Geographical Point of View on Transformation from Waste Disposal Site to Housing in Yangon City

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Introduction

Brownfields are generally defined as abandoned or underused industrial or commercial properties where redevelopment is complicated by actual or perceived environmental contamination. Brownfields vary in size, location, age and past use. They can range from a small, abandoned corner gas station to a large, multi-acre former manufacturing plant that has been closed for years. (Environmental Protection Agency,)

Some waste disposal sites suffer from the mistaken perception that they are contaminated, when in fact, they just need to be cleared of debris. There may be soil and groundwater contamination caused by discharges or dumping of organic and inorganic chemicals. Redevelopment of waste disposal sites benefits communities through urban regeneration, reduced sprawl, an increase in tax revenues and job and an improved living environment. Therefore, transformation of waste disposal site to housing area is important for sustainable development of the urban area. Brownfield redevelopment is important because it

- restores urban property to productive use, thus increasing property values
- increases job opportunities and local tax revenues
- improves public health and the environment
- utilizes existing public infrastructure.
- eliminates neighbourhood blight, thus improving a community's image and long-term sustainability.

Brownfields can be redeveloped for a wide variety of purposes. Successful redevelopment efforts have turned brownfields into retail sites, light industrial facilities, office parks, waterfront promenades, parks, schools, low–income housing, stadiums and transit centres. Strategic Brownfield redevelopment can clean up environmental hazards, remove neighbourhood eyesore, create jobs, provide housing and promote general economic health in local communities of all sizes. (Brownfield Basics, EPA)Transformation from brownfields to urban housing relates with smart growth urbanization. Smart growth is an urban planning and transportation theory that concentrates growth in the centre of a city to avoid urban sprawl; and advocates compact, transit-oriented, walkable, bicycle-friendly landuse, including neighborhood schools, complete streets, mixed-use development with a range of housing choices.

Aim

- to develop the urban environment through transformation from terminated waste disposal site to housing area.

Objectives

- to investigate the distribution of waste disposal sites within Yangon City
- to analyze the role of site and situation for transformation from terminated waste disposal site to housing area
- to analyze the environmental changes due to transformation from the former waste disposal site to housing

Geographic Environment of Yangon City

The geographic environment of Yangon City includes physical environment, human, social and cultural environments and economic environment.

Location and boundaries, relief, drainage, geology including earthquake risk, soils and natural vegetation form the physical environment of Yangon City. Yangon City is situated at the eastern part of Ayeyarwaddy Delta between Hlaing River, Panhlaing River and Bago River, and it is about 21 miles away from the sea. The Yangon City lies between north latitudes 16º 44' and 17º 5' and east longitudes 96º 0' and 96º 20'. Yangon City area was 265 square miles in 1996 but it has extended to 292 square miles as a result of the recent establishment of new towns in the east and west. In general, Yangon ridge lies parallel to the Hlaing River within the City's area. The average elevation of the ridge is between 40 feet and 80 feet above sea level, with some places over 100 feet. The northern part of the central ridge is higher than the southern part.

Due to the situation of topography, the main drainage direction is from central low ridge to either side. All of the streams in the west drain into Hlaing River and those in the east drain into Ngamoyeik Creek. The Hlaing River is flowing from north to south. Panhlaing River joins the Hlaing River. Then it flows south as Yangon River, meets Bago River in the southeast and continues south to enter the sea.Within the Yangon City area, the central low Ridge and the surrounding flatlands of deltaic character are the main geological features. The central Low Ridge or Yangon ridge is an asymmetrical, long narrow anticline which trends in a north-south direction.

There are variations in soil types within Yangon City area. The major soil types are as follows: (1) Yellow brown forest soils, (2) Lateritic yellow brown forest soils,(3) Lateritic soils, and (4) Gleyey soils.

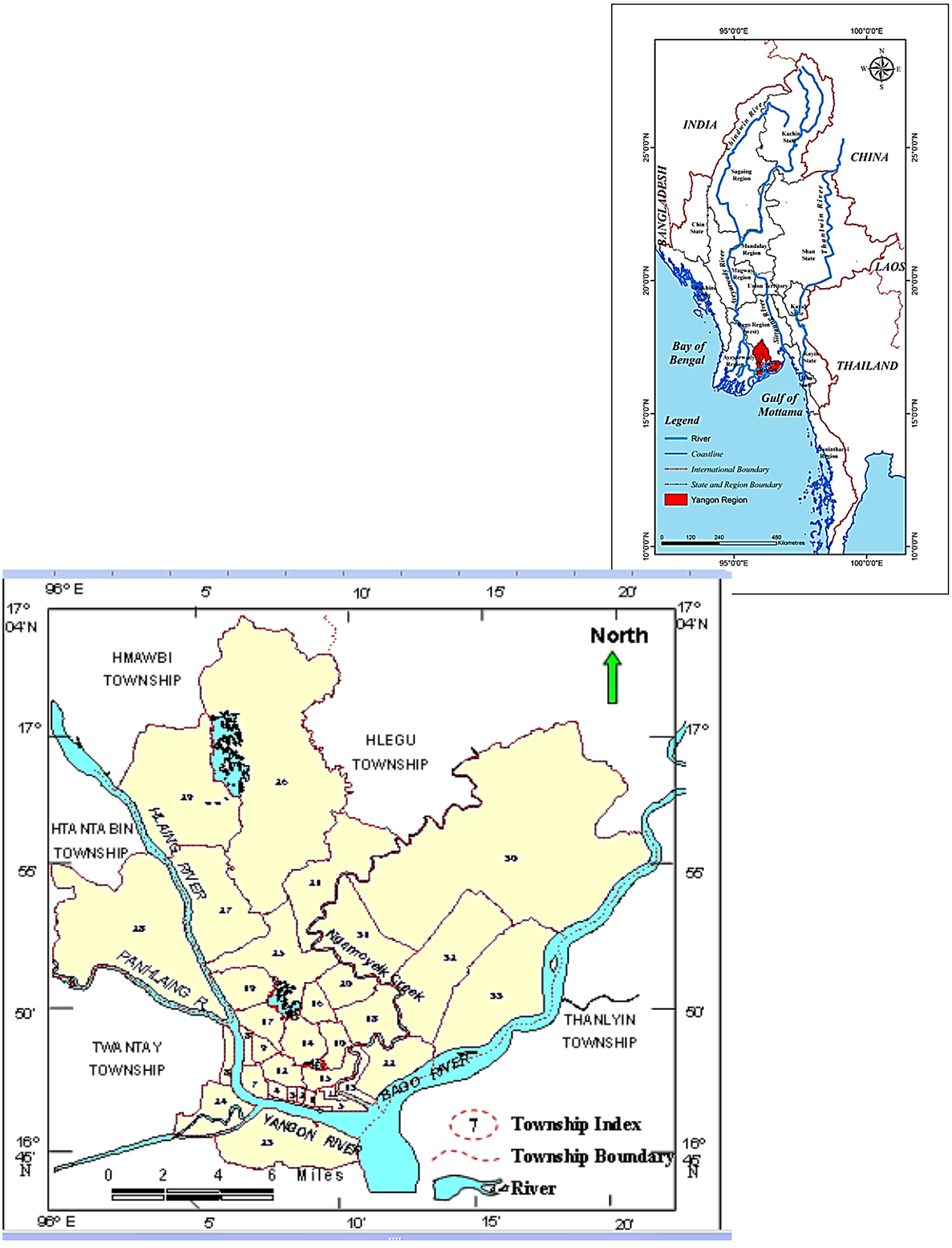

Figure (1) Location of Yangon City

Source: Based on Myanmar Survey Department

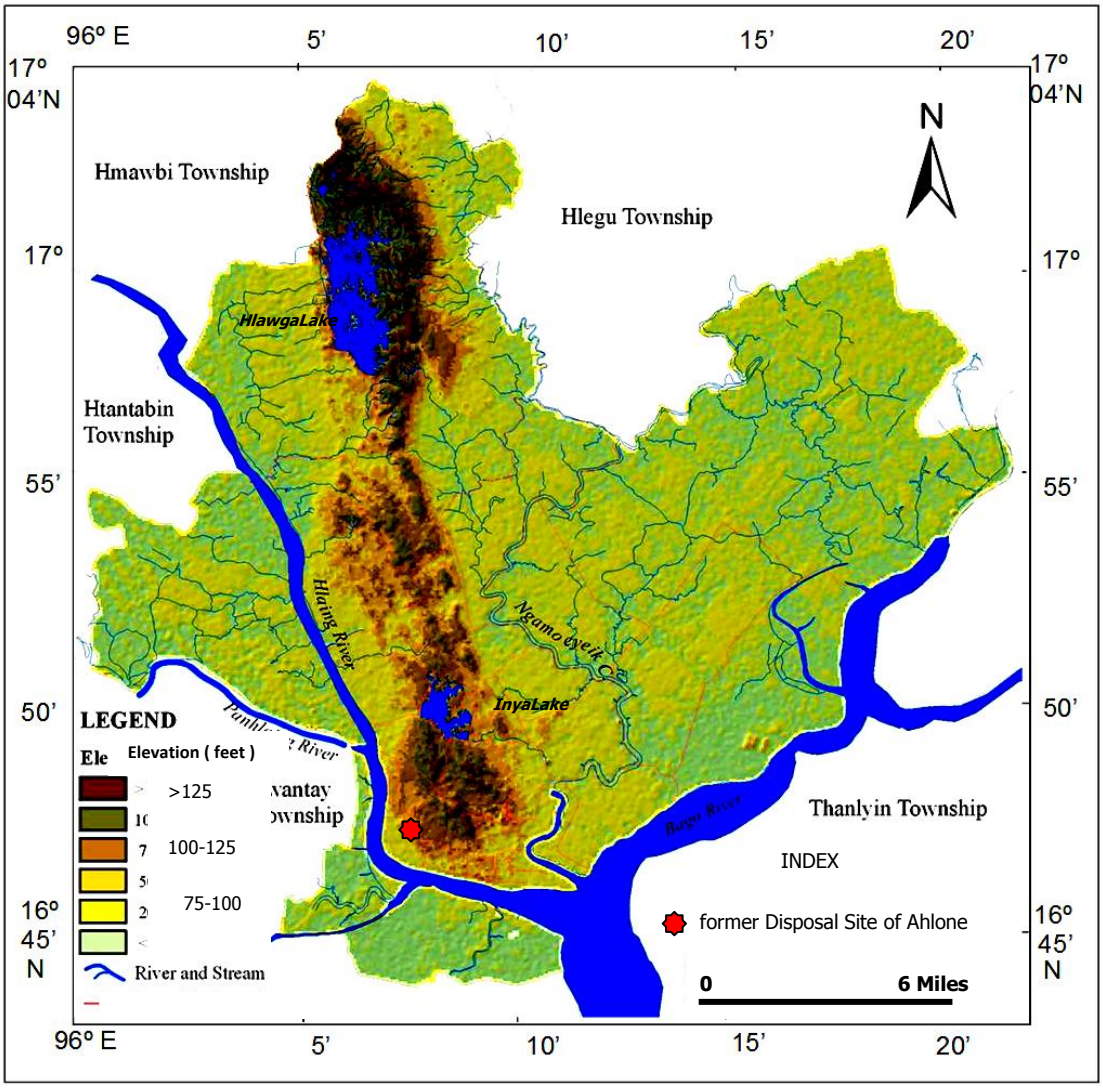

Figure (2) Physical landform of Yangon City

Source: Based on Topographic Map of Yangon City

Yangon is the Capital of Myanmar. According to Koppen Classification of climate, Yangon has tropical monsoon climate (Am). In general, the climate of Yangon City is a tropical monsoon type with well-defined wet and dry seasons. It has definite wet period during late May to October which is followed by a dry period from November to early May. The normal rainfall of Yangon is 7.35 inches and the mean annual temperature is 27.7ºC. Temperature and rainfall are the two most important climate elements. Mean monthly temperature is 27.7ºC. The average monthly temperature maximum temperature is 33.68ºC. The average monthly minimum temperature is 21.73ºC. April is the hottest month and Max temperature is 38.5ºC, Minimum temperature is 30.1 and Mean temperature is 34.3ºC. December is coldest month, 25.3ºC. The range of temperature is 11.95º C. Due to its location near the Andaman Sea and Gulf of Mottama, Yangon City experiences slightly moderate temperature condition

In the northern part of Yangon City area, where temperature are high and average rainfall is between 80 and 120 inches**,** deciduous and tropical monsoon forests were occurred in there. The

origin and growth of Yangon City is influenced by the physical environment. It includes good geological condition, natural drainage system, low flatland and favourable local climate. Yangon river, Hlaing river, Panhlaing river and Pazundaung creek are also navigable waterways.

In 1853, the plan for Yangon City (then Rangoon) was laid down on 0.8 square mile. This plan had built Yangon City. The City was drafted as a rectangular shape. Roughly, it was one and ahalf mile long and one half mile wide. According to the geographic setting of Yangon City, growth had been in a northward direction because of Ngamoeyeik Creek in the east, Hlaing River in the west and Yangon River in the south. The City had expanded particularly toward the north.

According to new "Municipal law" in 1922, the city had extended to 30.8 square miles and then the area further extended to 63.54 square miles in 1965. The area of Yangon City has to expand towards the north because of population increase. To ease the congestion and overcrowding within the City, The Yangon City Development Committee carried out the extension of Yangon City through, the development of new towns. The area of Yangon City was 77.73 square miles in 1973 and 128.9 square mile in 1983. The Yangon City Development area grew to 262.08 square miles with the absorption of Webargi and Shwepaukkan in North Okkalapa.

Table (1) Number of Population within Yangon City (1973 to 2014)

Year	1973	1983	1994	2005	2014
Number of Township	27	27	27	33	33
Number of Population	2055365	2513023	2720699	4111633	5211431

Source: Based on Population and Manpower Department

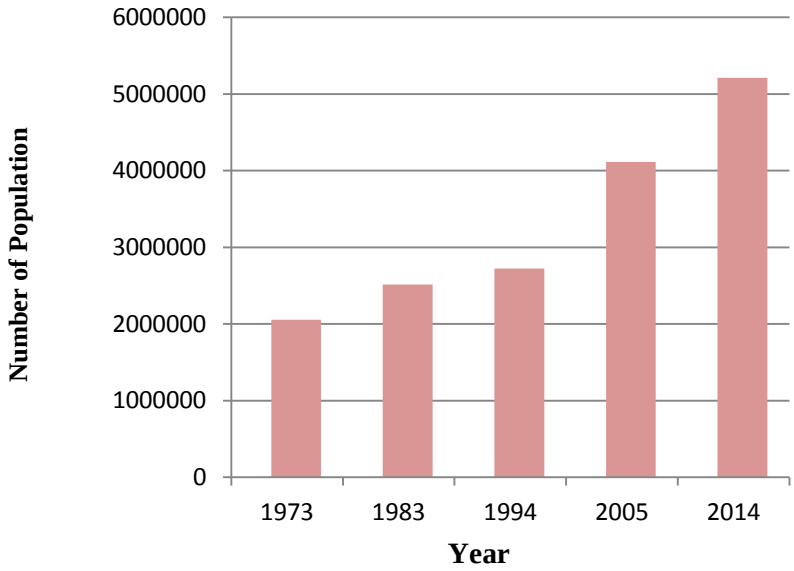

Figure (3) Number of Population within Yangon City (1973 to 2014)

Source: Based on Table 1.

Economic factor is also included in the geographical environment. The Economic development relate with the urban growth. Many economic activities are concentrated in Yangon, which had been, until recently, the capital but also the social and economic centre of Myanmar. Economic policies, flows of foreign capital, industrial development as well as trade are the major determining factors for economic development.

Myanmar regained independence from the British in 1948 and adopted a parliamentary system. The Revolutionary Council took power in 1962. The Socialist Republic of the Union of Burma came into being under a new constitution in 1974. The socialist economic system was practiced until the later period of 1988. The State Law and Order Restoration Council took over the State Power in September 1988 and introduced the market-oriented economy. The market-oriented economy had major impact on the growth of Yangon City. With the introduction of the market-oriented policy, many joint venture, companies and foreign capital investments also appeared in Myanmar.

Areal Growth of Yangon City

The City of Yangon, known as Dagon in ancient times is situated in the southern part of Myanmar and is twenty-one miles away from the sea. The city lies on a dagger shaped peninsula at the confluence of Hlaing River on the west, Yangon River on the south Bago River on the southeast and Pazundaung creek on the east. Yangon is now the largest and most prominent city in Myanmar although it originated as a small and humble fishing village. The city was planned for about 36000 inhabitants with the area about 0.8 square mile (2 sq-km) .Since then the city has been designated as the capital of Myanmar and known to the world formerly as Rangoon and later as Yangon.

It had twice suffered great damage during the War and after being bombed for three years by the Allied Forces during the Japanese occupation, most of its building had collapsed and it roads and drainage destroyed. In addition, its administrative machinery had stopped. As a result, Yangon which had enjoyed fame as the cleanest city in Southeast- Asia was a mess, and covered with garbage and rubble. In 1920 the city was extended northwards and the area became 33.38 square miles (86.45 square kilometers) with the population of 300,000. There were 16 townships, Kyeemyindine, Kyauktada, Sanchaung, Seikkyi-Khanaungto, Tamwe, Dala, Dagon, Dawbone, Pazaundaung, Pabedan, Bahan, Botahtaung, Lanmadaw, Latha, Mingalartaungnyunt, and Ahlone within Yangon Municipal area in 1922. The municipal committee at the time had administered the city and exercised its authority in accordance with the Municipal Act of 1922. By the 1922 act, the Yangon Municipal Committee became an autonomous body with its own administration and possessing wide powers to determine the fate of City.

In 1959-1960, three new satellite towns were built and City area covers about 78 square miles. After the Revolutionary Council had assumed power in 1962, the Yangon Municipal area

was considered too small, so urgent arrangements were made to extend the city limits. Administrative reforms were instituted in 1972. Local administrative bodies and departments were all dissolved and replaced by township Departments and all Municipal bodies came under the authority of the General Administration Department. In 1974 Yangon City composed 27 townships and the total area was about 80.55 square miles. With the implementation of site and services scheme physical boundary of the city has expanded substantially from around 133.64 square miles in 1980 to 233.22 square miles in 1991. At present, the city area covers about 292.426 square miles.

Table (2) Areal extension of Yangon City Area (1901 – 2005)

Year	Area (square miles)
1901	28.00
1920	33.38
1940	40.00
1953	47.57
1965	63.54
1974	80.55
1980	133.64
1991	223.22
1996	265.00
2000	288.00
2005	292.00
2015	292.43

Source: Survey Department, Yangon

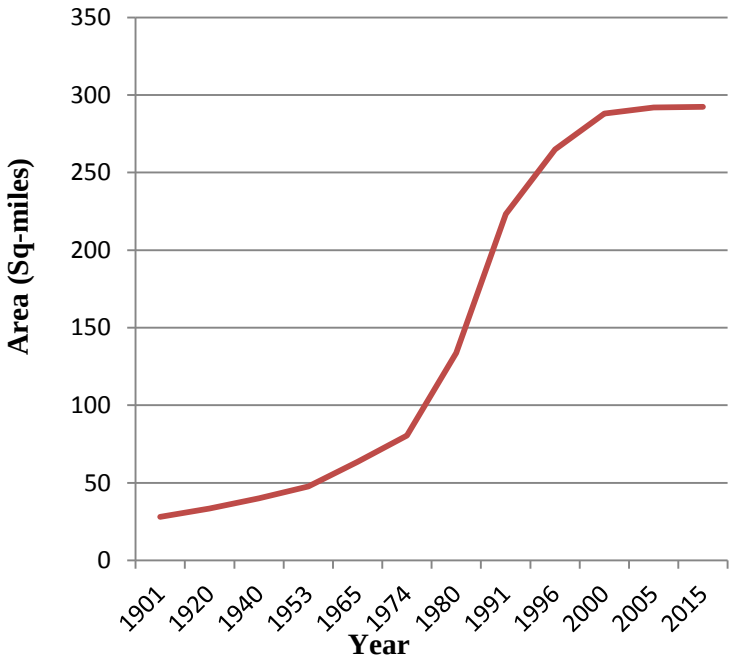

Figure (4) Growth of Yangon City Area (1901–2005)

Source: Based on table (2).

Spatial Distribution of Waste Disposal Sites in Yangon City

Yangon City with the highest population, financial, economic and education facilities is the biggest urban centre in Myanmar. It is playing a crucial role in the transformation process of Myanmar's economy from a socialist into a market-oriented economy. With rapid growth in population and industrial development, Yangon City is now facing with significant urban sanitation problems such as solid waste collection and disposal, sewerage etc. Especially, solid waste management has become a serious problem. This problem is compounded by the rapidly increasing amount of wastes of complex nature and composition, which result from the growth in urban population and the changes in their consumption patterns.

Distribution of Waste Disposal Sites in Yangon City

Solidwaste management is essential for public health and sanitation. The responsibility for providing the service is entrusted to Yangon City Development Committee (YCDC). Thus YCDC undertakes the task of solid waste service delivery, with its own staff, equipment and funds.

The collection and disposal of solid waste is one of the pressing problems of city life, which has assumed great importance in the recent past. The proper disposal of urban waste is not only absolutely necessary for the preservation and improvement of public health but it has an immense potential for resource recovery.

Waste disposal creates a problem primarily in highly populated areas. The more concentrated the population, the greater the problem becomes. When solid waste is disposed off on land in open dumps, it causes the following impact on the environment.

- ground water contamination by the leachate material generated by the waste dump,
- surface water contamination by the runoff from the waste dump,
- bad odor, pests, rodents and windblown litter in and around the waste dump,
- generation of inflammable gas within the waste dump,
- fire within the waste dump,
- erosion and stability problems relating to slopes of the waste dump,
- acidity to surrounding soils and
- bird menace above the waste dump which affects flight of aircraft (not get inMyanmar)

An effective system of solid waste management must be both environmentally and economically sustainable

- to be **environmentally sustainable**: it must reduce the environmental impacts as much as possible.

In 1940, the area of Yangon City (Rangoon) was only 42 square miles. There were only two garbage dump sites, one at Ahlone and the other at Ma-U-Gone. Ahlone dump site lies in Ahlone Township. Ahlone dumping site is meant for dumping garbage collected from Latha, Pabedan, Kyeemyindine, Ahlone, Kamayut, Hlaing, Sanchaung Townships and Kieghley Market. The Ma-U-

Gone dump site is for dumping of garbage from Kyautada, Botataung, Pazundaung, Mingalartaungntunt, Tamwe, Bahan, Dagon and Yankin Townships.

In the year1980, Yangon City was extended to 133.64 square miles. The site of the two garbage dumping grounds came to be within the extended city which is an ugly sight and inconsistent with the features of a modern city. So, waste disposal at these two dumping grounds was terminated. Ahlone disposal site was terminated in 1980, while Ma-U-Gone site was terminated in 1983.

New disposal sites appeared in Dawbone, Thabuttaw, Ngamoeyeik and Le Ywar. **Dawbon disposal site** was at the corner of Min Nandar and Ayeyarwon road in Dawbon Township. It appeared in 1982 and was terminated in 1999. **Thabottaw disposal site** was in KhineShweWa Street in Hlaing Township. It was started in 1989 and terminated in 1994. **Ngamoeyeik disposal site** was in Dagon Myothit(north) Township. Its use began in 2001 and was terminated in 2005. **Le Ywar disposal site** was in Thaketa Township. It appeared in 2001 and its use as dumpsite was terminated in 2005.

Current final disposal sites are at **Htain Pin, Dawei Gyaung, Dala, Hsateto and Mingalardon.**. The **Htain Pin disposal site** is in Hlaingtharyar Township and serves for dumping of garbage collected from Townships of West District, **Dawei Gyaung** serve for East District, **Dala** serve for South District and **Mingalardon** serve at North District of Yangon City.

These dump sites usually serve for a period of four or five years. After this four or five year period of garbage dumping, at least 12 inches of soil layer is formed on the site. When these dump sites have served their purpose and terminated, vegetable gardens, play grounds and other facilities cropped up in their place.

As for Ahlone and Ma-U-Gone Dumpsite, Housing projects have taken their places. The former Ahlone dumpsite has developed into River View Housing and Ma-U-Gone site has turned into Mingalar Garden City Housing Project area. The choice of these dump sites for housing project areas is due to their favourable site and situation.

Table (3) Spatial Distribution of Waste Disposal Sites within Yangon City

No.	Disposal Site	Location (township)	Area (acre)	Start of Waste Disposal site (year)	Termination (year)
1.	Ahlone	Ahlone	6.40	1940	1980
2.	Ma-U-Gone	Mingalartaungnyunt	64.00	1940	1983
3.	Dawbon	Dawbon	-	1982	1999
4.	Thabottaw	Hlaing	7.00	1989	1994
5.	Le Ywar	Thaketa	13.80	2001	2005
6.	Ngamoeyeik	Dagon Myothit (north)	3.40	2001	2005
7.	**Current Sites**				
	1. Htain Pin	Hlaingtharyar	18.10	2003	
	2.Dawei Gyaung	Dagon Myothit (north)	56.00	2003	
	3. Dala	Dala Township	-	2010	
	4. Seikkyikhanaungto	Seikkyikhanaungto Township	-	2010	
	5. Mingalardon	Mingalardon Tsp.	-	2010	

Source: Pollution Control and Cleansing Department, YCDC

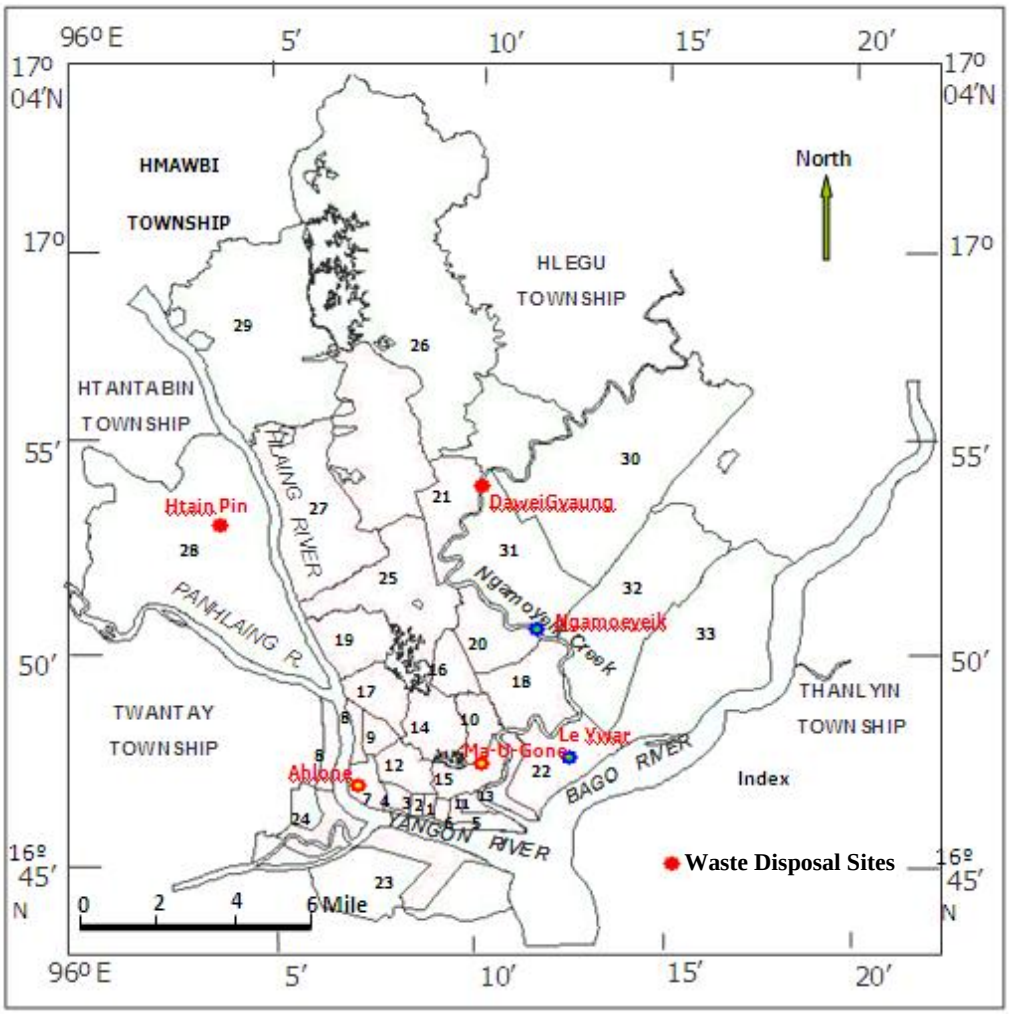

Figure (5) Spatial Distribution of Waste Disposal Sites within Yangon City

Source: Based on PCCD, YCDC.

Plate (1)Nga-Moe-Yeik Disposal Site **Plate (2) Le Ywar Disposal Site**

Some terminated disposal sites ---- vegetatable cultivation, teak plantation, playgrounds etc.

Waste disposal site-away from the Downtown area

Plate (3) From Waste land to Play Ground **Plate (4) From Wasteland to Teak Plantation**

Housing Development

The demand for new housing brought about economic growth and changing demography. For achieving a more sustainable pattern of development of housing it should aim to:

- give priority to the re-use of brownfield contaminated land for housing
- ensure that new housing development maintains or enhances the quality of the built environment
- ensure that new housing development is located so as to conserve energy, reduce the need to travel and be easily served by public transport
- create the opportunities for satisfying the full range of housing needs, enabling where justified, the provision of affordable housing.

Transformation from waste disposal site to housing development should be balanced with environmental, amenity and infrastructure considerations.

Site Requirements for Housing Development

An appropriate site should conform to the basic requirements such as site location, site standard and site density.

Site Location

Multi-family Housing sites must be located in areas that are appropriate for residential housing. To meet this requirement, the area where the site is located must be a residential area that provides adequate services and facilities.

A "residential area" as an area where at least half of the neighbouring properties are developed with inhabited residential structures. A project may be located in a downtown business area only if the project is part of a comprehensive strategy for meeting a community's development and housing needs. It should be community development and housing plan that addresses neighbourhood revitalization, housing, and economic development. Site must have adequate necessary facilities and services to support the needs of the residents.

- necessary facilities include schools, hospitals, and water and sewer systems
- necessary services include shopping, medical, and pharmaceutical services

Desirable areas are those where residents are more likely to find satisfactory living conditions. Sites in industrial area or declining neighborhoods or sites that are adjacent to high-volume train tracks, gas stations, and other such locations, that are likely to affect the value of the property or the quality of life of the residents, may not be acceptable.

Site Standard

Planning for development must take into consideration factors such as topography, soils, climate, adjacent land use, environmental impacts, energy efficiency, aesthetic and cultural values, public and private services, and housing and social conditions. Technical services, such as architectural, engineering, land survey, or site planning services, must be performed by professionals who are qualified and authorized to provide such services in the area where the project is developed.

Appropriateness for residential development should take into consideration conditions such as accessibility, adequate infrastructure, and absence of undesirable situations.

Sites must have infrastructure and utilities that are adequate for the needs of the site and that meet all local requirements. The facilities must be safe, economic, energy efficient, and dependable. The site must be accessible by a public road. There should be adequate availability electrical service to meet the needs of the proposed site.

The site must have water and wastewater disposal systems. Soil and geological conditions must be suitable for the type of construction proposed. Grading will promote drainage of surface water away from buildings and foundations, minimize earth settlement and erosion, and ensure that

drainage from adjacent properties does not create problems on the site. All slopes must be protected from erosion by planting or other means.

The Size and Shape of a site determines if there is enough room for the proposed units, as well as walks, parking, any on-site septic system, and other improvements. Sites must not have undesirable physical conditions that create hazards or unnecessary development costs. Examples of such conditions include:

-Poor soil conditions that increase development costs,

-Noise from nearby road, airports or factories that create unacceptable residential conditions, and

-Pollution from nearby facilities or crop spraying that creates hazardous health conditions.

Site Density

Acceptable density standard will vary by area and local preferences. It must be based on compatibility consistency with the community. Site density must be similar to other developments in the community. The Multi-Family Housing project should not look more crowded than the surrounding area nor should it look more spacious. Each site must be large enough to support the housing units as well as adequate public space, walkway, parking, and other site amenities. The quality of groundwater resources is important in the transformation of waste disposal site to Housing site.

Transformation from Ahlone Waste Disposal Site to Housing

Study Area: River View Garden Housing on former Ahlone Waste Disposal Site

It is located on Strand road, parallel with Yangon River, in Ahlone Township. It is at an average elevation of about 40 feet above sea level. It is bounded by Ahlone road in the north, Nguwa road in the east, Strand road in the north, and Forest road in the south. Over 10 YBS bus lines are running on the Strand road.

Ahlone disposal site covers an area of 6.4 acres and lies at the corner of Ahlone road and Strand road. It is the earliest dump site of Yangon City. The boundaries of Ahlone disposal site are Strand road in the west, Nguwa road in the east, Ahlone road in the north and No.(0262) Petroleum Filling Station, 8 storyed apartment building, waste collector trucks compound (Ahlone Township) with Forest road in the south. Various bus lines ply to and from Strand road which is important as the road connecting two townships of Lanmadaw and Kyeemyindine. Ahlone road leads to Dagon Township. Ahlone Dump Site was about 60 feet high which higher than its surroundings areas. In the neighbourhood are single unit housings, Sinmin Market, Myanmar Timber Enterprise, a Primary School and AungZayYa Housing Premises.

Former Thiri-Mingalar Fruit and Vegetable Market, which is important to the whole country, began functioning in 1992. All kinds of fruit and vegetables come from many parts of country, mostly by road. Since the time the vegetable market started to function, Ahlone Strand

Road became one of the important and busy roads within Yangon City. There were only ten bus lines plying on Ahlone Strand road prior to 1988. Since then, the bus lines plying on the strand road increased to twenty five lines. Today, there are buses to Insein, Hlaingtharyar and ShwepyitharMyothits plying on this road. Buses to Thaketa, Thanlyin and Kyauktan townships are also in service on this road.

Though the disposal of garbage on Ahlone Dumping Site was terminated in 1980, the River View Garden Housing Project commenced only in year 1997. During the seventeen year period between 1980 and 1997, the site was utilized as a bus terminal stop. The long standing decomposed garbage was sold as humus, and the site became a selling centre for humus. The Timber depot also piled its logs in store at this site. Above factors are the reasons for transformation of the former disposal site.

Accessibility of River View Housing Area is main cause of transformation to housing. Ahlone Township is one of the thirty-three townships within Yangon City. Ahlone Township is surrounded by Sanchaung, Dagon, Lanmadaw, Seikkan and Kyeemyindine Townships. The Yangon River serves as borderline for Seikkan Township. The junction of Ahlone road and Strand road is the place for consideration (study area). Strand road is one of the most important roads in Ahlone Township. Keighley Market, since 1992, is a centre for distribution of green vegetables and fruits merchandise to all over the country.

The Strand road begins from where; Bayintnaung road and Hledan road meet at the border of Kyeemyindine Township. There are now 25 bus lines plying on Strand road. As a result of the many road connections to this housing area (study area) it will take a few minutes only to the downtown area, and approximately one hour to other parts of Yangon City.

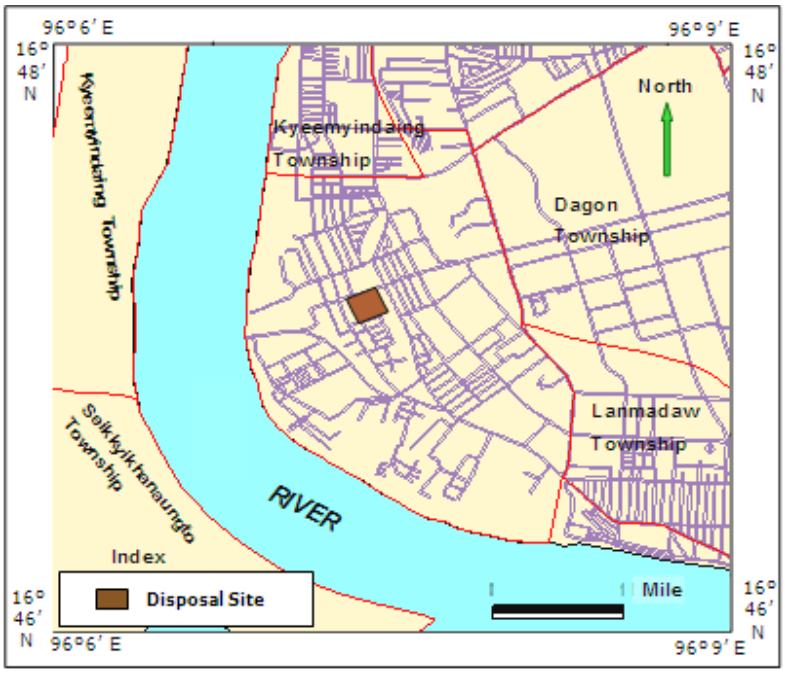

Figure (6) Location of the former Ahlone Waste Disposal Site

Source: Based on PCCD, YCDC

Plate (5) The former Ahlone Waste Disposal Site

Source: Olympic Company, January 2006

Field Note: This photo shows the storage of logs belonging to the timber depot at the former Waste Disposal Site, Ahlone Township.

Plate (6 &7) River View Garden Housing, Transformation from former Waste Disposal Site to Housing as Smart Growth

Field Note: these photos show the single unit houses, viewed from the Ahlone Tower, Ahlone Township

CONCLUSION

This Research paper is the distribution of waste disposal sites within Yangon City and the role of site and situation for transformation of waste disposal site to housing area.

Yangon City is the biggest urban centre in the country with the highest population, financial, economic and educational facilities. It is playing a crucial role in the transformation process of Myanmar's economy from a socialist into a market-oriented economy. With rapid growth in population and industrialization, YangonCity is now facing urban sanitation problems such as solid waste collection and disposal, sewerage, etc. Solid Waste Management is a part of public health and sanitation. The waste disposal creates a problem primarily in highly populated areas. The more concentrated the population, the greater the problem becomes.

Yangon City was only 42 square miles in the year 1940. There were only two garbage dump sites, one at Ahlone and the other at Ma-U-Gone. Ahlone dump site lies in Ahlone Township. The purpose was for dumping garbage collected from Latha, Pabedan, Kyeemyindine, Ahlone, Kamayut, Hlaing, Sanchaung townships and Kieghley Market.

In 1980, Yangon City was extended to 133.64 square miles. The existence of these garbage dumping ground within the centre of the extended city is inconsistent with the features of a modern city. The disposal of waste at Ahlone disposal site was terminated in the year 1980.

Disposal sites usually serve for a period of four or five years. Within four or five years of garbage dumping, at least 12 inches of soil layer is formed on the site. When these dump sites have served their purpose and terminated, vegetable gardens or play grounds or other facilities usually cropped up in their place.

At the terminated Ahlone, housing projects have taken their place. The former Ahlone Disposal site has developed into River View Garden Housing . The choice of these dump site for housing area is due to their favourable site and situation.

Ahlone Site had been used since 1940 when Yangon City was only 42.59 square miles in size. In the year 1980, YangonCity grew to the size of 133.64 square miles. Waste disposal sites affect the city feature. As such, disposal of wastes at these sites had to be terminated. With the extension of Yangon City, modernization of urban area and shortages in housing, the situation has become ripe for this waste disposal site to be transformed into housing complex areas.

The perception of residents actually living in the housing area as well as the neighbouring residents is also analysed. Neighbouring residents have been unhappy with the waste disposal site due to unfavorable side effects of the waste matters. They are now happier with the change in the environment. The environment of the city has become more pleasant as a result of the transformation of waste disposal site to a housing complex area.

The residents in the housing units on the former waste disposal sites have prior knowledge of these sites and are living without any misgivings. Among those who have moved in to the housing units; include those from other parts of YangonCity as well as those from other towns. Good site and situation are the main attractions of the housing areas.

Waste disposal site are naturally poor in earthquake resistance. The earlier established townships in YangonCity on Anticline, with sufficient hard rock strata of peak Ground Acceleration (P.G.A) rating (0.1g) to (0.2g) value are not of danger from earthquake shocks. New Towns are developed on alluvial soil strata of Peak Ground Acceleration (PGA) ratings 0.2g to 0.3g values are vulnerabler to earthquake shocks. As such, multi-storeyed high rise, structures should not be constructed in these areas.

Ahlone waste disposal site is fortunate in that during their functioning time, there were no plastic waste materials. Plastic materials fail to decay. It is only by intense heat that they can be decomposed. Plastic materials form loose soil strata.

Ahlone site has been developed as housing areas. The remaining waste disposal site is Dawbon, Thabottow, Le Ywar and Ngamoeyeik. Dawbon and Thabottaw are merely filling land area, and not sizable enough to be transformed to other uses. Le Ywar and Ngamoeyeik are measured by parameters. Le Ywar is of poor accessibility and Ngamoeyeik is of moderate accessibility. Although Ngamoeyeik waste disposal site is quite favourable with respect to accessibility, its area size of only three acres does not quality for development into on housing area. Rather, as smart, it should be developed into a playground or a super market.

Appendix

River View Garden Housing Environmental Changes

In front of Housing

Right View of Housing

Right Side of Housing

Left view of Housing

Left View of Housing

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