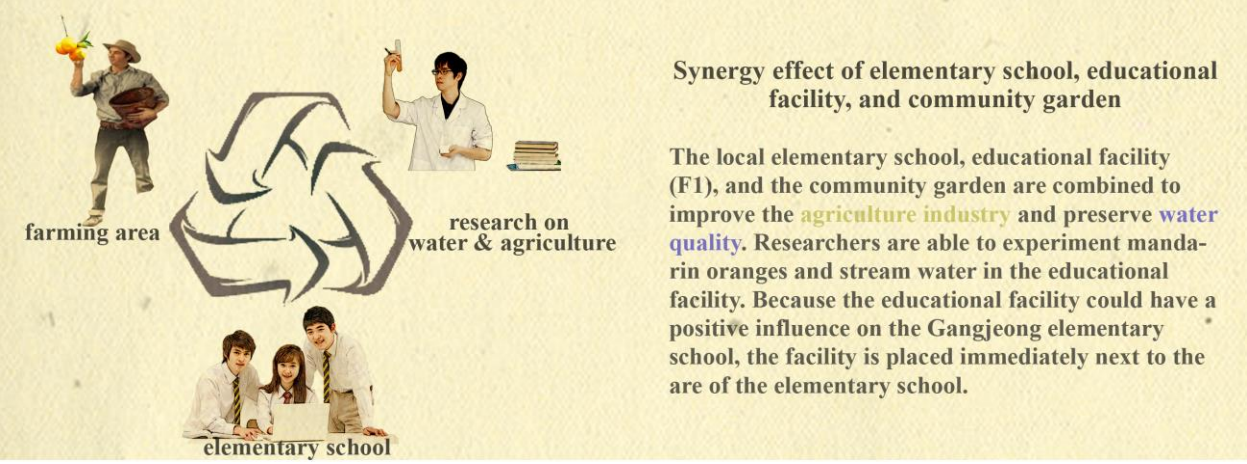
medical facility is placed with the community facility to supplement the role of the community facility. The sports facility is placed next to the area (F3) of the community garden park (will be explained at the next page), as the park functions as outside activities such as walking and jogging. The visitor facility is placed at the entrance area (F2) of the village and the naval base. By locating the entry spot, the visitor facility can act as introducing the Gangjeong village and the naval base. Besides, there are already religious facilities, including a church (F4) and a Buddhist temple (F5) in the Gangjeong village. Thus, sharing the religious facilities with the naval base could help mingle with the residents and the new population generated by the naval base. So, as the Gangjeong village has no Catholic church, the church is located on the area (F2) between the local church and the Buddhist temple.

Military housing units are placed between the naval base and the residential area for social cohesion. Compared to the military housing in the original plan, the housing units are closer to the local resident instead of creating a gated community of the naval base. However, by considering how the military operates, the housing is placed closer to the naval base than the facilities. By placing housing between the naval base and the civilian-military facilities, military households are able to walk to the naval base, the civilian-military facilities, and the local convenience facilities such as restaurants, grocery stores, banks, educational institutions, and so forth. Thus, the military personnel and their families could interact with local residents on the streets when they go to the local and civilian-military facilities. In addition, according to the naval base plan, there are three types of housing units, including single-family housing, row housing, and apartment housing. Generally, military families could live in the single-family housing and row housing, while single military personnel could live in apartment housing. Thus, the single-family housing and row housing are placed on the area (H1) closer to the residential

area when compared to apartment housing (H2 and H3). Furthermore, each type of the military housing is dependent on different streets, including the two new naval base streets and the Ieodo road in order to disperse traffic jams on the streets. As the apartment housing includes more units, it tends to generate more traffic on streets. Thus, the apartment housing relies on the new military streets: H2 is located on the new naval street connecting widely and H3 is located on another new naval street connecting locally. The single-family housing and row housing are placed on the area of Ieodo road, which is somewhat far from the village center to prevent traffic from increasing.

The original military housing area is used for the natural preservation area with the original plan to protect the Gangjeong stream by creating a buffer zone between the naval base boundary and the edge of the stream. The trees will be planted into the buffer zone (40m or 130 feet) to prevent environmental contamination from the Jeju naval base. By expanding the nature preservation area to the original military housing area, it will help the local habitat and water quality. The area is a good field to plant 921 trees which have been pulled from the naval base. Additionally, there is a relic site on the original military housing area. Thus, the nature preservation area will preserve the relic sites by deterring the facilities construction and keeping people from going into the area. The buffer area will hinder strangers from observing the Jeju naval base. Moreover, the Olle course tourists are able to enjoy the Jeju nature by brushing the preservation area without necessarily touching the fences and the walls of the Jeju naval base.

Because the Jeju naval base already eliminated the agricultural lands, the civilian-military facilities and military housing are placed on the faming lands primarily, it is necessary to try to enhance the agricultural industry through the naval base plan in order to express their volition to become helpful for the Gangjeong village. As society and economy data and analysis explained in chapter 4, the agricultural industry is an important activity socially and economically. Thus, Community Garden Park is recommended in this village to encourage the overall community, military personnel, and visitors to consider and participate in improving the mandarin orange industry. The community garden is used to find methods of rearing quality mandarin orange. The local famers and institutions related to the agriculture participate in experiment with possible mandarin trees by planting and managing. The experimental mandarin trees are implanted in the community garden park as landscape trees like an open community orchard. The residents and military families are able to enjoy the garden park and the mandarin tree. The visitors like Olle walking tourists can experience the local agricultural activities and recognize the Gangjeong village characteristic through observing the local tree, cultivating scene and enjoying the community garden park. As another buffer zone, the community garden park protects the security of the Jeju naval base and creates views of garden views rather than base fences.



[Figure 5. 8] Synergy effect for improving water and agriculture quality.

Through the educational facility and the community garden park, it is expected to make a synergistic effect and improve water and agriculture quality (see figure 5. 8). As illustrated in the data and analysis chapter, the water quality and agriculture are of significant value for the village of Gangjeong. To improve the water quality and mandarin orange industry, continuous study is necessary. As the educational facility checks and researches the water quality and finds out the improved kinds of mandarin orange product, it serves as a valuable research institution for preserving the drinking water and the agriculture industry. The community garden park will become a major farming field for experimentation and function as sharing their knowledge with the local farmers, while exhibiting the product of mandarin oranges to the local residents and visitors. Additionally, the educational facility would be likely to have a positive influence on the Gangjeong elementary school. As researchers experiment on the mandarin orange and display their products, the students are able to observe the experiment and become interested in the local agriculture and their village. Therefore, the community garden park, the educational facility, and the local school are expected to have synergy effect. It is one of good the opportunities that the Jeju naval base fuses into the village of Gangjeong.

6. Conclusion

[Figure 6. 1] Correlation of the literature review with the data and analysis and the recommendation.

Many aspects of the Jeju naval base are not different from other cases studied in the literature review chapter, including the Kings Bay Project, Guam, Okinawa, St. Mary's County, the Philippines and so forth (see figure 6. 1). According to the literature review and data analysis, the Jeju naval base could follow the negative impacts on the village of Gangjeong like the other cases when it comes to the five fields, including environment, society, culture, economy, and transportation. On the other hand, as the civilian-military naval base, the naval base project includes some social and economic advantages over the surroundings like other military bases. Based on the data analysis, the recommendation suggested the alternative alleviating the negative impacts and enhancing the benefits. This is the overall correlation of the thesis process in the process of finding out the answers and reaching objectives.

6. 1 Research implication

There are three objectives of this thesis: identify negative and positive issues caused by the Jeju naval base, identify potential synergies that can strengthen between the Jeju naval base and the village of Gangjeong, and propose alternative physical plans that will mitigate the negative impacts of the area and capitalize on the assets of the area. Based on the objectives, this thesis researched the Jeju naval base and the village of Gangjeong in the five fields, including environment, society, culture, economy, and transportation.

Generally, the Jeju naval base will have negative impacts on the village of Gangjeong environmentally, although the naval base plan prepares measures to reduce the negative influence on the environment of the Gangjeong village. The great deal of earthwork has covered some agricultural lands and worth coastline and rock with a large amount of concrete and

eliminated many trees in the construction site. The huge construction site could pollute the Gangjeong and the Ackgun streams, a clean and valuable water resources, through contaminated water runoff and dust. In addition, the construction light affects lightning bug activities negatively during the nighttime construction work. Lastly, the Jeju naval base blocks the beautiful ocean view from the coastline and the village of Gangjeong.

The civilian-military facilities will play a positive role in providing the welfare services and meeting places for both the local residents and military personnel and their family members. The kinds of facilities involve education, visitor, community, medicine, sports, and religious functions. Because many residents are somewhat old, the medical facility can care for them. As the current educational infrastructure is based on the present local residents, the educational facility could help the new military households and the local children. The community, sports, religious facilities will become meeting spots for the local residents with the soldiers and their families. The visitor facility will offer information about issues of the Jeju naval base in the village of Gangjeong to visitors by notifying the issues. On the other hand, the new population could cause negative issues such as lack of community facilities and friction between the local residents with the new population. Because the new population is 7,429 people, which is a large scale compared to the local population, it will feel the lack of the current community infrastructure such as education services and the daily convenient facilities. Furthermore, still some residents who hold unfavorable opinions of the naval base and the new population could generate friction with the military personnel.

The huge size of the construction site intimidates the Gangjeong village's cultural value such as water quality and relic sites. The water resource is important for the village of Gangjeong. Thus, the Gangjeong and Ackgun streams are preserved by the Jeju government due to value of

the water quality and natural habitat. However, the naval base is placed immediately next to the stream and could generate contaminated water and soil by threatening the water value. In addition, the naval base construction site includes three relic sites: one military housing area and two main naval base sites. Although the Korean navy proposed preservation plans, the construction work already has intimidated the relics.

The naval base is likely to increase the local economic benefit through the new population influx, the cruise tourism, and the navy activities. The new people should be dependent on the local business particularly the major local commercial street. The current local business like grocery stores and restaurants have local scale customers. However, when the military personnel and their family begin to use the shops and restaurants, benefits of the facilities should be higher than before. In addition, because the new population generated by the Jeju naval base is a good source of commercial market, various kinds of amenities and conveniences could emerge in the village of Gangjeong. The commercial services created by the new amenities and conveniences should benefit the local residents as well. Furthermore, if the cruise port starts to function as a tourism port, the large-scale of cruise ships will shuttle tourists from the other countries and areas to the village of Gangjeong directly. Although the possibility of the cruise port operation is not certain, the visitors carried by the cruise ships could generate the local economic benefit.

The Jeju naval base could bring about traffic congestion along the local streets as well as the naval base's new streets. The current local road system is based on the local population size, which is about 5,366 people. Currently, almost all of the local streets are two way roads with less traffic jams. Although the naval base project suggested the new street for military purpose and the new military population, the street should make at least five intersections where it meets the

local streets in the village of Gangjeong. The five intersections will be expected to generate traffic jams and air pollution.

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