STUDY ON THE LAND PRICE OF PRIVATE REAL ESTATE PROJECTS IN DHAKA AND ITS ASSOCIATION WITH PHYSICAL AMENITIES AND ENVIRONMENTAL ELEMENTS

Submitted by
Md. Manzur Morshed Khan

MASTER OF URBAN AND REGIONAL PLANNING

Department of Urban and Regional Planning
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The thesis / project titled **"STUDY ON THE LAND PRICE OF PRIVATE REAL ESTATE PROJECTS IN DHAKA AND ITS ASSOCIATION WITH PHYSICAL AMENITIES AND ENVIRONMENTAL ELEMENTS"** submitted by Md. Manzur Morshed Khan, Student No. 0416152016, Session: **April 2016**, has been accepted as satisfactory in partial fulfillment of the requirement for the degree of MASTERS OF URBAN AND REGIONAL PLANNING by Course work and Thesis on 17/10/2021.

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It is hereby declared that this thesis or any part of it has not been submitted elsewhere for the award of any degree or Diploma.

Md. Manzur Morshed Khan

DEDICATED TO

My Beloved Parents

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LIST OF ABBREBIATION

BUET : Bangladesh University of Engineering and Technology
DURP : Department of urban and Regional Planning
MURP : Masters of Urban and Regional Planning
RAJUK : Rajdhani Unayon Kortipakhya (Capital Development Authority)
BBS : Bangladesh Bureau of Statistics
REHAB : Real Estate Housing Association of Bangladesh
DOHS : Defense Officers Housing Society
BLDA : Bangladesh Land Developer Association
DMDP : Dhaka Metropolitan Development Plan
RDP : Regional Development Plan
DSP : Dhaka Structure Plan
UAP : Urban Area Plan
DAP : Detailed Area Plan
PRLDR : Private Residential Land Development Rule
CBD : Central Business District
KM : Kilo Meter (km)
ANOVA : Analysis of Variance
HSD : Honest Significant Difference
GIS : Geographic Information System
FT : Feet (ft.)

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By the grace of the Almighty Allah I have completed my Master of Urban and Regional Planning (MURP) thesis. Here I would like to take the opportunity to express my deepest gratitude to all the people, Department of Urban and Regional Planning and Bangladesh University of Engineering and Technology (BUET) for cordial support during my study time in MURP at BUET.

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ABSTRACT

The price of the residential land is associated with several factors such as accessibility and location, size and shape, physical and environmental amenities, topographical and climatic factors, economic and social security, neighbourhood quality, etc. of the residential land. Among all these features, the physical amenities and environmental elements influence the price of the residential land within the project site. Physical and environmental amenities are a set of local attributes. The wide roads, shopping centres, educational institutions, health care centres, recreational centres, religious centres, city and community centres, bus or metro stations, utilities and services etc. are the physical amenities. However, the environmental elements of the residential land are the rivers, lakes, water bodies, parks, playgrounds, urban green and forests, open spaces, farmlands, the orientations of the plots etc. According to the empirical research, these physical and environmental features enhance the residential quality of life and influence the residential land price within the site of the residential area. Consequently, there are some legal guidelines such as "Private Housing Land Development Rule 2004 (amendment 2015)" which have listed a set of criteria to ensure physical and environmental elements in the real estate projects of Bangladesh. Private real estate companies are developing residential projects besides government agencies in the Dhaka Metropolitan Development Plan area. A wide range of price categories (*lakh* per *Katha*) has been found in these private residential projects. However, there is a little variation of plot prices in public residential projects though these projects are also provided with adequate environmental and physical amenities. This research studied the land price in private residential projects and investigated the association of physical and environmental amenities on land prices within the site of private residential projects in Dhaka. This research also compared the land price variations in public residential projects with private residential projects based on the environmental and physical attributes. Out of several large residential projects from the eastern part of the Dhaka Metropolitan Development Plan area, private residential projects 'Shornali Abashon', 'Sun-valley Abashon' and 'Malum City' have been selected as the study projects and Sector-15 of 'Purbachal New Town' have been studied as public residential projects. Secondary data have been used in this study. The samples from the study projects are selected at 95% confidence interval and 5% margin of error plots. As sample 246, 239 and 247 numbers of residential plots are selected from Shornali Abashon, Sun-valley Abashon and Malum City projects respectively. Every third plot of the study projects have been selected as sample plots in this research. Secondary data such as list

of plot prices as well as the site maps of the study projects have been collected from the projects offices. A database has been prepared with data of each plot price. The maps have been digitized. From the digitized maps the shortest distance in meters between the residential plots and the environmental as well as physical attributes were documented. In this research, descriptive statistics, Correlation analysis, ANOVA (Tukey HSD), and Regression analysis have been conducted. It has been found from the study that the plot price (*lakh* per *Katha*) of private residential projects are influenced by environmental and physical attributes, which makes a wide range of categories of residential plots prices within the project sites. The most significant physical attributes on residential land price are the width of the access road, distance from the school, distance from the market. Furthermore, the environmental attributes which are strongly associated with residential land price are the corner plot, distance from the lake, river, playground, and park. On other hand, it has been found that the residential land prices in public projects do not have any linkage with the environmental and physical attributes. There is a flat price for all types of plots in the public residential projects. This research also explained that the price of public residential projects can be increased if the environmental and physical attributes are considered in fixation of the plot price. This research has recommended that real estate companies are supposed to provide better physical and environmental amenities as they calculate and get the economic benefits of the services and amenities through the pricing of land. However, this research also recommended public agencies to incorporate the physical and environmental amenities in residential projects and include the value of these environmental and physical amenities in pricing the residential plots. This will ensure proper justification in residential plot pricing and plot allocation procedure.

CHAPTER 01
BACKGROUND OF THE STUDY

1.1 Introduction:

Dhaka is one of the fastest-growing megacities in the world. According to the annual report of the Bangladesh Bureau of Statistics, the population of this megacity is about 21 million (BBS, 2020). The Dhaka Metropolitan Development Plan (DMDP) area is about 1,528 square Kilometers (DMDP, 1995-2015). Housing is a basic need of this megacity and a major share of urban land use has been dedicated for residential use in Dhaka (Dewan, 2013). Both public and private sectors are operating in the residential land development of Dhaka to meet the housing need of the growing population (RAJUK, 2015; REHAB, 2012). According to the Rajdhani Unnayon Kartipokkha (RAJUK) and Real Estate Housing Association of Bangladesh (REHAB), at present 56 numbers of RAJUK enlisted real estate companies are developing residential projects. These residential land development is happening both in a planned and unplanned manner to provide demanding shelter for the increasing population of Dhaka (Islam, 2005). There are some planned residential areas in Dhaka which were developed by the Government alone. The Uttara Model Town, Gulshan, Dhanmondi, Mirpur, Mohakhali, Banani, Baridhara, and DOHS (e.g. Mohakhali, Banani, and Baridhara) are the residential projects planned and developed by the Government (RAJUK, 2019). On the other hand, Basundhara Residential area, Kadirabad Housing, Mohammadpur Housing Society have been planned and developed by real estate companies in Dhaka (REHAB, 2012).

Unplanned residential areas of Dhaka have poor residential quality. Streets are narrow, houses are built very densely without adequate open spaces. There are a lack of playground and recreational facilities and a scarcity of educational institutions and shopping facilities in unplanned residential areas of Dhaka (RAJUK, 2019). Conversely, planned residential areas have a comparatively better-built environment to ensure the residential quality of life. In the case of planned residential areas, plots are designed in regular shape and roads are wide. There are some community facilities in some residential projects developed by public agencies but often these are absent in maximum projects of private companies (Alam, 2011; REHAB, 2012).

In the last few decades, the residential land prices were changed several times in Dhaka (Seraj & Alam, 1989). The growth trend of the residential land prices has been influenced by so many factors such as social, physical, and environmental factors in Dhaka. It has been found that the residential plot prices in planned areas have increased from the unplanned residential areas because of including better environmental and physical amenities (Islam et al., 2007).

The price of residential land is linked with many issues such as accessibility, location, distance to CBD, land use pattern, size of the land, the shape of the land, physical amenities, environmental elements, topographical features, climatic factors, economic security, commercial aspects, social security, neighbourhood quality, provision of utilities and services, etc. (Hai & Huong 2017; Raden et al., 2013). These features make the variation in residential plot prices between different residential projects and within the site of the specific residential projects (Benson et al., 1998). Empirical research has found that physical amenities and environmental elements influence the price of the residential land within a site of any residential project most (Abbot & Klaiber, 2010). These environmental elements and physical amenities are a set of local attributes which influence the price of the residential plots by enhancing the residential quality of life (Lynch, 1996; Schaeffer et al., 2018). The physical amenities of the residential land are wide road, market or shopping, educational institutions, health facilities, recreational centre, religious centre, city and community facilities, bus or metro station, utilities, and services, etc., however, river, lake, waterbody, park, playground, urban green and forests, open spaces, farmlands, the orientation of the plots, etc. are the environmental elements of the residential land (Baranzini et al., 2011). These features have a very positive impact to enrich the quality of the built environment as well as upgrade the values of the residential land property (Geoghegan, 2002). Consequently, the Private Residential Land Development Rule (PRLDR), 2004 which was amended in 2015 has listed a set of criteria to ensure physical and environmental elements in the real estate projects of Bangladesh (RAJUK, 2015). This rule has provided a set of guidelines to incorporate the physical amenities and environmental elements in residential projects which will make the residential built environment free, open and breathable as well as enriched with the residential quality of life.

A wide range of categories of plot prices (*lakh* per *Katha* where 1 *Katha* is 720 sq. ft. or 66.89 sq. meter) for residential plots with different environmental and physical attributes

have been found in the private residential projects of Dhaka. On the other hand in public residential projects, there are little variations in plot prices even after having adequate environmental amenities and physical attributes. The residential plots with better environmental elements and physical amenities are being sold at higher prices in real estate projects of Dhaka. The real estate companies provide physical and environmental elements in their projects and also get relevant economic benefits from the plots. However, in the case of public residential projects, land price varies according to land use category such as the different prices for residential or commercial plots. The land price also varies due to the increase in the budget of the projects in different phases of land development in public residential projects of Dhaka (RAJUK, 2018).

A number of researches explained the psychological and physical benefits of providing environmental and physical attributes in a built environment at home and abroad (Gnagey & Grizalva, 2018). Some research works were performed on the relationship of land values with physical and environmental attributes abroad (Hai & Huong 2017; Bird et al., 2018; Khadish & Nutusil, 2012). There is a void in research which indicates the necessity of the study of land price variations with the considerations of environmental elements and physical amenities as well as the economic benefits of providing these attributes in residential projects of Bangladesh (Hussain et al., 2014). Consequently, this research aimed to study the residential plot prices and the association of various topographical features, environmental elements as well as physical amenities on the price of the plots within the site of private residential projects in Dhaka. This research also aimed to make a comparison of plot price variations between private and public residential projects based on the provided environmental elements and physical amenities.

The findings of this study have encouraged the real estate companies to provide better physical and environmental amenities as they calculate and get the economic benefits through the pricing of land with provided environmental elements and physical amenities. This research has also suggested public agencies to consider the value of the environmental elements and physical amenities in plot price fixation procedure of public residential projects as the public residential projects have been designed with adequate environmental elements and physical amenities. These will justify the price of the residential plots and as well as avoid malpractice in plot allocation procedure. Moreover, this research has justified the client in choosing residential plots according to the price variations based on provided environmental elements and physical amenities.

Furthermore, this research has addressed the association between environmental elements and physical amenities with economic benefits for the first time in Bangladesh.

1.2 Objectives of the Study:

This research has been done to study the land price of residential projects of private real estate companies and to find out the association of physical amenities and environmental elements with the plot price within the sites of the projects. Conversely, this research has also presented the plot price scenario of the public residential project and has compared it with strategies followed by the private residential developers. The objectives of the research were-

1) To study the land price of residential plots in private real-estate projects in Dhaka
2) To study the influence of physical, topographical, and environmental attributes on the land price
3) To compare the land price of public and private real estate projects considering these attributes

1.3 Scopes and Limitations of the Study:

A huge number of data (i.e. list of plot prices) has been collected from so many public and private residential projects in the DMDP area. Moreover, the project maps and projects details (e.g. project plan, project policy and etc.) have been taken from the office of the study projects. The study projects were surveyed physically to take the geo reference for digitizing the site map of the study projects. Necessary development related data has been collected from the Rajdhani Unnayon Kortipakhya (RAJUK), Bangladesh Bureau of Statistics (BBS) as well as Real Estate Housing Association of Bangladesh (REHAB) to conduct the research.

One of the limitations of this research was that the asking price of residential plots (i.e. secondary data) has been used. The asking prices may slightly vary from the transaction prices sometimes, as real estate companies may offer some discount seasonally to attract the buyers. Though these variations are not consistent. However, the real estate companies do not reveal discounted prices most of the time for their business policies as well as the real estate companies have given only the asking prices during data collection. Moreover, as the discounts are applied on the asking price which was fixed based on the provided environmental elements and physical amenities, thus there might be very little impact on

analysis in this case. That is why the asking prices have been considered here instead of transaction prices. There are no remarkable topographical features that can influence the price of the residential plots in the study sites hence it has not been considered in this research. Moreover, this research studied the land price variations within the site of the residential projects due to the variation of environmental and physical attributes. Therefore another limitation of this research was that the land price variation between various residential projects in different locations of CBD has not been considered in this study.

1.4 Organization of the Research:

This research report is composed of eight chapters which were organized in a systematic way to explain the whole research.

The first chapter of this research has introduced the research work, discussed the rationale of the research, objectives, and scopes, and limitations of the study. This chapter has also narrated the framework of this research.

Chapter two has presented the literature review which has been done to understand the basic concepts to conduct this research. The literature study has discussed the various definition, necessary theorem of land price evaluation, explanation various attributes of residential land, residential land market and trend of growth of the residential land price of Dhaka, methods of relevant research, illustration of relevant public law, and others necessary findings. These literature studies have developed the proper direction to organize this research.

Chapter three has explained the methodology of the research. The methodology of this research concentrated on on-site selection, sampling and data collection process, methods of data analysis, and evolution and interpretation of the findings from analysis to achieve the objectives of this study.

Chapter four has presented the profile of the study projects. The general information regarding location, size, the spatial quality of residential plots, the process of benchmark residential land price of the study project have been described in this chapter.

Chapter five has dealt with the analysis to achieve objective number one. This chapter narrated the land price of residential plots with various attributes through descriptive analysis.

Chapter six explained the analysis to achieve objective number two. The Association of environmental and physical attributes on residential land price has been marked and influential environmental and physical attributes have been detected in this chapter by performing various statistical analyses.

This chapter described the price of residential plots with physical and environmental attributes as well as the plot price fixation procedure in a public residential project. Moreover, this chapter has described the prospects of plot price variation in public residential projects with the change of the physical and environmental attributes.

Finally, the recommendations and conclusions of the research have been presented in chapter number eight. The recommendations and conclusions have been drawn from the research results and findings. This chapter has also included the recommendation for further study.

CHAPTER 02
LITERATURE REVIEW

2.1 Introduction:

This chapter presents the review of literature which have been done to conduct this research. Various sources of literature such as books, research papers, journal articles, conference publications, public rules, and policies are studied to compose this chapter. The basic assumption regarding the residential land (e.g. activities and requirements of residential environment, influential features of residential land as well as environmental elements and physical amenities of the residential land and etc.) are described sequentially. Several theories and models of land value are discussed here and tried to be explained in the context of Dhaka. Moreover, the legal guidelines of including physical and environmental attributes in residential projects of Dhaka are described.

2.2 Residential Land Property and Value of Residential Land:

The land which is used for residential purposes can be defined as residential land property. It is one of the most precious assets. In the past residential land was a common good and could not be transferred or sold, but now a days it has become a commodity or composite goods that are desired and can be exchanged in the modern market system (Kutter et al., 1997). Residential land property can also be defined from various sources. According to National Housing Authority (NHA), residential land properties are used for residential purposes such as single-family homes, condos, cooperatives, duplexes, townhouses, and multifamily residences (National Housing Policy, 2016). The residential property is developed and scaled for future development for residential purposes (Rosen, 1974).

The value of the residential land reflects the subjective expectation and perception of the worth of the land. The price or value of the residential land property is offered from the perception of potential benefits that can be achieved from the residential land (Kutter et al., 1997). In the open market system, the value of land or land property means the exchange values that are calculated from the estimation at which the land or land property is expected to be sold and given a certain assumption (Adams, 1994).

According to REHAB (2012) and RAJUK (2020), the price of the residential land is being fixed based on the provided facilities and benefits in the private residential projects of

Dhaka. A wide range of price categories has been found focusing on various activities and facilities in the residential land market of Dhaka (REHAB, 2012; RAJUK, 2020).

2.3 The Activities and Requirements for the Residential Environment:

Some activities compose the residential environment and make the residential area lively and vibrant. These activities demanded some requirements such as physical infrastructures and environmental elements, etc. Markets and shopping centres generate economic activities; family activities become active by centring neighbours and community peoples; schools, colleges, and universities operate educational activities; religious centres give spiritual activities; social activities gather in the civic centres or community centres; recreational activities generated by centring parks, playgrounds, lakes, and rivers; hospitals, clinics and medical centres provide health care activities in the residential area. There are also others activities such as utilities and services activities and food activities etc. in the residential and living environment (Zheng, 2003; Ping Ai, 2005). The activities and requirements are compiled in the following Table: 2.1.

Table 2.1: Activities and Requirements for Residential Environment

Activities	Requirements
▪ Economic activities	Market, shopping centre, etc.
▪ Family activities	Neighbours, community people, etc.
▪ Educational activities	School, college, university, etc.
▪ Spiritual activities	Religious centre
▪ Social activities	Civic centre, community centre, club, etc.
▪ Recreational activities	Park, playground, lake, and river, etc.
▪ Community activities	Community services
▪ Health care activities	Hospital, Clinic and medical centre, etc.
▪ Utility and service activities	Electricity, gas, water, sewerage, etc.
▪ Food and other activities	Restaurant, food supply, etc.

Source: Based on literature study from Zheng (2003) and Ping (2005)

These activities (Table: 2.1) create the residential environment active and vibrant. According to REHAB (2012), the real estate companies of Dhaka provide various types of activities in their residential projects to draw the attraction of the buyers. These projects advertise their brand focused on numerous facilities such as shopping centres, markets, parks, playgrounds, schools, colleges, universities, medical centres, and services. It has been found that these activities increase the value of the residential land (REHAB, 2012). The residential activities need some requirements. These requirements add significant

attributes to residential land property and increase the residential land value. The following section has discussed the influential attributes of residential land value.

2.4 Spatial Pattern of Urban Land Value Model:

The price of residential land can be measured by various methods of land value evaluation model. There are several models which have addressed the land evaluation such as the traditional land value model (e.g. urban land value and location to CBD, Bid-Rent model of land value), the classical model of urban structures, as well as the contemporary urban land value model (e.g. multiple regression land value evaluation model). These models have addressed the process of evaluation of urban land value by measuring spatial features attached to the land property. Various spatial patterns of urban land value models have been studied in this section to understand the reasons behind the variation of residential land prices. Some significant urban land value models related to this research have been synopsized here to find out the basic reasons of land price variations in residential projects in the DMDP area (Wingo, 1961; Eckert, 1990; Kivell, 1993; Hartshorn, 1993; Zheng, 2003; Ping, 2005).

2.4.1 Urban Land Value and Location to CBD:

Lowdon Wingo (1961) studied the location and urban land value systematically by modelling the value of consumption in transport. This model has focused the association between the costs of land with the distance from the centre. Furthermore, it explained that, the cost of land decrease with the increase of the transportation cost. Figure: 2.1 has described the cost of land and the cost of transport with the distance from the centre.

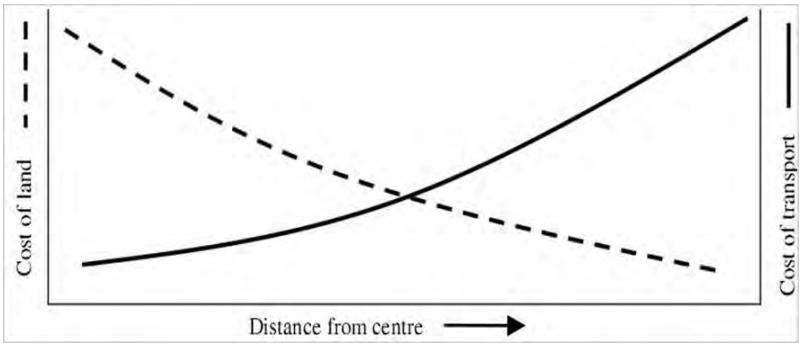

Figure 2.1: Land and Transportation Cost Variation with Distance to City Center
Source: Adapted from Kivell (1993)

This model has shown the land price variations with the variations of distance from CBD. The distance determines the travelling cost with the cost of the land (Wingo, 1961). In

context of Dhaka, land price of various residential projects are found dissimilar for different distance to the CBD (i.e. Motijheel Central Business District, Dhaka) (REHAB, 2012). However, this research was focused on the land price variations within the site of the residential projects only. Consequently, distance from CBD is not considered in this study. Shopping centres and marketplaces are present in every residential project in the DMDP area. These make variations in residential plot prices based on the distance of residential plots from shopping centres or market places (RAJUK, 2019; REHAB, 2012).

2.4.2 Bid-Rent Model of Land Value:

William Alonso gave theory in the year of 1964 to apply accessibility requirements to the city centre for various types of land use (e.g. housing, commercial, and industry) which is called bid rent theory. The bid rent theory has described the changes of land price and demand of real estate with the changes of distance from the Central Business District (CBD). Land users all compete for the most accessible land within the CBD. The amount they are willing to pay is called "bid rent". According to this theory, each land use type has its rent gradient or bid rent curve (Figure: 2.2). The curve sets the maximum amount of rent any land use type will yield for a specific location. Households, commercial establishments, and industries compete for locations according to each bid rent curve and their requirements for access to the city centre (Alonso, 1964).

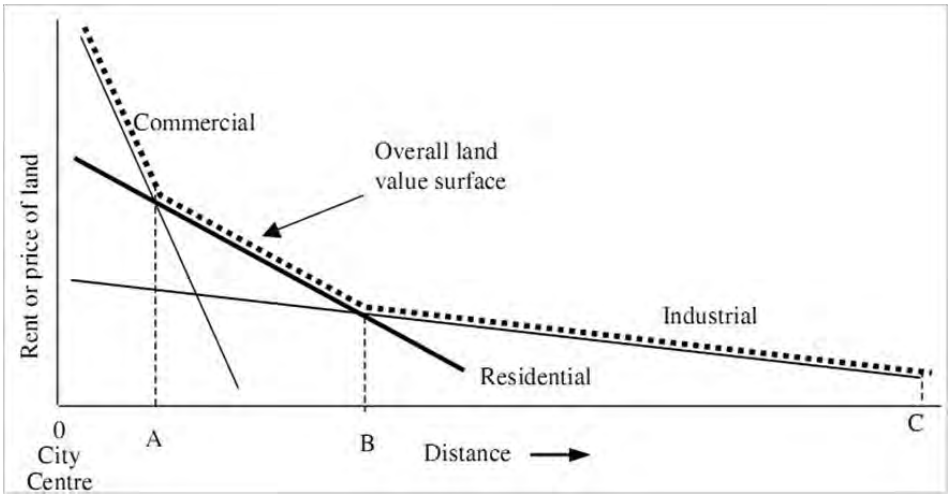

Figure 2.2: Urban Land Use and Bid-Rent Model
Source: Adapted from Kivell (1993)

This theory was also focused on how the land use patterns are determined by the land values. In the context of Dhaka, land of higher prices are being used in such a way that it can generate economic benefits for the long run such as residential plots of higher prices

get higher rent value from the constructed building on it. Therefore, the real estate companies aim to achieve much benefits from these plots by selling these plots at higher prices (REHAB, 2012).

2.4.3 Land Valuation in Classical Urban Structure Model:

The classical urban structure model (Burgess' concentric zone model, Hoyt's sector model, and Harris and Ullman's multiple nuclei model) gave a spatial pattern of urban structures based on very specific functions and directions. These three models have been studied to understand the urban land structures according to the functional activities.

Among these urban structure models, Burgess recognized five concentric functional zones (CBD, Transition, Low-income housing, Middle-income housing, and Commuters' zone) and gave a concentric zone model in 1920 (A). According to the Burgess' concentric zone model, as the city grew the inner zones encroached on the outer ones in this model (Figure: 2.3). On the other hand, Hoyt's sector model explained urban land value variations in different sectors (B). According to Hoyt's sector model, the cities tended to form in wedge-like patterns or "sectors" radiating from the CBD and centred on major transportation routes (Figure: 2.3). Easier accessibility makes higher land values. In this model different commercial functions would be closed to the central business district but manufacturing functions would emerge in a wedge surrounding transportation routes. Residential functions developed as a wedge-shaped with a sector of low earning housing bordering manufacturing or industrial sectors (noise, pollution, and traffic make these areas the least desirable) while sectors of middle- and high-income households were located furthest away from these functions (Sector Model, 2016). Moreover, Chauncy Harris and Edward Ullman (1940) gave the multiple nuclei model in 1940 by arguing that neither of the earlier models adequately reflected city structure (C). This model focused on the notion that the CBD was losing its dominant position and primacy as the nucleus of the urban area. Several of the urban regions would have their subsidiary but competing "nuclei" as manufacturing cities became modern cities and modern cities became increasingly complex. Thus this model broke the dominance of the central CBD.

Burgess' model indicated that the value of the residential land is much higher than in the suburb. Hoyt's sector model improved the Burgess' concentric zone model by considering the sectors and directions as well as explained by sector-wise land value

variation. Ullman's model has indicated multiple centres instead of one single centre. The differences of the urban land values in various places are related to their locations of the different land uses except for the location to CBD (Zheng, 2003; Ping Ai, 2005).

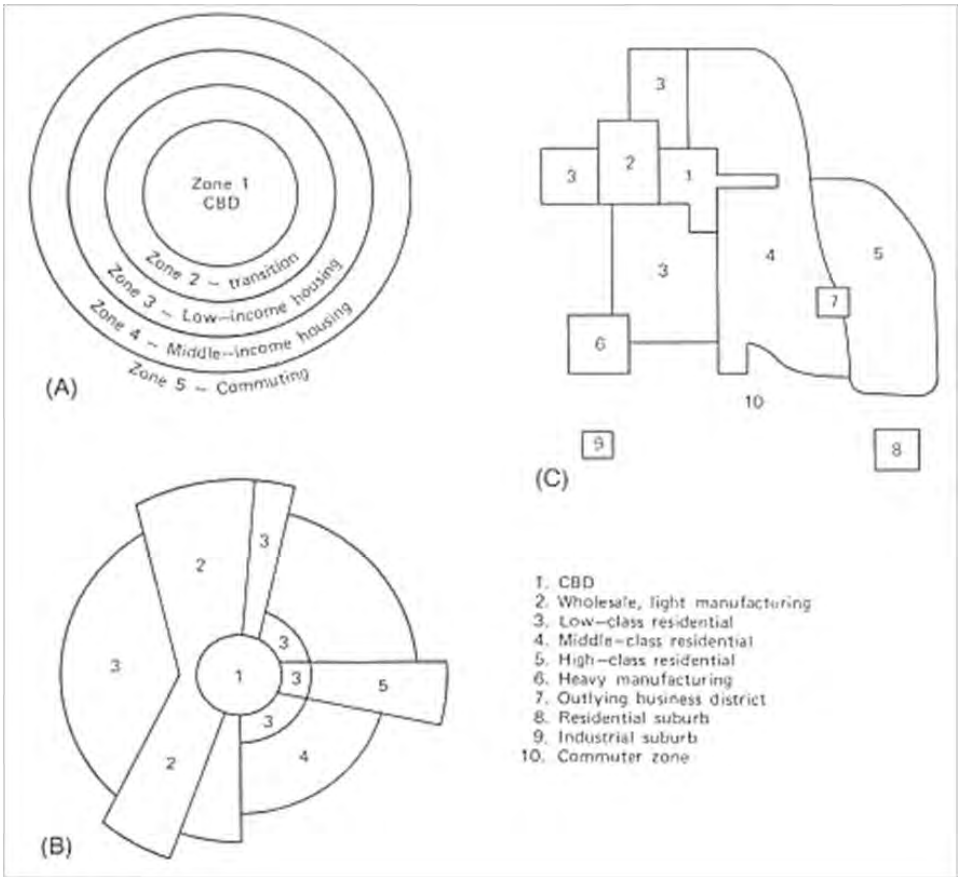

Figure 2.3: Three Model of Urban Structure / Residential Distribution
Source: Adapted from Hartshorn (1993)

These three models do not directly work on the land value but they have drawn some special characteristics of residential land value since there is an economic relationship between the cost of land and the cost of transportation (distance). These three models have been studied to find out the spatial relationship of land value with the urban structures. Moreover, this research is focused on the land price variations due to the differences of spatial attributes (distance to various environmental and physical attributes) in the private residential projects in the DMDP area.

2.4.4 Multiple Regression Land Value Model:

Multiple Regression land Value Model is prepared from the statistical technique that has been used to analyze the relationship between a single dependent variable (land value) and several independent variables (environmental and physical attributes of land

property) in many researches. The objective of multiple regression analysis is to use the independent variables whose values are known to predict the value of the single dependent value (Eckert, 1990). The general model is below.

$$\mathbf{Y = X_0 + B_1*X_1 + B_2*X_2 + B_3*X_3 + B_4*X_4 + B_5*X_5 + B_6*X_6 + B_7*X_7 + \ldots\ldots\ldots + B_n*X_n}$$

Where, Y = Independent Variables (land value)

X_0 = Regression constant/ intercept obtained after analysis of variables

X_1 - X_n = Independent Variables (attributes land property)

B1 – B_n = Coefficients or value rating for independent variables

(Eckert, 1990; Zheng, 2003; Ping Ai, 2005).

The Multiple Regression Land Value Model assumes the value of land by considering the contribution of each attributes to the land value. In this research, the coefficient of environmental and physical attributes can be predicted by calculation from the price of the residential land and the value of environmental and physical attributes. The price of the residential plots can also be predicted by considering the coefficient of various attributes in the price calculation procedure also.

There are several research where this model has been used to determine the value of the residential land. Ping Ai (2005), in his MSc thesis "Residential Land Value Modeling: a case study Hankou, China" multiple regression land value models have been used to determine the value of the land of Hankou in China. That research considered land price as dependent variables and various attributes related to a location such as distance from various activities, transportation such as access to different roads, and numerous environmental attributes as independent variables (Ping Ai, 2005).

On the other hand Bin Zheng (2003), studied the land value analysis in his MSc research "Urban Residential Land Value Analysis: a case study Danyang, China" using the multiple regression model of land value analysis. This research also focused to determine the residential land value considering the land price as dependent variables and various independent attributes such as distance to different facilities (Zheng, 2003).

In the context of Dhaka this model is very applicable to find out the value of the residential land and the association of physical and environmental attributes on the value of the residential land. The price of the residential land can be considered as the dependent variables and the distance to the environmental and physical attributes are the independent

variables. The coefficient value of the physical and environmental attributes from the regression analysis indicates the influence of these attributes respectively. The coefficient value can be positive or negative which indicates the direction of the association (positive or negative) between the variables. Positive value of the coefficient indicates that, dependent variables (i.e. plot price) increase with the increase of the independent variables (e.g. physical and environmental attributes). Moreover, negative value of the coefficient explains that, dependent variables (i.e. plot price) increase with the decrease of the independent variables (e.g. physical and environmental attributes). There are also contemporary and alternative approaches of land evaluation such as sale comparison approach, cost approach, income approach, comparison of land, valuation methods, etc. All of the models have been used for various purposes in different circumstances and conditions. Only the spatial pattern of land evaluation has been addressed in this part of the chapter.

2.5 Influential Attributes on Residential Land Value:

Many attributes influence the value of residential land. Some attributes make the variation in land prices between different residential projects in different locations. On the other hand, some attributes make land price variations within the site of a residential area (Hai & Huong 2017). This part of the literature study has focused to the most influential attributes of the residential land which make land price variations within the projects sites. Moreover, the price of the residential land is calculated from the value of these attributes in many researches (Raden & et al., 2013).

Several studies have explained that more accessibility to various activities in a community attracts the buyers of residential land. Geographical location has a positive impact on the choice of residential land. Distance from CBD also determines the price of the land. The residential property closer to CBD sells at higher prices. The land-use categories, land area, and size of the land influence the price of the residential land (Gnagey & Grijalva, 2018). Moreover, the price of the residential land has been influenced by the shape of the land such as regular or irregular shape. Economic security such as Investment and resell security of the land influence the choice of the clients. Social security and neighbourhood quality which may be physical (housing style and condition, landscaping, available facilities) and social (friendliness of neighbours, ethnic, racial, or economic composition) also add value to the residential land property (Hjerpe et al., 2016). Utilities and services

such as electricity, gas and water supply, sewage disposal, and telecommunications, etc. have an association with the price of the residential land. The land hosts commercial opportunities such as warehouses, industrial property, retail stores, parking lots, malls, hotels, office buildings, and medical centres, etc. add economic value to the residential land property (Izon et al., 2016; Mcconnell & Walls, 2005). The climatic condition of the residential area such as temperature, humidity, precipitation, flood, and natural hazards, etc. measure and attract the choice of the client for buying residential land. Topographical features such as land elevation, mountain, and valley, pattern of rivers, etc. have also influence on the value of the residential land (Raden & et al., 2013). The Table: 2.2 has been prepared the influential attributes on the residential land price.

Table 2.2: Influential Attributes on the Value of Residential Land

Influential Attributes on the Value of Residential Land		
▪ Accessibility ▪ Location ▪ Distance to CBD ▪ Land use ▪ Land area ▪ The shape of the land ▪ Size of the land	▪ Physical amenities ▪ Environmental elements ▪ Climatic Factors ▪ Topographical Features	▪ The Economic security ▪ Social security ▪ Neighbourhood quality ▪ Utility and services ▪ Commercial aspects ▪ Property Features ▪ Legal and planning control

Source: Based on literature study from (Mcconnell & Walls, 2005; Raden & et al., 2013; Hussain & et al., 2014; Hjerpe et al., 2016; Izon, 2016; Gnagey & Grijalva, 2018)

Empirical research found that the price of the residential plots is mostly influenced by the physical and environmental amenities (Gnagey & Grijalva, 2018). These environmental and physical amenities also add value to the quality of the residential land. Therefore, the price of the residential land increase by the environmental elements and physical amenities (Geoghegan, 2002).

2.6 Environmental and Physical Amenities of Residential Land:

The environmental and physical elements enrich the quality of the residential built environment to the residential land by providing the physical and environmental benefits to the residential property (Kadish & Nutesil, 2012). Environmental attributes have a lot of positive impacts on residential land property. According to Baranzini and Schaerer (2011), environmental amenities are a set of local attributes which enhance the environmental quality of residential life that can be defined as the environmental

amenities or attributes. Urban green such as parks, playgrounds, open spaces, farmland, forests; water bodies such as rivers, lake canals, etc. are the environmental attributes of residential land property which give wellbeing to urban residential life (Baranzini & Schaerer, 2011). These amenities provide opportunities for recreation, relief from urban stresses and congestion, moreover, these amenities make some positive relationship with our psychological health (Gangey & Grijalva, 2017).

However, there are lots of physical amenities of residential land property which create better access, better circulation, utilities, and services to the attached residential property (Gnagey & Grijalva, 2018). Many definitions have introduced some infrastructural establishments which are defined as physical amenities of residential land property. The width of the site adjacent road, access of services, and distance from the CBD, health facilities, educational institutions, and markets are the physical elements of the residential land property. These elements provide all kinds of physical support of the residential land. (Hjerpe et al., 2016; Izon, 2016; Islam et al., 2013). A set of physical and environmental attributes has been prepared from the findings from the literature study for this research (Table: 2.3).

Table 2.3: Physical Amenities and Environmental Elements of Residential Land

Physical Amenities	Environmental Elements
▪ CBD (Distance to residential projects) ▪ Road (Width of site adjacent road) ▪ Market/ Shopping (Distance to plots) ▪ Education Institutions: School/ College/ University (Distance to plots) ▪ Health Facilities: Hospital/ Clinic (Distance to plots) ▪ City Center (Distance to plots) ▪ Utility Services (Distance to plots) ▪ Recreation Center (Distance to plots) ▪ Bus/ Metro Station (Distance to plots) ▪ Religious Center (Distance to plots)	▪ River (Distance to plots) ▪ Lake (Distance to plots) ▪ Water Body: (Distance to plots) ▪ Park (Distance to plots) ▪ Playground (Distance to plots) ▪ Open Space (Distance to plots) ▪ Urban Green/ Forest (Distance to plots) ▪ Farmlands (Distance to plots) ▪ Plot Orientation: North/ South/ East/ West/ Corner Plot

Source: Based on literature study from (Geoghegan et al., 1997; Benson et al., 1998; Bourassa et al., 2004; Mcconnell & Walls, 2005; Abbot & Klaiber, 2010; Hjerpe et al., 2016; Izon, 2016; Gnagey & Grijalva, 2018; Shafer et al., 2000; Tyrvainen & Miettinen, 2000)

The environmental and physical amenities are organized from the findings of numerous literature studies in Table: 2.3. It has been found that these environmental and physical amenities make the variation of plot prices within the site of the residential projects in various residential projects abroad (Hjerpe et al., 2016; Izon et al., 2016).

There are so many residential projects in Dhaka. Though these residential projects are different in locations, size, concept, target, vision, as well as brand, but the characteristics of these study projects are almost similar. Various physical and environmental amenities have been observed in these residential projects in the DMDP area which are similar as described in Table: 2.3 (REHAB, 2012; RAJUK, 2020). These environmental and physical attributes increase the number of qualities of the residential built environment in the residential projects in Dhaka (Islam et al., 2013).

Many real estate companies advertise their projects by giving names according to the provided environmental amenities such as 'Lake View Projects, River View Projects, Park View Projects, and Green City, etc. These real estate developers offer the price of the residential plots in various categories based on the provided amenities (REHAB, 2012; RAJUK, 2020).

2.7 Association of Physical and Environmental Attributes with Land Value:

Residential land property is a composite good where the value of land is attached to the provided environmental and physical amenities. Generally land with better access, better facilities, and better communication to major parts of the city, natural and environmental elements, basic services, better position, and location, is of higher price (Hussain & et al., 2014). Empirical research found that there are significant positive relationships between the plot price and environmental as well as physical amenities (Geoghegan, 2002).

According to Wolf “yard, street, trees, forest, open spaces and parks in development growth area can add a value to the residential property” (Wolf, 2007). Hence green and open spaces provide fresh air which creates a breathable space and increases the land price in residential land areas (Kadish and Nutesil, 2012). As discussed earlier, prices of residential land are influenced by various physical and environmental factors.

A number of researchers were focused to determine the influence of environmental and physical attributes on land price by using several statistical methods. Various methods have been found in the literature studies to determine the relationship between the land

value and environmental as well as physical attributes (Gnagey & Grijalva, 2018; Hjerpe et al., 2016; Izon et al., 2016). Descriptive Statistics, Regression analysis, Correlation analysis, Hedonic Pricing methods, ANOVA (Tukey HSD), T-test, Chi-square test, GIS matrices, and etc. methods are the most remarkable observed methods to describe the relationship between the residential land price and various environmental and physical variables. These methods were used for different outputs of the different research (Geoghegan 2002; Irwin 2002; Mcconnell and Walls, 2005; Abbot and Klaiber, 2010). To determine the value of residential land; the value of the land was considered as dependent variables. Environmental and physical attributes were considered as independent variables. The change of these variables caused the change of the value of residential land property. Use of regression analysis and correlation analysis, the relationship of physical and environmental variables on the value of land was shown in various researches (Geoghegan 2002). The value of a residential land property depends on unique bundles of environmental amenities (Sirmans et al., 2005). In these cases, the ANOVA test and Chi-square test were used to determine the association of a different group of orientations with the price of residential land. Hedonic pricing methods had been used to determine the price value of residential land for various kinds of environmental amenities. Gnagey & Grijalva had shown that environmental amenities provide significant value to the price of residential land (Gnagey & Grijalva, 2018). The following methods were used in numerous researches to describe the association of environmental and physical variables on the value of residential land (Table: 2.4).

Table 2.4: Various Methods of Analysis the Association of Land Value with Environmental and Physical Attributes

Methods	Association Analysis
▪ **Descriptive Analysis**	Used to describe and narrate different variables with residential land and land price.
▪ **Regression Analysis**	Used to determine the influential variables on the residential land price.
▪ **Correlation Analysis**	Used to find out the association of different variables with the price of the residential land.
▪ **ANOVA (Tukey HSD)**	Used to access the potential difference between different groups of variables (group of plot orientations) and Tukey HSD explains the position of exact differences between the groups (group of plot orientations)

Methods	Association Analysis
▪ Hedonic Pricing Methods	Used to determine the land value by measuring the characteristics or provided services to the residential land such as comfort, style, luxury, etc.
▪ T-Test	Used to identify potential variables from two variables (on residential land price).
▪ Chi-square Test	Used to evaluate relationships between categorical variables (on residential land price).
▪ **GIS**	Used to determine the exact geographical position and measure the actual dimension between different variables of residential land.

Source: Based on literature study from (Geoghegan, 2002; Irwin, 2002; Mcconnell & Walls, 2005; Abbot & Klaiber, 2010)

The sales price significantly depends on the physical and environmental quality of the residential area within the site. The sale price of the residential plots attached to the river, the lake is higher than the other plots. The basic services as schools, markets also increase the sales price of residential land. Also plots with wide adjacent road sales in higher prices than others. Same plots have the same environmental and physical amenities but different orientation makes variations in prices. Climatic-oriented plots are at higher prices than the plots of other orientations. The environmental attributes and physical elements make different combinations among themselves or between together. It has been observed from the literature study that, the combination of provided environmental and physical amenities make a wide range of sale price variations. The better combination provides sales at higher prices. This research has performed some methods of analysis from the Table: 2.4 to determine and measure the association of land price with environmental and physical attributes (Geoghegan, 2002; Irwin, 2002; Mcconnell & Walls, 2005; Abbot & Klaiber, 2010).

2.8 The DMDP Area and the Residential Land Market in DMDP Area:

'Rajdhani Unnayan Kattripakha' (RAJUK) is the development and planning authority for Dhaka which was established in 1987 by replacing Dhaka Improvement Trust (DIT). RAJUK is responsible for planning the metropolitan area, developing the land with infrastructure with estate management of commercial as well as residential schemes and exercising legal powers. This section has discussed the DMDP area, residential land developers in the DMDP area, the residential land market of the DMDP area, as well as the trend of growth of residential land price in the DMDP area.

2.8.1 The DMDP Area:

In 1995 the Dhaka Metropolitan Development Plan (DMDP) was prepared under the Town Improvement Act 1953 to guide and control the land development of the DMDP area. There were plans for different periods in DMDP. These are, firstly "The Dhaka Structure Plan (1995-2015)" which was a long-term development strategy, secondly "The Urban Area Plan (1995-2005)" that was an interim mid-term strategy and the lastly "The Detailed Area Plan (1995-2015)" which was detailed planning proposals for specific sub-areas. Preparation of the new Regional Development Plan (RDP) which will be the extension of DMDP from 2016 to 2035 is in process.

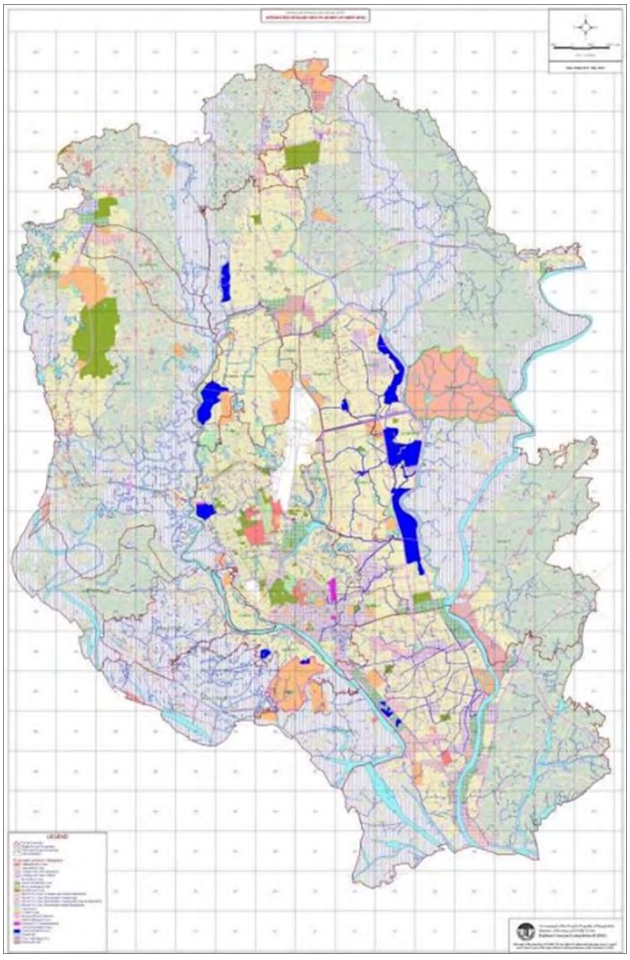

Figure 2. 4: Map of DMDP Area
Source: RAJUK (2019)

According to DMDP (1995-2015), the total area is 1528 Square Kilometer (Figure: 2.4). RAJUK has been defined their jurisdiction by a plan in 2005 which comprised of Dhaka city, several other municipalities within the Dhaka district, and its surroundings with a higher level of urbanization. The area can be considered as the main city, which contains

the old part of the city and the area enclosed by the three major rivers Buriganga, Turag, and Balu Rivers. It is defined as the Dhaka Metropolitan Development Plan (DMDP) area (RAJUK, 2012). At present, the city is extending towards its surroundings (Kabir & et al., 2012). Rapid urbanization is influencing the extension of Dhaka. The extension of the city is happening both in a planned and unplanned manner simultaneously with the public and private sector developers (Islam, 2005).

2.8.2 Public and Private Sector Land Developers in DMDP Area:

Several private real estate companies are engaged in residential land development projects along with the public agencies in Dhaka as the city of Dhaka is growing very rapidly and the necessity of residential plots is increasing very speedily. These developers are doing several projects in Dhaka with different concepts and targets (REHAB, 2012).

- **Private Sector land developers:**

There are numbers of private real estate companies are working under the Real Estate Housing Association of Bangladesh (REHAB) and Bangladesh Land Developer Association (BLDA). According to RAJUK, there are 56 numbers of RAJUK enlisted private real estate companies are working in the DMDP area. Out of 56 private real-estate companies, there are 24 numbers of companies are working in the eastern side of the DMDP area (RAJUK, 2019). These private real estate companies are working under the REHAB. The Basundhara residential area, Eastern Housing, Mohammadpur Housing Society, etc. are some residential land projects which have been developed by the private real estate land developers in Dhaka (REHAB, 2012).

- **Public Sector land developers:**

Public development authorities such as 'Rajdhani Unnayon Kartipakkhya' (RAJUK), 'National Housing Authority (NHA) deal with the public sector residential land development projects of Dhaka. There are so many residential projects developed by this authority (RAJUK, 2019). The residential area of Dhaka; such as Dhanmondi, Gulshan, Banani, and Mirpur was established before the independence of Bangladesh by the public works department of the Government (RAJUK, 2012). After the Independence of Bangladesh RAJUK established Uttara Model Town in 1990. Purbachal New Town Projects, Jhilmil Projects, Uttara's third phase extension are being developed by the RAJUK in different places of Dhaka (RAJUK, 2019).

Both the public and private sectors are engaged in several residential projects in various places of Dhaka. The number of private real estate companies has been increased in recent times. Consequently, these projects are very huge and have been developed in different locations with different concepts. Therefore these developers have concentrated to rationalize better-built environments as well as modernize the residential quality the life.

2.8.3 Residential Land Market in DMDP Area:

The residential land market is a potential economic sector of Dhaka. Two types of residential land markets are noticed in the DMDP area; the private sector land market and the public sector land market. It has been found, the residential land market of Dhaka is dominated by the private sector land developers. The aim, vision, mission, and target are found different between private and public sectors land market (Barua & et al. 2010).

- **The residential land market of the private sector:**

Private residential projects are being developed by real estate companies in the DMDP area. It is remarked from the literature study that, private sectors are concentrated on the economic benefits from the residential projects (Alam, 2018). They advertise and marketing attitudes of residential projects of private sectors indicate their business strategies. Various categories of plot prices have been marked out from private residential projects (REHAB, 2012). They offer plots at different prices with different types of physical and environmental benefits to the plots. These private real estate companies explore their projects to the market by focusing on provided physical and environmental amenities.

- **The residential land market of the public sector:**

Public residential projects are developed by public authorities. It has been observed from the survey and literature review that public residential projects have been developed and designed also by providing physical and environmental amenities. Yet public residential projects do not have the plot prices variation. Plot price has been offered based on the plot types or phasing of development. Usually, these projects offer residential plots to specific the groups of pelople such as government employees, freedom fighters, ethnic people, etc. So economic benefits are not the main concern here (RAJUK, 2020).

The real estate companies in the DMDP area consider the physical and environmental attributes as the influential attributes to gain financial benefits from residential projects.

Conversely physical and environmental attributes are not considered in plot price fixation procedure in public residential projects rather these attributes enhance the residential quality of life.

2.8.4 The Trend of Growth of Residential Land Price in DMDP Area:

Residential land values in Dhaka have changed several times in the last few decades (Seraj & Alam, 1989). According to the Alam (2018), land values have increased by an average of 22.26% per year between the year of 1990 and 2000, while the period spanning from 2000 to 2010 the yearly increase was about 74% in Dhaka (Alam, 2018). Table: 2.5 has presented the increase of the land value in public and private residential projects of Dhaka.

Table 2.5: Land Value Growth in Residential Projects of Dhaka (1983–2008)

Name of the housing project	Land price increase		
	Purchase value (land price/m^2)	Present value (land price/m^2)	Percentage increase/m^2
Public			
Uttara Model Town	6268.39	36,193.94	477.40
Nikunja	3636.45	36,979.2	916.90
Rupnagar housing	5297.62	27,368.42	416.62
Private			
Basundhara	7792.54	36,779.23	371.98
Janata housing	6181.82	13,333.34	115.69
Mohammadia housing	4116.6	27,272.98	562.51
Banasree new town	5479.58	18,812.90	243.32
Nobodoy housing	4349.09	16,000	267.89
Dhaka Uddayan	3083.64	10,181.81	230.19
Eastern housing Pallabi exten.	7786.82	54,400	598.62

Source: *Adapted from Alam (2018)*

The growth of residential land price of Dhaka has been influenced by so many physical, environmental, and social factors. (Seraj & Alam, 1989; Islam, 2005). The land price in planned area has been increased from the unplanned residential area as the planned residential area has better environmental and physical amenities. The unplanned area has a scarcity these amenities. Consequently, the price of residential land in the unplanned area of Dhaka is lower than the planned residential area. Thus, residential land price of a new part of Dhaka is higher than the old part of Dhaka city (Islam & Mitra, 2007).

2.9 Legal Guideline of including Physical and Environmental Attributes in Residential Projects of Dhaka:

There are some legal obligations of residential land development projects. The National Housing Authority (NHA) has some policies for the residential land development projects such as "National Housing policy, 2016". On the other hand "Private Housing Land Development Rule (PRLDR) 2004 (amendment 2015)" has listed a set of criteria to ensure physical and environmental elements in the real estate projects of Bangladesh, particularly for Dhaka city. It is a gazette notification that is applicable for those areas which are included in the Master plan according to The Town Improvement Act, 1953 and The Building Construction Act, 1952. This public legal instrument was enacted on 01 March 2004. The environmental and physical issues have been discussed from the synopsis of the PRLDR-2015 in Table 2.5 (RAJUK, 2015).

Table 2.5: Synopsis of environmental and physical issues from PRLDR

Physical and Environmental Issues	Concern Rules
Open space & civic facilities	Private Residential Land Development Rules have instructed to provide a minimum of 30% (thirty percent) of the total land to accommodate civic and utility facilities (Playground, lake, park, market, school, health facilities, religious spaces, community spaces, and graveyard) accept primary and secondary road.
Green spaces and park	Green spaces, playgrounds, and parks will be provided based on several populations of the planned residential area to ensure open and breathing spaces.
Natural sources of amenities	There is a specific guideline to preserve the natural sources of water such as rivers, lakes, canals, etc. in PRLDR. These natural sources should not be disturbed anyhow in the planned area and will not be included in mandatory 30% spaces for civic and utility facilities. If these elements are present in the projects must be kept free and ensure smooth water flow. Moreover, additional sources of these environmental elements can be created and make the connection between these.
Physical elements (road width)	The rules have given guidelines regarding the road network within the project area. There are should be minimum standards for all types of roads within the site. The minimum road width of primary should not be less than 60 feet, the secondary road not be less than 40 feet and for the tertiary road, it is not less than 25 feet. The road network should be clear in the layout plan and provided with sufficient footpath and plantation beside the road.

Physical and Environmental Issues	Concern Rules
Environmental impact assessment	The projects should be approved by the environmental authority of the Government. In this case, the environmental impact assessment must be assessed including the surrounding natural and built environment. The natural and built environment of the surrounding area must not be hampered by the projects.

Source: RAJUK (2015)

The PRLDR has provided many directions and policies for residential land development. PRLDR has given directions to keep environmental and physical amenities in the residential of Dhaka. Nowadays the real estate companies are doing residential projects by focusing on these environmental and physical attributes. These residential projects have made a wide range of price categories of residential plots based on the provided environmental and physical attributes (REHAB, 2012; RAJUK, 2020).

2.10 Research Gap in Bangladesh:

There are many researches regarding the residential land and the value of the residential land as well as the influence of various attributes on the residential land in abroad (Geoghegan et al., 1997; Benson et al., 1998; Shafer et al., 2000; Bourassa et al., 2004; Abbot & Klaiber, 2010; Hjerpe et al., 2016; Izon, 2016). A number of researches has described the value of environmental attributes on residential land property (Geoghegan, 2002; Irwin, 2002; Mcconnell & Walls, 2005). Besides, some researches explained the significance of the physical amenities on residential land value (Gnagey & Grijalva, 2018). Moreover, some researches are performed to focus the association of residential land price with the environmental as well as physical amenities (Hjerpe et al., 2016; Schaeffer & Dissart, 2018). Furthermore, several researches were done on the spatial pattern of urban residential land value changes (Kaivell, 1992). On the other hand, some researches have been performed on the methods of land evaluation (Rosen, 1974; Tyrvainen & Miettinen, 2000; Zheng, 2003; Ping Ai, 2005)

In the context of Bangladesh a number of researches were performed on the housing and real estate problems in Bangladesh (Seraj, 1989; Barua et al., 2010). Some researches were done on the growth trend of the land value with the urbanization of Dhaka (Alam, 2011; Islam, 2009; Alam, 2018). Moreover, some researches explained the impact of urbanization on the environment (Dewan, 2013). Furthermore, there is a research on the

impaact of landscape on houing price (Hussain et al., 2014). There are no specific research on the residential land price variations and the influential environmental and physical attributes on the price of the residential land within the site.

Consequently, this research was focused to study the land price variations in residential projects of Dhaka and to find out the influential attributes on the price of the residential land within the project sites. This research has also indicated that, the environmental and physical amenities add economic value to the residential projects. As there is no specific research in this field, this research has been taken to provide some significant recommendations for the public agencies, real estate companies as well as the client groups regarding the justification of pricing, selling as well as buying the residential land. Furthermore, this research has been conducted to describe the prospects of land price variations with the changes of physical and environmental attributes in public residential projects of Dhaka.

2.11 Conclusion:

This chapter has been focused on the critical evaluation of existing literature by connecting with the context of Dhaka to identify the research gaps. Consequently, the definition of residential land and land value, activities and requirements of residential environment as well as various methods of land value evaluation have been explained from the critical analysis of numerous researches. Moreover, influential attributes on residential land value, physical and environmental attributes of residential land are described with the context of Dhaka and provided the legal guidelines of including environmental and physical attributes in residential projects. Furthermore this chapter has explained the research gap in the context of Bangladesh and provided the necessity of undertaking this research.

CHAPTER 03
METHODOLOGY OF THE RESEARCH

3.1 Introduction:

This chapter has presented the methodology of the research as well as the approaches to achieve the objectives of this research. The methodology of the research was concentrated on the way of study area selection, sampling and data collection process, methods of data analysis as well as the process of evaluation and interpretation of findings from analysis. This chapter has described the process of selecting the study projects (Shornali Abashon, Sun-valley Abashon, Malum City as well as Sector-15 of RAJUK Purbachal New Township Projects) based on some criteria from a number of residential projects in Dhaka. Moreover, Data sampling (systematic random sampling) and data collection process are described here. Methods of several statistical analyses such as descriptive analysis, correlation analysis, ANOVA (Tukey HSD) analysis, and regression analysis, etc. are explained which have been performed to get the results from the analysis. Furthermore, this chapter illustrated the process of evaluation and interpretation of the findings of analysis to achieve the objectives accordingly.

3.2 Study Area Selection:

This study concentrated on the study of land price variations in private residential projects within the project sites. At present, several public and private residential projects are in operation in the DMDP area. There are variations in these projects by size, location, and the presence of physical as well as environmental attributes. To select the study areas (residential projects), this research has considered the location, size, project approval from the RAJUK along with the presence of topographical, environmental, and physical amenities in these projects. The considerations of selecting the study areas are as follows.

- **Location of the projects:**

This criterion has concentrated on the location of a major trend of urban development in the DMDP area. A major trend of expansion of Dhaka is evident in the eastern part of the DMDP area (RAJUK, 2019). The construction of an eight-lane road has already connected the central city with this eastern side of Dhaka. The Purbachal New Town project of RAJUK is also located in this area including 26,000 numbers of residential plots (RAJUK, 2020). As is mentioned that, 56 numbers of RAJUK enlisted real estate

companies are doing residential projects around Dhaka whereas 24 numbers of real-estate companies are engaged in residential projects in this area (RAJUK, 2019). The ongoing residential projects from the eastern side of the DMDP area have been selected as study projects in this study.

- **Projects size:**

The residential projects in the DMDP area are not similar in size based on the number of plots. It is found that the large projects are planned with numerous environmental elements and physical amenities (REHAB, 2012; RAJUK, 2020). Some of the largest residential projects based on the plot number have been considered as study projects for this research.

- **Projects authority and legal approval:**

Many private residential projects do not have projects approval from the RAJUK (REHAB, 2012; RAJUK, 2020). This research concentrated on the RAJUK approved residential projects. The ongoing RAJUK approved residential projects within the DMDP area have been selected as the study projects in this research.

- **Presence of topographical, physical, and environmental amenities:**

There are no significant topographical features (e.g. land elevation) that make land price variation within the site of residential projects in the DMDP area. Consequently, the topographical feature has not been counted in this study. Only the presence of environmental and physical features of residential projects have been considered to select the study area. Moreover, the presence of environmental and physical attributes are not similar for all residential projects in the DMDP area. The projects with a maximum number of environmental and physical attributes according to Table: 2.3 have been selected as the study projects for this research.

From the eastern part of the DMDP area, out of 10 numbers of RAJUK approved ongoing private residential projects, the three largest residential projects (i.e. Shornali Abashon, Sun-valley Abashon of Swadesh Properties Ltd. and Malum City of Malum Group) are selected as the study projects for the analysis of this research. These three projects are comprised of numerous environmental and physical attributes.

This research has also compared the land price variations of private residential projects with public residential project based on provided environmental elements as well as

physical amenities. Hence, one residential block of RAJUK Purbachal New Township Projects (Sector-15, RAJUK Purbachal New Township Projects) has been studied as a representation of public sector real estate projects. This project is also located in the eastern part of Dhaka and the allocation of the plot has already been completed and planned with numerous environmental and physical features (RAJUK, 2020). The study projects from the private and public sectors are mentioned in Table: 3.1.

Table 3.1: Study Projects of the Research

Serial	Projects	Project Authority	Project Category
01	**Shornali Abashon**	Swadesh Properties Ltd.	**Private Residential Projects**
02	**Sun-valley Abashon**	Swadesh Properties Ltd.	
03	**Malum City**	Malum Group	
04	**Sector-15, RAJUK Purbachal New Township Projects**	RAJUK	**Public Residential Projects**

3.3 Data Collection Process:

Secondary data have been used for this research. Necessary secondary data such as lists of plot prices (asking price) as well as the necessary documents such as project plan, project policy and site maps of the study projects have been collected from the project offices of private and public residential projects; 'Shornali Abashon', 'Sun-valley Abashon', 'Malum City' as well as 'Purbachal New Town Projects (sector-15)'. However, REHAB and RAJUK were also conducted for other necessary development related data for this study (RAJUK, 2020; REHAB, 2012).

There are about 676 numbers of residential plots in Shornali Abashon, 624 numbers of residential plots in Sun-valley Abashon and 677 numbers of residential plots in Malum city. These projects are selling residential plots at different prices with various environmental elements and physical amenities. Collected site plans of each project have been digitized using GIS to measure the shortest distance in meter between the plots and environmental as well as physical attributes. The environmental elements (variables) such as plot orientation, distance to park or green open spaces, distance to the lake, distance to

the river, distance to the playground as well as the physical amenities (variables) such as the width of site adjacent road, distance to market or shopping facilities, distance to primary or secondary school are organized according to the list of plot prices of the study projects. A database has been prepared by having data on the land prices of residential plots with physical and environmental attributes (Appendices A).

Moreover, the land price variations in Purbachal New Town Projects are not linked with the environmental and physical attributes. In this circumstance, relevant data on environmental elements and physical amenities for a residential block from the Purbachal New Town Projects (Sector-15) has been collected for the analysis of this research (RAJUK, 2020).

3.4 Sample Selection and Sample Size:

Systematic random sampling methods have been used to select the sample plots in this research. At 95% confidence interval and 5% margin of error, 246, 239, and 247 numbers of residential plots were selected as samples from Shornali Abashon, Sun-valley Abashon, and Malum City projects respectively (Table: 3.2).

In systematic random sampling, the sampling interval closest to the integer is 3. The sampling interval was respected to choose the subsequent plots of this site. In this study, data sampling was done by choosing a random starting point between 1 and the sampling interval 3. Every third plot has been selected for the sample plots of Shornali Abashon (Figure: 3.1), Sun-valley Abashon (Figure: 3.2) & Malum City (Figure: 3.3).

Table 3.2: The Sample Size of Study Projects

Serial	Project	Number of Residential Plots	Sample Size
01	**Shornali Abashon**	676	247
02	**Sun-valley Abashon**	624	239
03	**Malum City**	677	246

Source: Based on the data collected from the project office of Shornali Abashon, Sun-valley Abashon and Malum City

The location maps of the sample plots of Shornali Abashon (Figure: 3.1), Sunvalley Abashon (Figure: 3.2) and Malum City (Figure: 3.3) have been organized as follows.

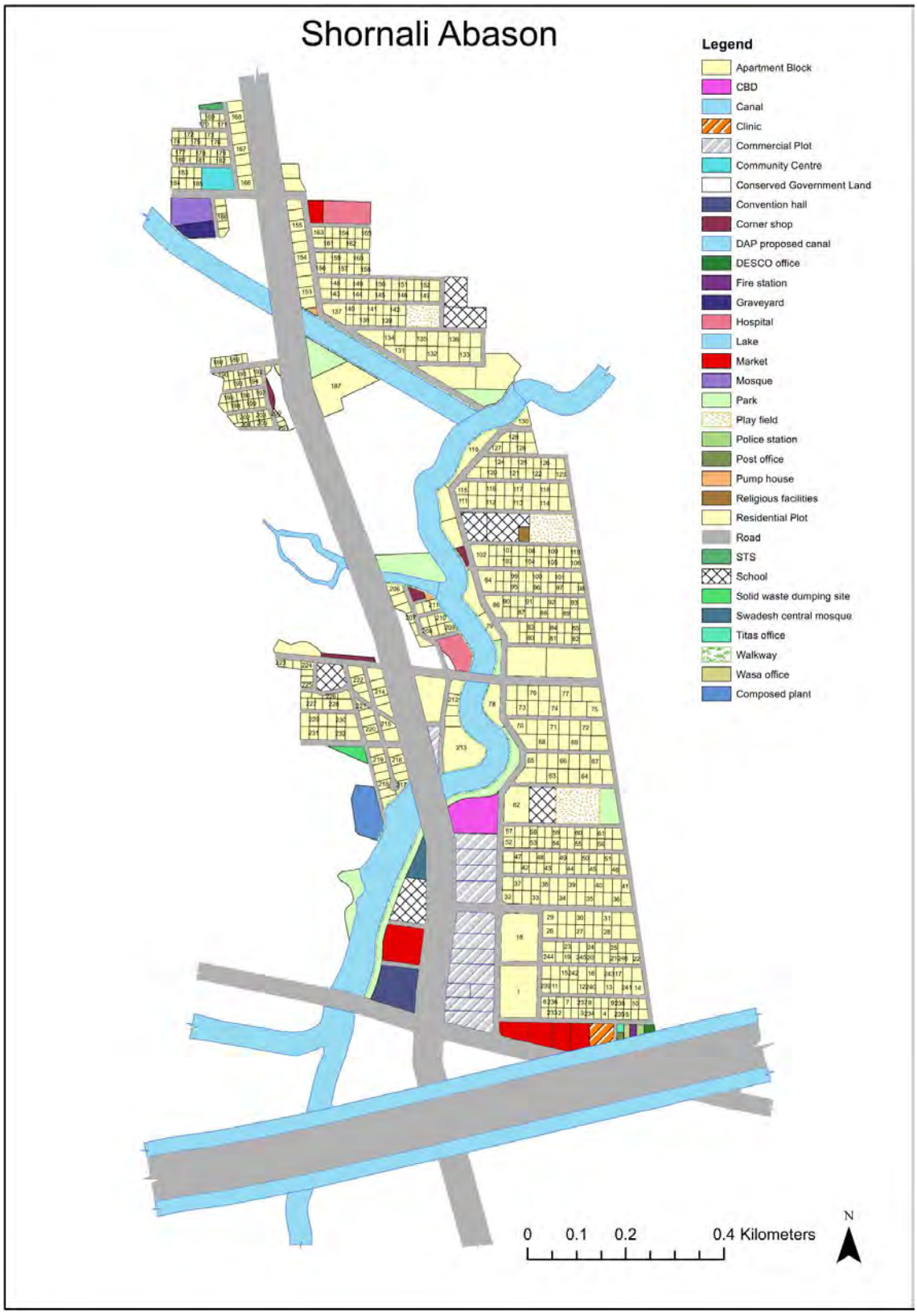

Figure 3.1: Location of Sample Plots in Shornali Abashon

Source: Project office of Shornali Abashon

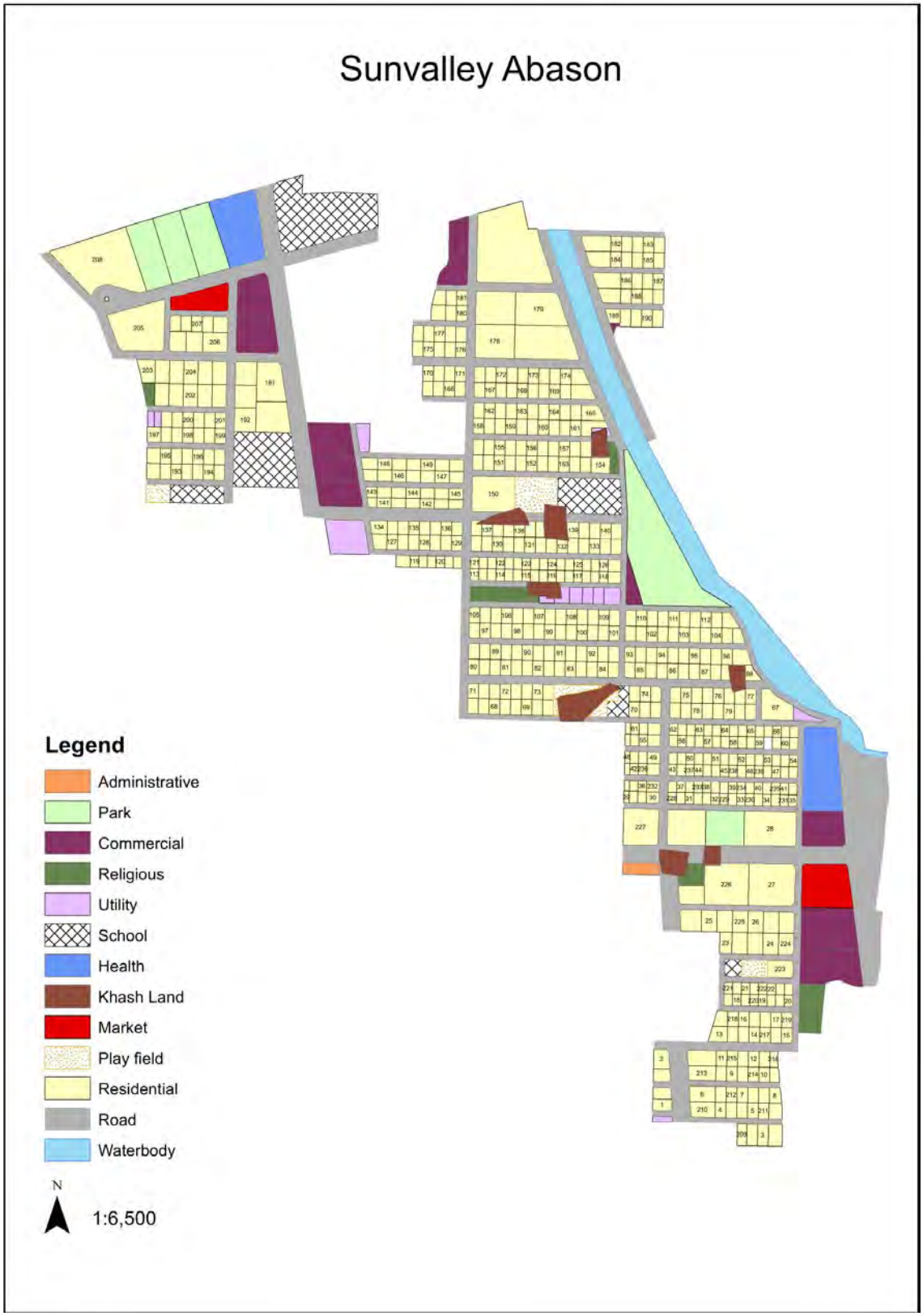

Figure 3.2: Location of Sample Plots in Sun-valley Abashon

Source: Project office of Sun-valley Abashon

Figure 3.3: Location of Sample Plots in Malum City

Source: Project office of Malum City

3.5 Methods of Data Analysis:

Data have been analysed using different kinds of methods of statistical analysis to find out the result according to the objectives of this research. This research has studied the land price of private residential projects and found out the influential physical and environmental attributes on residential land price (*lakh* per *Katha*) in private residential projects of Dhaka. Subsequently, this study was focused to give a justification that how the environmental elements and physical amenities can influence the plot prices in public residential projects as it is found that, the plots are being sold at a flat price for all types of plots in public residential projects.

In this research, several statistical analyses have been conducted according to the necessity. Descriptive Statistics, Correlation Analysis, ANOVA (Tukey HSD), Regression Analysis have been conducted in this study to find out the results of this research. Prices of the residential plots (*lakh* per *Katha*) as the dependent variables and the environmental and physical attributes as independent variables have been considered when the correlation analysis, ANOVA (Tukey HSD), as well as regression analysis, were performed. The methods of different statistical analysis are explained in the below.

- **Descriptive statistics:**

Descriptive statistics are used for two purposes; providing basic particulars about variables in a dataset and highlighting the prospective association between variables. Descriptive analysis has been conducted to study the land price of private residential projects with various environmental and physical attributes and to achieve the first objective of this study. These methods have given some significant descriptions such as maximum, minimum, average, and standard deviation of the plot prices of Shornali Abashon, Sun-valley Abashon, Malum City as well as Sector-15 of Purbachal New Township Projects. The environmental and physical attributes have also been explained using descriptive analysis in this research. The number and percentage of plots with different types of environmental and physical attributes have been described using this method in this research.

- **Correlation analysis:**

Correlation analysis quantifies the association between two continuous variables, for example, a dependent and an independent variable or among two independent variables

(Raden & et al., 2013). The sample of a correlation coefficient is estimated in the correlation analysis. It ranges between -1 and +1, denoted by r, and quantifies the strength and direction of the linear association among two variables (Hai & Huong, 2017). The coefficient value (correlation coefficient r) below 0.35 indicates the weak relationship between dependent variables (per *Katha* plot price) and independent variables (environmental and physical attributes), the value between 0.36 to 0.67, indicates the moderate relationship, as well as the value from 0.68 to 1, indicates the strongest relationship between the dependent variables (per *Katha* plot price) and independent variables (environmental and physical attributes) (Taylor, 1990; Vogt, 2005). The status of the association between dependent variables (*lakh* per *Katha*) and independent variables (physical and environmental attributes) have been emanated from correlation analysis in Shornali Abashon, Sun-valley Abashon, and Malum City in this study. This method has given specific results between the dependent variables (*lakh* per *Katha*) and independent variables (physical and environmental attributes) by the value of the correlation coefficient.

- **ANOVA (Tukey HSD):**

ANOVA is a statistical technique that assesses potential differences in a scale-level dependent variable by a nominal-level variable having two or more groups. On the other hand, the Tukey Test is called Tukey's Honest Significant Difference (HSD) test. It is a post-hoc test based on the standardized range distribution. An ANOVA test explains the overall results, but the Tukey HSD Test explains the position of exact differences. Getting significant results from ANOVA, Tukey's HSD is used to find out which specific group's means (compared with each other) are different (Sabine & Everitt, 2004; Davison & Sharma, 1994). The test compares all possible pairs of means. ANOVA (Tukey HSD) test has been used in this research to determine whether there are any significant variations of plot prices due to different plot orientations.

- **Regression analysis:**

Regression analyses have been conducted to determine this research's influential physical and environmental attributes on per *Katha* plot price in Shornali Abashon, Sun-valley Abashon, and Malum City. The summary of the coefficient values indicates the comparative order among the independent variables (environmental and physical attributes) from which the influential attributes can be detected (Sabine & Everitt, 2004).

In this study regression analysis has also been conducted among the three private residential projects together to detect the common influential attributes on per *Katha* land price. The significance of the environmental and physical attributes on land price can be perceived by using the equation of regression analysis and the coefficient values of different environmental and physical attributes from these three private residential projects together.

3.6 Process of Interpretation the Results of Analysis:

The results from the descriptive analysis, correlation analysis, regression analysis, and ANOVA (Tukey HSD) have been appraised and interpreted to explain the achievement of the objectives of this research. The interpretation have been organized from the reference of empirical researches in this study. (Taylor, 1990; Davison & Sharma, 1994; Sabine & Everitt, 2004; Raden & et al., 2013; Hai & Huong, 2017).

- **Interpretation of the results for 1st objective:**

The first objective is to study the plot prices of private residential projects in Dhaka. The plot prices of private residential projects with environmental and physical attributes have been evaluated, interpreted as well as described through descriptive analysis (Chapter-5). This analysis has given the maximum, the minimum, the mean, and standard deviation of the plot prices with provided environmental and physical attributes of the study projects (Shornali Abashon, Sun-valley Abashon, and Malum City). The residential plots' maximum, minimum, mean prices have indicated the variations of land prices with environmental and physical attributes. The standard deviation has indicated the range of the price that is how the price spread out around the mean price. This has indicated the consideration of the project's authorities to accommodate the residential plots with specific environmental and physical attributes to increase the price of the residential plots and achieve maximum economic benefits.

- **Interpretation of the results for 2nd objective:**

The influence of physical amenities and environmental elements have been investigated according to the 2nd objective of this research. The interpretation of the result to achieve the 2nd objective have been explained from the correlation analysis, ANOVA (Tukey HSD), and regression analysis which have been performed to find out the influential attributes on the price of the residential plots (Chapter-6). Correlation analysis has been done between dependent variables (residential plot price) and the independent variables

(physical and environmental attributes) to find out the association of the plot prices with physical and environmental attributes from the correlation coefficient value. The correlation coefficient value is $\leq .35$ has indicated that there is a weak or low relationship between plot prices and the environmental and physical attributes in Shornali Abashon, Sun-valley Abashon as well as Malum City. Alike, $.36 \leq$ correlation coefficient value $\leq .67$ has explained the moderate relationship between plot prices and the environmental and physical attributes respectively. Similarly, correlation coefficient value $\geq .67$ has indicated the strong or high relationship between plot prices and the environmental and physical attributes in the study projects. The positive and negative values of correlation coefficients have shown the positive association (e.g. increase the value of dependent variables with the increase of independent variables) or negative association (e.g. increase the value of dependent variables with the decrease of independent variables) or of the plot prices with environmental and physical attributes in Shornali Abashon, Sun-valley Abashon, and Malum City (Taylor, 1990).

ANOVA (Tukey HSD) has been performed to find out the influential plot orientations on plot prices. The output of the ANOVA analysis has shown whether there is a statistically significant difference between the group means. The significance value is 0.00 (i.e., $p = .00$), which is below 0.05 has mean, there is a statistically significant difference in the plot price between different orientations in the study projects (i.e. Shornali Abashon, Sun-valley Abashon, and Malum City). Multiple comparisons of the influence of plot orientations on plot prices have been prepared from the ANOVA analysis. ANOVA (Tukey HSD) analysis has found out the statistically significant difference between the groups of plot orientations as determined in the study projects in chapter: 6 (Sabine & Everitt, 2004; Davison & Sharma, 1994).

The regression analysis has been done to find out the influential environmental and physical attributes on the residential plot prices (Chapter-6). The regression analysis has been performed between the dependent variables (residential plot price) and the independent variables (physical and environmental attributes) in the study projects. From the regression analysis, the R-squared value statistically measured, how close the data are to the fitted regression line. From the results of regression analysis, the positive coefficient has indicated that the price of residential plots increases with the increase of the value of environmental and physical attributes. Therefore the negative coefficient has indicated that the price of residential plots increases with the decrease of the value of

environmental and physical attributes. Thus the value of coefficients has measured the influence of environmental and physical attributes on the residential plot prices of the study projects in the chapter: 6 (Raden et al., 2013).

- **Interpretation of the results for 3rd objective:**

The study has compared the residential land price variations in public residential projects with private residential projects based on the variation of environmental as well as physical attributes according to the 3rd objective (Chapter-7). The residential plots of sector-15 of RAJUK Purbachal New Township Projects have been provided with numerous environmental and physical attributes. The environmental and physical attributes of the public residential project (sector-15 of RAJUK Purbachal New Township Projects) have been explained by descriptive analysis. This study has addressed the prospects of the land price variations in public residential projects by considering the value of environmental as well as physical attributes in regression land price evaluation model (Eckert, 1990; Zheng, 2003; Ping Ai, 2005).

3.7 Conclusion:

The methodology of this research was focused to achieve the objectives sequentially. The methodology (study area selection, data sampling and data collection process, methods of analysis, process of appraisal and interpretation of the results of the analysis) has been organized according to the approaches of several empirical researches and connected with the context of this study. The following chapters (chapter number 05, 06 and 07) have explained, appraised and interpreted the findings of the analysis.

CHAPTER 04
STUDY AREA PROFILE

4.1 Introduction:

The profile of study areas has been presented in this chapter. This chapter has introduced the profile of three private and one public residential project. RAJUK approved private residential projects; Shornali Abashon and Sun-valley Abashon of Swadesh Properties Ltd. and the Malum City of Malum Group have been selected as private residential projects for this research. These three projects are currently selling plots with a wide range of plot prices. These private projects have various types of environmental and physical amenities. Subsequently, one residential block (Sector-15) from Purbachal New Township Projects has been studied as a representation of a public sector real estate project. This project is also located in the eastern part of Dhaka and allocation of the plot has already been completed and it is planned with numerous physical and environmental amenities (RAJUK, 2020).

Figure 4.1: Location of the Study Sites

Source: Google Earth

These projects are situated in different places in the DMDP area with different distances from the CBD Motijheel Shapla Chatter (Figure: 4.1). Sun-valley Abashon is comparatively close to the CBD and Malum City is comparatively far from the CBD.

4.2 Shornali Abashon of Swadesh Properties Ltd.:

Shornali Abason is situated beside the 300 feet wide road towards the Purbachal new town projects. It is one of the big projects of Swadesh Properties Ltd. The distance between the project site and Hazrat Shahjalal International Airport, Dhaka is about 6.7 km and 12.7 km perpendicular distance from the CBD. It takes 03 to 05 minutes to drive from the Kuril-Bishwaroad flyover. Project photos are given in Appendices: B. The following table (Table: 4.1) has given the summary of the Shornali Abashon.

Table 4.1: Summary of Shornali Abashon

Name of the Project	Status	Category	Number of Residential Plots	Number of Commercial & Others Plots	Total Number of Plots
Shornali Abashon	Selling	Private Residential Project	676	61	737

Source: Based on data collected from the project office of Shornali Abashon

4.2.1 Spatial quality of residential plots in Shornali Abashon:

The project is planned with many environmental and physical attributes. There is a wide lake within the project site. The whole project has designed and provided sufficient spaces for green. There are many parks, playgrounds, markets, educational institutions, health care centres in the Shornali Abashon. The project is designed with a very well-connected road network. The project has a road network with 200 feet, 60 feet, 40 feet, 30 feet & 25 feet wide roads. At present, the project has 687 ready plots which are selling at different prices based on the environmental and physical attributes. The project authority has a target to enlarge the projects in near future. The project map is presented on the following page (Figure: 4.2).

4.2.2 Process of residential land pricing in Shornali Abashon:

There are various types of residential plots on this site based on size, purposes, and environmental and physical facilities. Most of the plots are organized in the north-south orientation of this project. There are large plots for multistorey residential complex and luxurious villa in this site with lots of environmental and physical benefits like besides lake, park and wide road. The figure on the following page has presented the map of the Shornali Abashon (Figure: 4.2).

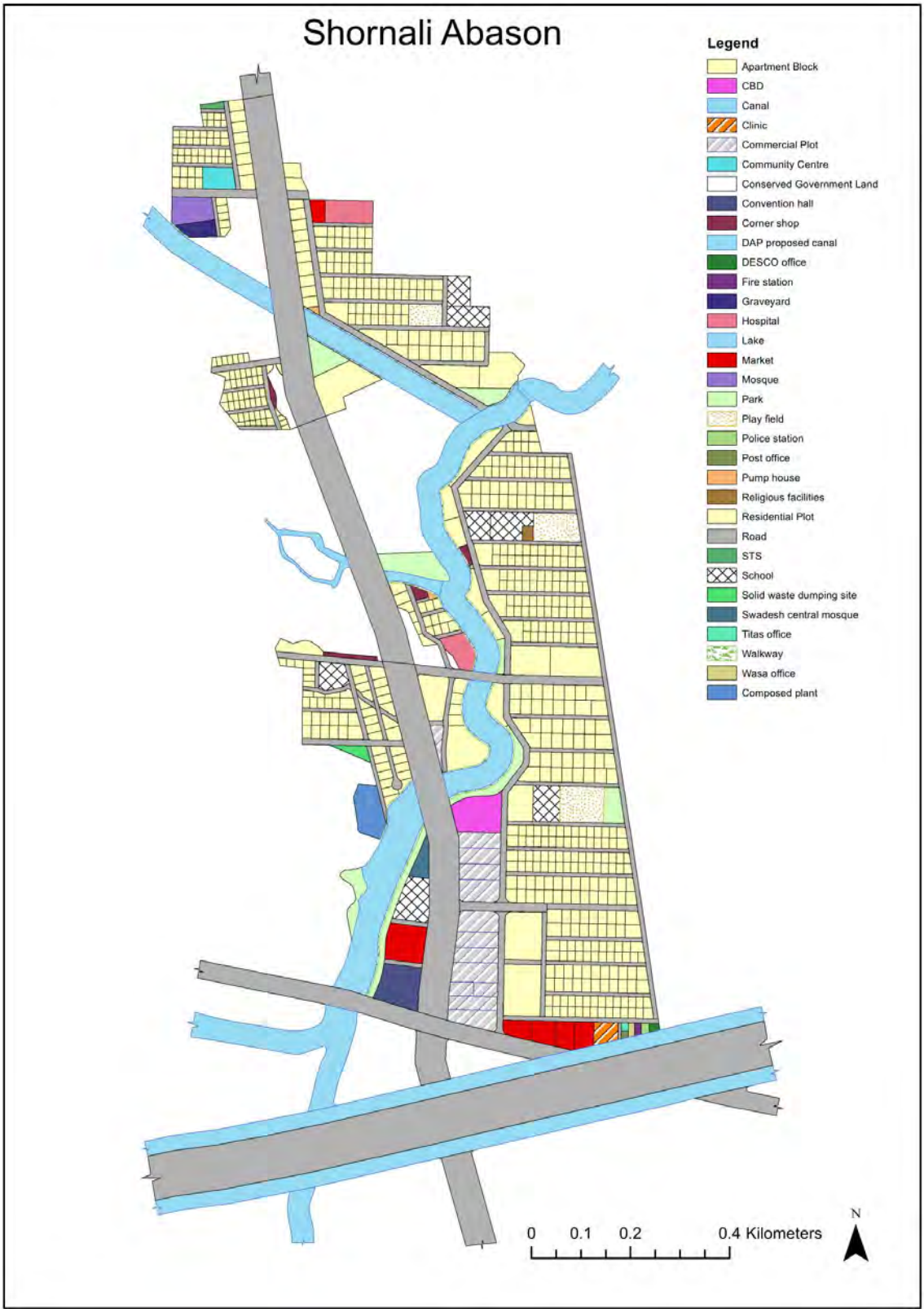

Figure 4.2: Project Map of Shornali Abashon

Source: Project office of Shornali Abashon

It is found from the survey that the price of the residential plots depends on the provided environmental and physical elements. There are numerous types of price variations of the residential plots on this site. The residential plots beside the park, lake, and playground

with wide site adjacent road are of a higher price to sell. It is also found that south-facing and corner plots are selling at higher prices than other orientation plots. Market, primary schools, and health facilities have also influenced plot prices. The residential plots were offered in a wide range of prices depending on the provided environmental and physical amenities in Shornali Abashon.

4.3 Sun-valley Abashon of Swadesh Properties Ltd.:

Another project of this study is the Sun-valley Abason of Swadesh Properties Ltd. It is situated beside 100 feet, Modani Avenue (opposite side to United States Embassy) & consisting approximately 3300 *bigha* land and 10.4 km away from Hazrat Shahjalal International Airport, Dhaka, and 8.51 km from the CBD. The entire project is in a lucrative location that is surrounded by Aftabnagar (South), Bansundhara R/A (North), 200 feet Eastern Avenue (East), and Badda, Gulshan, Banani, Pragati Soroni (West). The project has 624 ready plots to sell. The project authority has the intention to extend the projects in near future also. Project photos are composed in Appendices: B. The following table (Table: 4.2) has given the summary of the Sun-valley Abashon.

Table 4.2: Summary of Sun-valley Abashon

Name of the Project	Status	Category	Number of Residential Plots	Number of Commercial & Others Plots	Total Number of Plots
Sun-valley Abashon	Selling	Private Residential Project	624	53	677

Source: Based on the data collected from the project office of Sun-valley Abashon

4.3.1 Spatial quality of residential plots in Sun-valley Abashon:

This project was selected for many reasons for this study. It has also included some different environmental and physical attributes. The project has a road network of 200 feet, 130 feet, 80 feet, 60 feet, 40 feet, 30 feet & 25 feet wide road which connects most of the important places of Dhaka City. Another significant environmental attribute is a river. There is a small river (river Balu) attached to the projects. The figure on the following page has presented the map of the Sun-valley Abashon (Figure: 4.3).

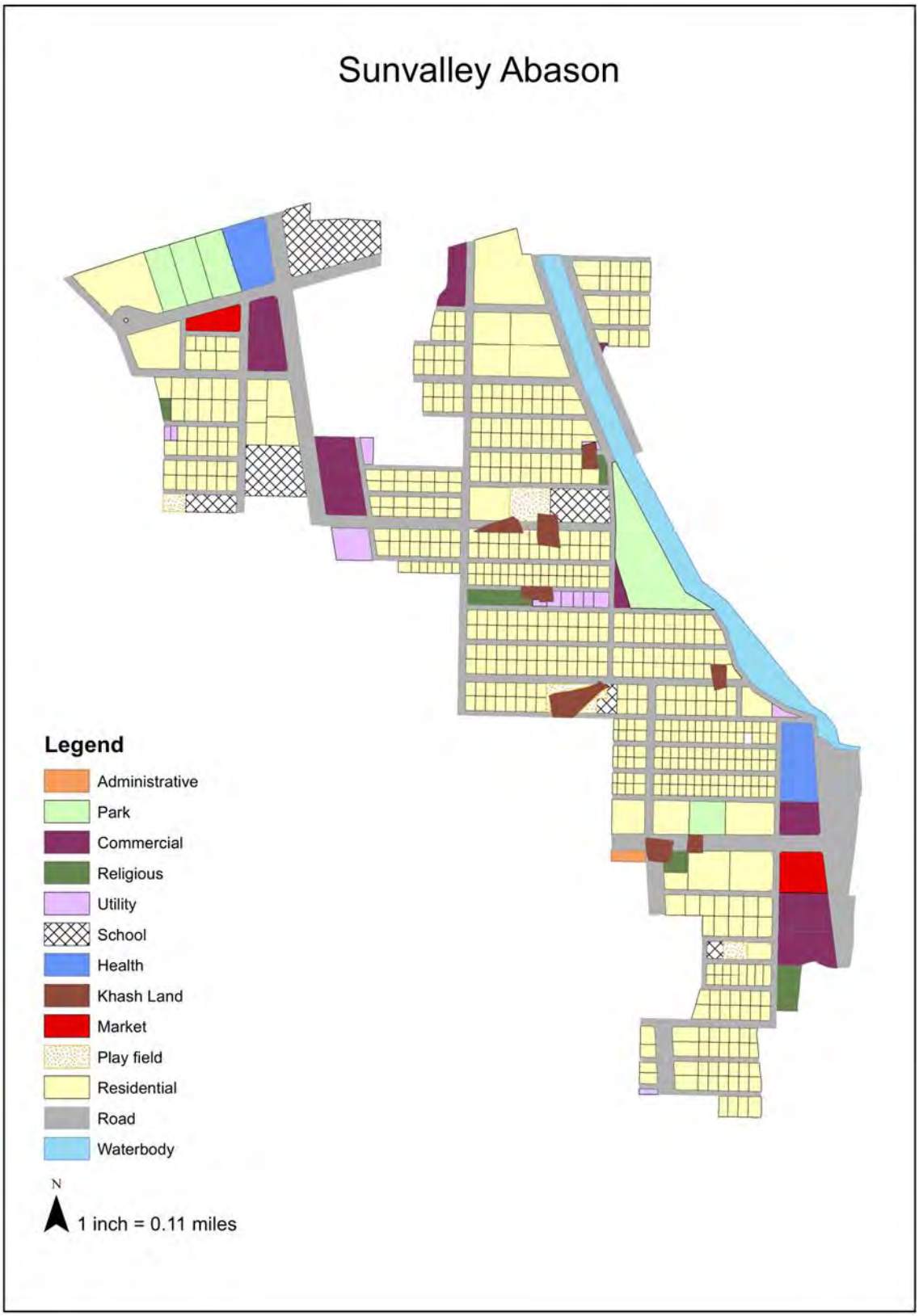

Figure 4.3: Project Map of Sun-valley Abashon

Source: Project office of Sun-valley Abashon

Several residential plots get the benefits of the river. Furthermore, most of the residential plots of this project are north-south oriented, many parks, playgrounds, educational

institutions, markets are present in this project. Figure: 4.3 has shown the map of Sun-valley Abashon.

4.3.2 Process residential land pricing in Sun-valley Abashon:

There are also various types of residential plots in this site based on size, purposes, and environmental and physical facilities in Sun-valley Abashon. Most of the plots are organized in the north-south orientation of this project. The residential land price of these projects was offered by measuring the provided environmental and physical attributes of this project. The residential plots which are closed to the river, park, playground market, and educational institutions are offered a higher price. The width of the site adjacent road also adds value to the land price of this project. Different combinations of environmental and physical amenities determined the asking price of residential plots in Sun-valley Abashon.

4.4 Malum City of Malum Group:

At present concern, client groups have become more concerned to buy plots with environmental and physical benefits for getting a better residential built environment. As a result, the real estate companies are offering residential plots with numerous types of physical and environmental facilities. The Purbachal Malum City of Malum Group is another site for analysis to get the result of this research. Purbachal Malum City is located in the extended eastern side of DMDP area 17.8 KM from the Hazrat Shahajalal International Airport of Dhaka and 18.7 km from the CBD. At present, the project has about 677 ready residential plots with various types of physical and environmental attributes to sell. Project photos are given in Appendices: B. The following table (Table: 4.3) has given the summary of Malum City.

Table 4.3: Summary of Malum City

Name of the Project	Status	Category	Number of Residential Plots	Number of Commercial & Others Plots	Total Number of Plots
Malum City	Selling	Private Residential Project	677	60	737

Source: Based on the data collected from the project office of Malum City

4.4.1 Spatial quality of residential plots in Malum City:

There are various types of plots that have different types of physical and environmental attributes such as market, hospital, clinic, educational institutions, playground, and wide road, etc. in Malum City (Figure: 4.4).

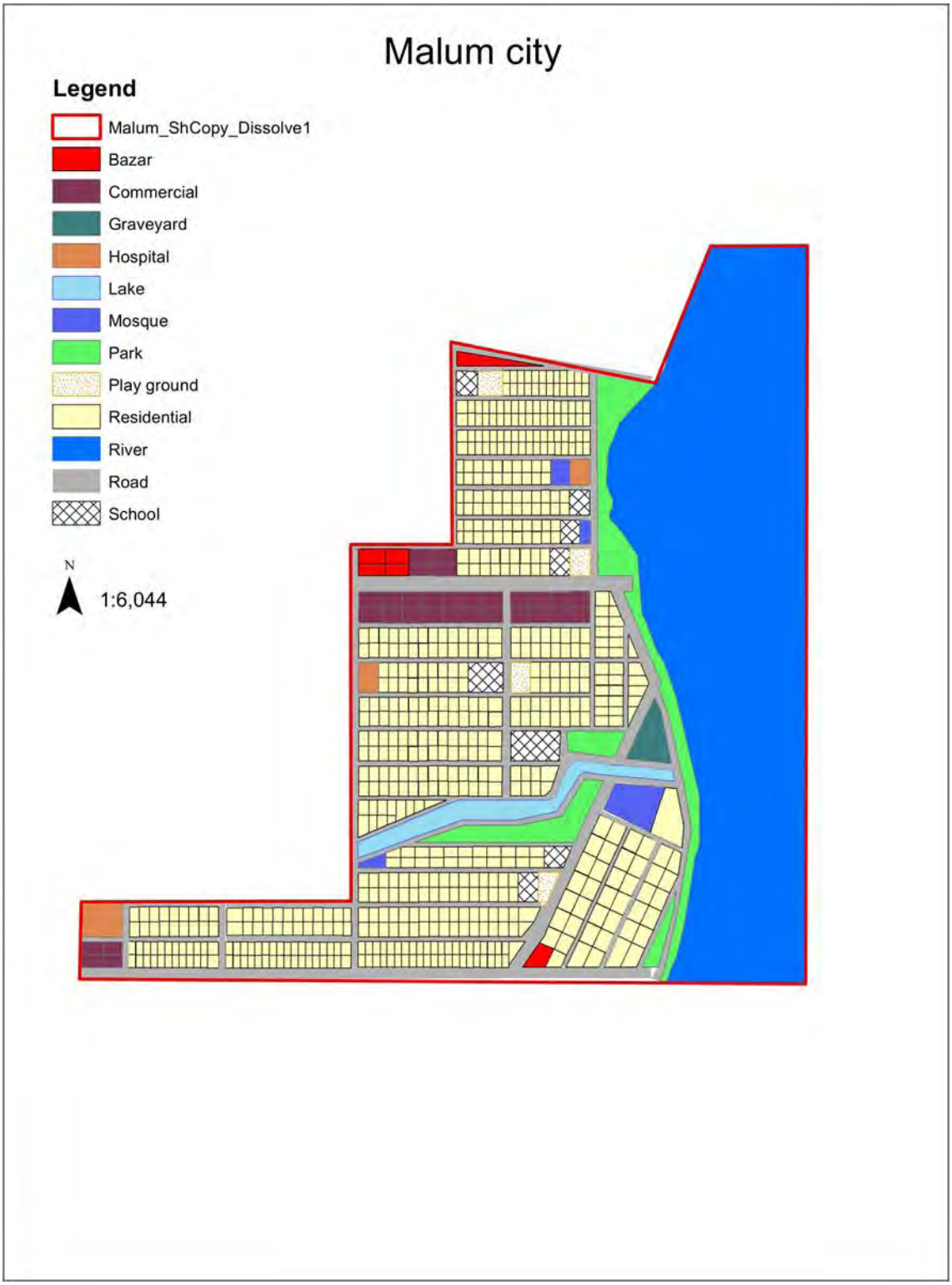

Figure 4.4: Project Map of Malum City

Source: Project office of Malum City

The most significant reason for the selection of this project as a study site is that the project has taken the benefits from both river and lake. There are various types of residential plots in this project with different types of environmental and physical elements. The types of road width of the projects are 30 feet, 35 feet, 40 feet, 60 feet, 80 feet, and 120 feet. The project map of Malum City has been presented in Figure: 4.4.

4.4.2 Process of residential land pricing in Malum City:

The project authority has measured the price of the residential plots depending on the provided physical and environmental attributes. The plots which are attached to a water body such as river and lake with wide road have offered maximum price per *Katha*. However, there are many categories were made depending on the orientation of the plots. It is found that the south-facing plots and south-facing corner plots have a greater price per Katha. The lower price plots have a minimum number of physical and environmental elements in project Malum City.

4.5 Sector-15 of RAJUK Purbachal New Township Projects:

Purbachal New Township Project is a public project of RAJUK which is situated on the eastern side of the DMDP area. The GOB has already completed the construction of 8 lanes connecting the road with the airport and roadside lake/canal through the eastern side of the DMDP area. The RAJUK is developing the Purbachal new town project in the eastern part of Dhaka which is very large with 26,000 residential plots (Figure: 4.5). The Township will be linked with an 8 (eight) lane-wide expressway from the Airport Road and Pragati Swarani crossing. The distance between the Purbachal New Township Projects and CBD is 13.9 km.

Moreover, there are many natural amenities are present in this Project of RAJUK such as rivers, natural lakes, green and open spaces (Figure: 4.5). It is the biggest Planned Township project in the country. The Project area is comprised of about 6150 *acres of* land. The distance is only 6.8 km. There is a very good communication network with a newly constructed eight-lane connecting road. RAJUK has already developed lots of infrastructures to make the project active. There are so many development plans with the project.

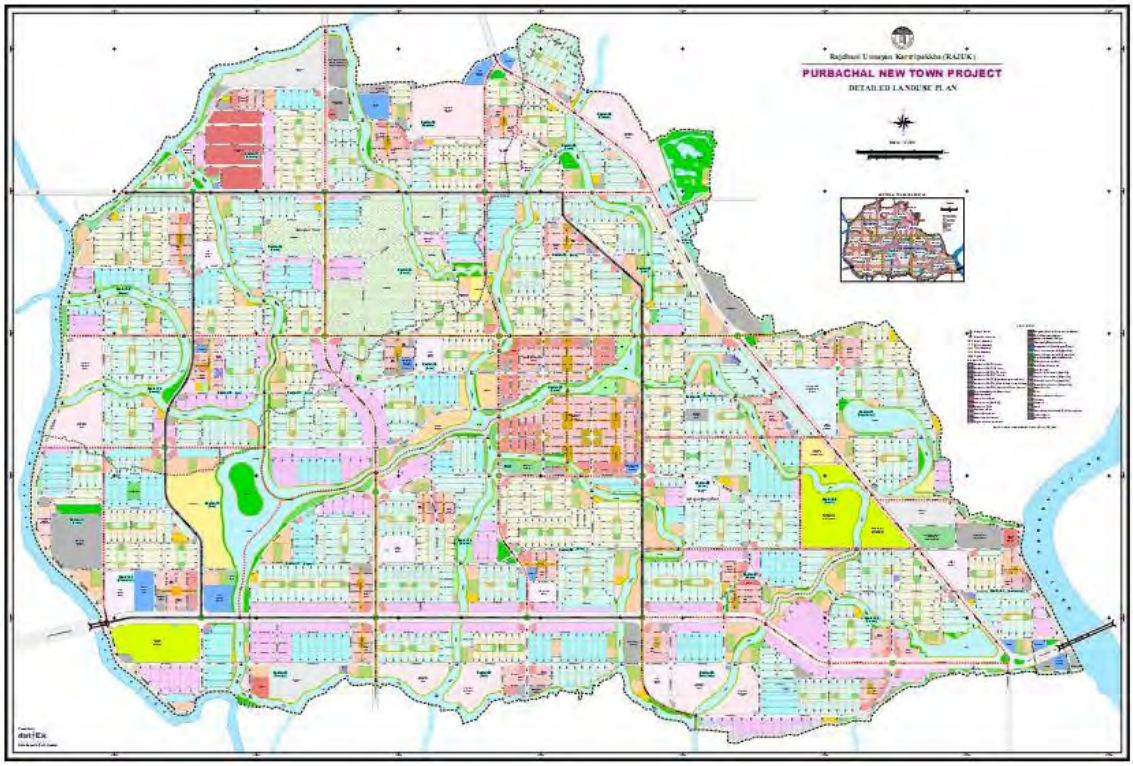

Figure 4.5: Project Map of RAJUK Purbachal New Township Projects

Source: RAJUK Office

The Sector-15 of RAJUK Purbachal New Township Projects has been selected as a public residential project for the study of this research. This sector has been planned with providing maximum environmental and physical amenities compared to the other sectors of RAJUK Purbachal New Township Projects. Distance between the Sector-15 of RAJUK Purbachal New Township Projects and the Hazrat Shahzalal International airport is about 11 km. There are about 600 plots in this sector including 540 residential plots in Sector-15 of RAJUK Purbachal New Township Projects.

Table 4.4: Summary of Sector-15 of RAJUK Purbachal New Township Projects

Name of the Project	Status	Category	Number of Residential Plots	Number of Commercial & Others Plots	Total Number of Plots
RAJUK new Township Project (Sector-15)	Selling	Public Residential Project	540	60	600

Source: RAJUK Office

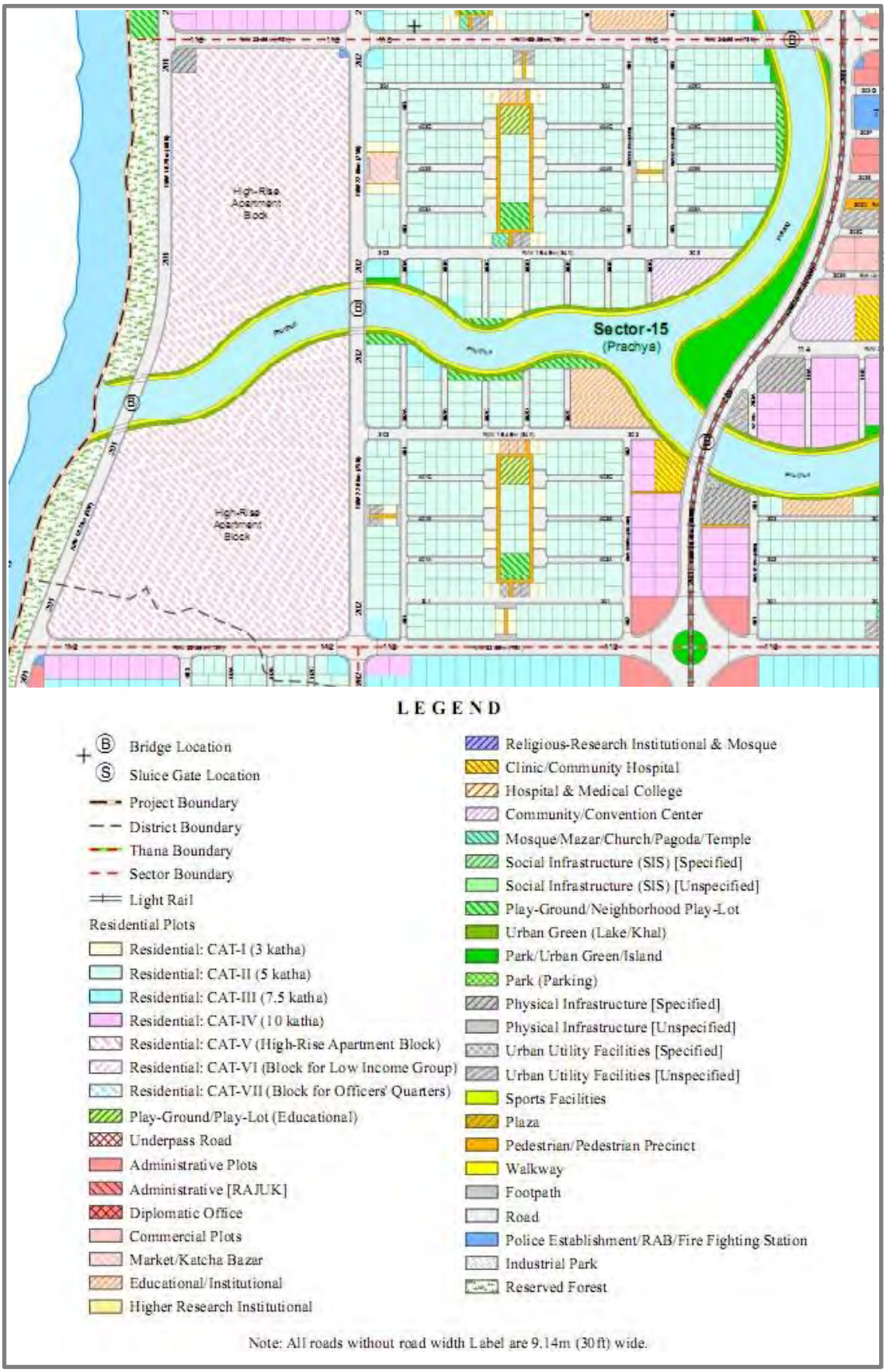

Figure 4.6: Project Map of Sector-15, RAJUK Purbachal New Township Projects

Source: RAJUK Office

4.5.1 Spatial quality of residential plots in Sector-15 of RAJUK Purbachal New Township Projects:

Sector-15 of RAJUK Purbachal New Township Projects is a naturally beautiful block of RAJUK Purbachal New Town Projects (Figure: 4.6). This sector is consists of 60 commercial and 540 residential plots with so many environmental and physical attributes. There is a natural lake that has to enrich the residential quality of the residential plots. There are also others attributes which are markets, hospitals, clinics, educational institutions, playgrounds, and wide roads, etc. The types of road width of this block are 100 feet, 75 feet, 54 feet, 44 feet, 40 feet, and 30 feet. The project map of Sector-15 of RAJUK Purbachal New Township Projects has been shown in Figure: 4.6.

4.5.2 Process of residential land pricing in Sector-15 of RAJUK Purbachal New Township Projects:

On the other hand, it is found that there are no significant price variations of residential plots in public residential projects rather have a lot of environmental and physical attributes. Only the phase of allotments and the professional status of government services determine the price of the plots. Purbachal new town project of RAJUK has been selected as a study project of this thesis research for further comprehensive study.

RAJUK has planned to develop the area as a self-contained New Township with all modern facilities and opportunities including 38.74 % land used for Residential, 25 % for Road, 6.41% for Administrative and Commercial, 3.2 % for Institution and Industrial Park, 6.6 % for urban Green and Open spaces, 7.1 % for Lakes and canals, 2.5 % for sports, 6.9 % for Education, Health and Social Infrastructure as well as 3.55 % other services in Sector-15 of RAJUK Purbachal New Township Projects.

4.6 Conclusion:

The Shornali Abashon, Sun-valley Abashon as well as Malum City are the weightiest ongoing private residential projects with numerous environmental and physical attributes in the DMDP area. Moreover, the Sector-15 is one of the most attractive sectors of ongoing Purbachal New Township Projects. These projects have been selected as the study projects of this research. The analysis of this research has been performed based on the data collected from these three study projects respectively. The following chapter has presented the analysis and findings of the research.

CHAPTER 05
LAND PRICE WITH PHYSICAL AND ENVIRONMENTAL ATTRIBUTES IN PRIVATE RESIDENTIAL PROJECTS

5.1 Introduction:

This chapter has described the land price of private residential projects with the physical amenities and environmental elements. Further by using descriptive analysis, this chapter has narrated the variations of residential plot prices with the variations of physical amenities and environmental elements. The Shornali Abashon, Sun-Valley Abashon and Malum city were taken as the study projects from private residential projects for this research. The residential plot prices of these three private projects have been described with maximum, the minimum, mean and standard deviation of the plot prices with the changes of physical amenities such as the width of the site adjacent road, distance from market and shopping, distance from nearest primary or secondary schools and environmental elements such as distance from the playground, distance from the river, distance from the lake, distance from park and orientation of the plots etc.

5.2 Price of the Residential Plots:

Plot prices of residential plots of Shornali Abashon, Sun-valley Abashon and Malum City have been depicted in this section where the standard deviation stipulates the intermission of the price of various types of plots. The standard deviation value means how dispersed the plot prices are in relation to the average price. A low standard deviation means the prices are clustered around the average price and a high standard deviation indicates the prices are more spread out around the average price.

Table 5.1: General Summary of Plot Prices of Private Residential Projects

Name of the Projects	Sample Size	Minimum Plot Price (*Lakh/Katha*)	Maximum Plot Price (*Lakh/Katha*)	Average Plot Price (*Lakh/Katha*)	Standard Deviation
Shornali Abashon	247	33	60.50	46.41	9.12
Sun-valley Abashon	239	30	60	46.12	8.2
Malum City	246	18.75	53.75	41.21	7.16

Source: Based on data collected from the project offices

The minimum price of the residential plots is 18.75 *lakh* per *Katha* (1 *Katha* = 720 Square Feet or 66.89 Square Meters) have been observed in Malum City and the maximum price of the plots 60.50 *lakh* per *Katha* have been noticed in Shornali Abashon (Table: 5.1). The price of residential plots is minimum in Malum City because this study project is far from CBD compared to three study projects of this research which have been discussed in chapter four (study area profile). The Malum city is 18.7 kilometers (km) far from the CBD (Motijheel, Dhaka) where the distance between Shornali Abashon and Sun-valley Abashon from CBD is 12.7 km and 8.51 km. The average plots price is highest in Shornali Abashon (46.41 *lakh* per *Katha*) and the lowest average price of the plots have been seen in Malum City (41.21 *lakh* per *Katha*) have been observed (Table: 5.1). Standard deviation is minimum in Malum city 7.16 and maximum is 9.12 in Shornali Abashon which indicates plot price is more spread out (± 9.12 *lakh per Katha*) around the average price (*33 lakh* per *Katha*) in Shornali Abashon than the Sun-valley Abashon and Malum City (Table: 5.1). There are more categories of residential plot prices in shornali Abashon than the Sun-valley Abashon.

5.3 Plot Prices with Orientations of the Plots:

Orientation of plot means that the plot is oriented towards a cardinal direction which are North, South, East and West. It indicates that the front edge of the plot is should be parallel to a specific cardinal direction like South facing plot means the front edge of the plot is parallel to the south axis. In the case of the plots which have two front edges, it can be defined as corner plot. Plot orientation increases the scope to design the residential building with natural ventilation. It ensures the natural airflow and openness of the plots. The effect of the plot orientations influences the choice of the client to buy residential plots. It has been found from the various literature studies and the survey of the site that there are remarkable changes in per *Katha* plot price with the changes of plot orientations (Ottomanelli et al., 2014; Kutter et al., 1997).

The private real estate projects; Shornali, Sun-valley and Malum City have different types of prices for different types of plot orientations. North, South, East, West and Corner Plots are the categories of plot orientations that have made variations in plot prices in the study sites according to the observation from the survey. It has been observed that maximum plots are north-south oriented to ensure the climatic benefits of the regional context. The corner plots usually have more open spaces than others because of having a road on two

or more sides. That is why the price of these plots are higher compared to other orientations in these three study sites; Shornali Abashon, Sun-valley Abashon and Malum City.

5.3.1 Plot Prices with plot orientations in Shornali Abashon:

The plot prices' maximum, minimum, average and standard deviation have been investigated here with the change of the plot orientation in Shornali Abashon. The standard deviation of plot price per *Katha* of each orientation has indicated the variation of price ranges within the group of the same orientation of the plots (Table: 5.2).

Table 5.2: Plot Prices with Plot Orientations in Shornali Abashon

Orientation of the Plots	Number of Plots	Percentage of Plots	Minimum Price (*Lakh/ Katha*)	Maximum Price (*Lakh/ Katha*)	Mean Price (*Lakh/ Katha*)	Standard Deviation
West	14	5.71%	33.00	60.50	50.52	12.47
East	7	2.86%	44.00	60.50	55.39	7.85
North	89	36.33%	33.00	60.50	44.08	8.51
South	91	37.14%	34.10	60.50	45.07	8.26
Corner plot	44	17.96%	35.75	60.50	51.14	8.28

Source: Based on data collected from the Project office of Shornali Abashon

Table 5.2 shows that the average price of North faced plots (44.08 *lakh* per *Katha*) are the lowest and the east faced plots (55.39 *lakh* per *Katha*) are the highest than the plots of other orientations. There are some noticeable facts behind it. The price of those plots is higher than the corner plots due to the comparatively lower distance from the river of those plots which has been described in the upcoming chapter of the analysis. The prices of corner plots (51.14 *lakh* per *Katha*) are higher than the west oriented plots. The standard deviation of plot price per *Katha* is highest for west faced plots (12.47), thus the price range varies for it more than the other.

Table 5.2 also shows the ratio regarding the distribution of plots according to the orientations. From table 5.2 it has been found that most of the plots were either North (36%) or South (37%) oriented in Shornali Abashon. The percentage of the east oriented residential plots were minimum in Shornali Abashon.

5.3.2 Plot prices with plot orientations in Sun-valley Abashon:

In Sun-valley Abashon, this study has described the maximum, minimum and standard deviation of prices (*lakh* per *Katha*) with different orientations of plots which explained the price variations with the variation of plot orientations (Table: 5.3).

Table 5.3: Plot Prices with Plot Orientations in Sun-valley Abashon

Orientation of the Plots	Number of Plots	Percentage of Plots	Minimum (*Lakh/ Katha*)	Maximum (*Lakh/ Katha*)	Mean (*Lakh/ Katha*)	Standard Deviation
West	1	0.42%	51.00	51.00	51.00	-
North	90	37.66%	30.00	60.00	44.85	8.64
South	96	40.17%	31.20	60.00	46.73	7.43
Corner plot	52	21.76%	30.00	60.00	47.09	8.76

Source: Based on data collected from the project office of Sun-valley Abashon

The average price of the corner plots (47.08 *lakh* per *Katha*) are higher than plots of other orientation except west faced plots (51.00 *lakh* per *Katha*). The North faced plots are with the lowest price (44.85 *lakh* per *Katha*). The value of standard deviation is about the same for orientations and comparatively lower (7-8 *lakh* per *Katha*). Thus, the plot price varies within 7-8 *lakh* per *Katha* from the mean price of different orientated plots in Sun-valley Abashon. The average price of the plot is found highest for West orientation because there were other environmental and physical amenities are attached significantly with these plots in Sun-valley Abashon (Table: 5.3).

Table 5.3, it has been observed that there is only one West faced plot and no east faced plots in Sun-valley Abashon. From table 5.3, it has been observed that most of the sample plots of the site are either North faced (37.7%) or South faced (40.2%). One-fifth of the total plots (21.8%) are corner plots in Sun-valley Abashon.

5.3.3 Plot prices with plot orientations in Malum City:

The following analysis described the changes of plot prices with the orientation of plots in Malum City. Here the maximum, minimum, average and standard deviation of plot price per *Katha* has been described according to the findings from the study site Malum City (Table: 5.4).

Table 5.4: Plot Prices with Plot Orientations in Malum City

Orientation of the Plots	Number of Plots	Percentage of plots	Minimum (*Lakh/ Katha*)	Maximum (*Lakh/ Katha*)	Mean (*Lakh/ Katha*)	Standard Deviation
West	7	2.85%	40.00	48.75	43.40	3.36
East	9	3.66%	41.25	48.75	44.31	1.99
North	93	37.80%	18.75	46.25	39.44	6.97
South	103	41.87%	20.00	51.25	41.71	6.85
Corner plot	34	13.82%	18.75	53.75	43.27	8.89

Source: Based on data collected from the project office of Malum City

From Table: 5.4, it has been found that the maximum average price per *Katha* plot are East Oriented plots (44.30 *lakh* per *Katha*) and North faced plots are at the lowest price (39.43 *lakh* per *Katha*). The value of standard deviation is comparatively lower for East (1.99) and West (3.36) oriented plots. Thus, the price of those facing plots stayed 2-3 *lakh* per *Katha* from the mean value. The standard deviation is highest for corner plots (8.89) which has indicated the price of the corner plots are more spread out around the average price in Malum City. From Table: 5.4, it has been also seen that most of the sample plots of the site are either North faced (38%) or South faced (42%). One-sixth of the total plots (14%) were corner plots.

5.4 Plot Prices with the Width of Access Road:

The access road means the adjacent road which gives primary access to the plot. The width of the access road defines the openness of the plots. There are different kinds of road width from 25 feet to 120 feet in the selected private residential projects; Shornali Abashon, Sun-valley Abashon and Malum City. The variation of plot prices has been found in the residential plots of these projects with the changes of the road width. The description of the per *Katha* prices according to the categories of the access road width has been composed in this section.

5.4.1 Plot prices with the width of an access road in Shornali Abashon:

The plots of Shornali Abashon have been planned to have access from 25 to 200 feet wide roads. The Sample plots were besides 25, 30, 40, 60 and 200 feet wide roads. The summary of the access road width of the sample plots of Shornali Abashon has been given

in Table: 5.5. Table 5.5 presents the variation of plot prices according to the variation of access road width with standard deviation.

Table 5.5: Plot Prices with the Width of Access Road in Shornali Abashon

Road Width (Feet)	**Number of Plots**	**Minimum** (*Lakh/ Katha*)	**Maximum** (*Lakh/ Katha*)	**Mean** (*Lakh/ Katha*)	**Standard Deviation**
25.00	182	33.00	60.50	45.20	8.87
30.00	26	34.10	60.50	46.50	9.79
40.00	21	44.00	60.50	50.21	6.60
60.00	6	38.50	53.35	45.74	6.70
200.00	10	60.50	60.50	60.50	.00

Source: Based on data collected from the project office of Shornali Abashon

According to findings of the analysis in Table: 5.5, has been found from Table: 5.5 that the maximum average price (60.50 *lakh* per *Katha*) of the residential plots are besides 200 feet wide road and the minimum average price (45.20 *lakh* per *Katha*) is found beside 25 feet wide road. The standard deviation is maximum (9.79) for 30 feet wide road that means the plot prices are more spread out (± 9.79) around the average price (46.50 *lakh* per *Katha*) besides 30 feet wide road in Shornali Abashon (Table: 5.5).

From Table: 5.5 following bar chart (Figure: 5.1) has been prepared to describe the percentage of the distribution of plots according to the width of the access road. It has been seen that most of the plots (74.3 %) are beside 25 feet access road. Thus, the site is mostly covered by a 25 ft. access road.

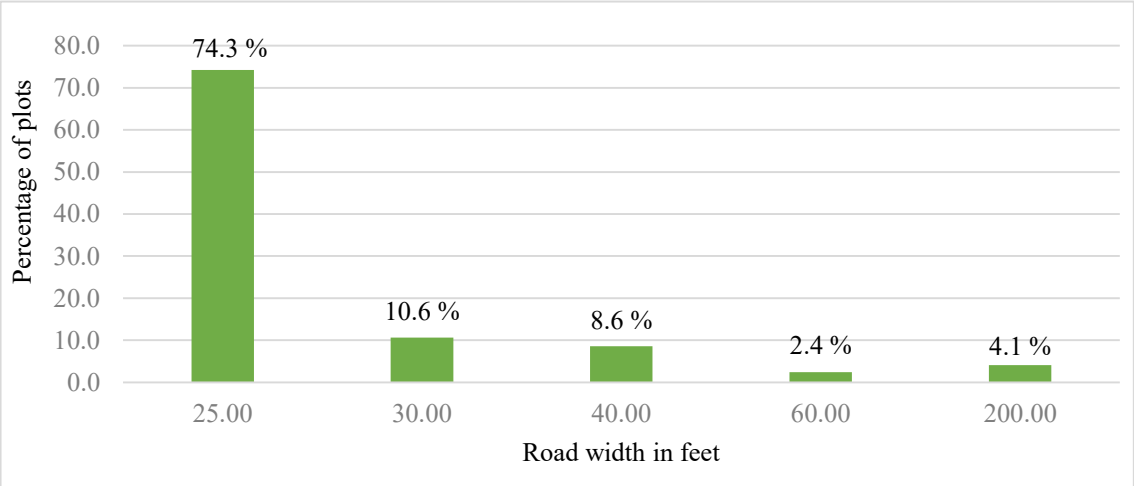

Figure 5.1: Plots with Road Width in Shornali Abashon

Source: Based on data collected from the project office of Shornali Abashon

5.4.2 Plot prices with the width of an access road in Sun-valley Abashon:

The sample plots of Sun-valley Abashon were besides 25, 40, 60, 80 feet wide roads. The plot prices of Sun-valley Abashon with the width of the access road have been described in Table: 5.6.

Table 5.6: Plot Prices with the Width of Access Road in Sun-valley Abashon

Road Width	Number of Plots	Minimum (*Lakh/ Katha*)	Maximum (*Lakh/ Katha*)	Mean (*Lakh/ Katha*)	Std. Deviation
25.00	188	30.00	60.00	45.12	7.84
40.00	38	30.00	60.00	47.79	9.04
60.00	9	52.20	57.00	55.07	1.69
80.00	4	57.00	57.00	57.00	0.00

Source: Based on data collected from the project office of Sun-valley Abashon

It has been found that the average plot price is the highest (57 *lakh* per *Katha*) for these plots which are beside 80 feet wide road and the lowest price (45.12 *lakh* per *Katha*) of the plots which are beside 25 feet wide road. Standard deviation is comparatively higher for plots beside 25 feet (7.84) and 40 feet (9.04) wide road which means the price are more spread out (± 7.84 and ± 9.04) around the average price of the plots beside 25 feet (45.12 *lakh* per *Katha*) and 40 feet (47.79 *lakh* per *Katha*) wide road respectively in Sun-valley Abashon.

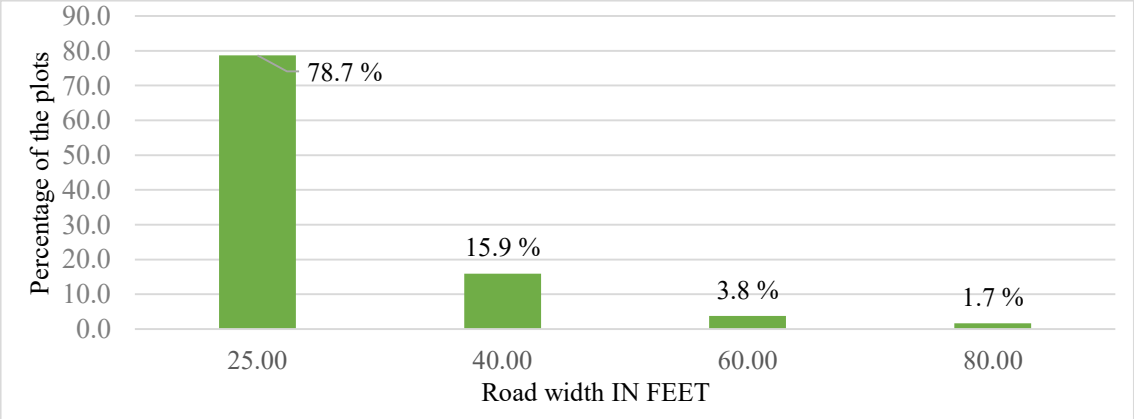

Figure 5.2: Plots with Road Width in Sun-valley Abashon

Source: Based on data collected from the project office of Sun-valley Abashon

The bar chart (Figure: 5.2) has been prepared from the summary of the data in Table: 5.6. In Sun-valley Abashon, most of the plots (78.7 %) are beside 25 feet access road. Thus, the site is mostly covered by a 25 ft. access road as well.

5.4.3 Plot prices with the width of an access road in Malum City:

In Malum City the plots have been found beside 25, 40, 60 and 80 feet wide roads. A summary of the access road width of the sample plot has been given in the below table (Table: 5.7).

Table 5.7: Plot Prices with the Width of Access Road in Malum City

Road Width	Number of Plots	Minimum (Lakh/ Katha)	Maximum (Lakh/ Katha)	Mean (Lakh/ Katha)	Standard Deviation
25.00	195	18.75	52.50	41.22	6.61
40.00	14	40.00	51.25	44.82	3.76
60.00	34	22.50	53.75	38.79	9.84
80.00	3	51.25	51.25	51.25	0.00

Source: Based on data collected from the project office of Malum City

The average plot price (51.25 *lakh* per *Katha*) is highest for plots having access from 80 feet wide roads and the lowest price (41.22 *lakh* per *Katha*) for the plots beside 25 feet wide roads (Table: 5.7). Standard deviation (9.84) is comparatively higher for plots beside 60 feet road. In addition to road width, various environmental factors also influence the price of plots located along 60 feet wide roads as well. The standard deviation is maximum (9.84) for 60 feet wide road that means the plot prices are more spread out (± 9.84) around the average price (38.79 *lakh* per *Katha*) besides 60 feet wide road in Malum City (Table: 5.7).

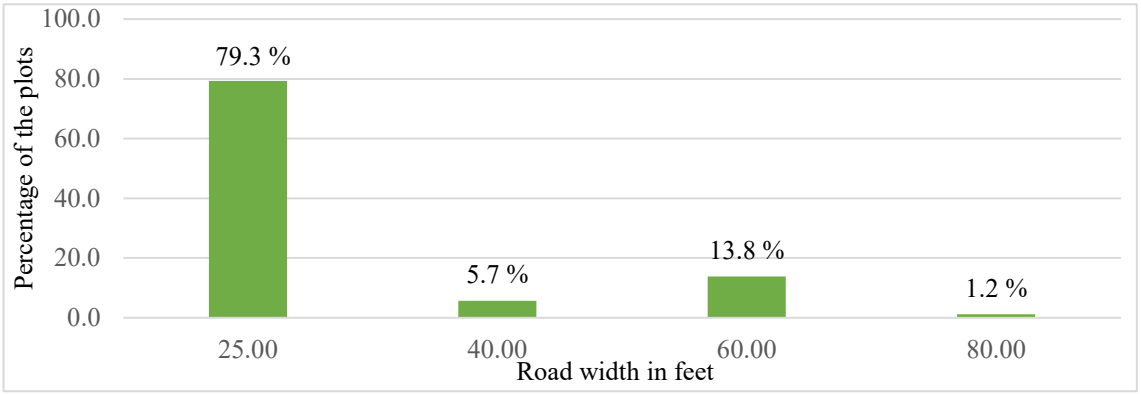

Figure 5.3: Plots with Road Width in Malum City

Source: Based on data collected from the project office of Malum City

The following figure (Figure: 5.3) describes the percentage of plots according to the width of the access road. From Table: 5.7, it has been seen that most of the plots (79.3 %) are beside 25 feet access road. Thus, the site is also mostly covered by a 25 feet access road.

5.5 Summary of others Physical and Environmental Attributes:

This section has described the physical amenities and environmental elements which are related to the physical distance between residential plots. The shortest physical distance have has determined from a digitized Map of the study projects using GIS. The shortest physical distance from the plots has been considered for each attribute like distance to river, lakes, parks or green open spaces, playgrounds, markets or shopping centres and primary or secondary school. The environmental and physical attributes remain almost the same for the projects; Shornali Abashon, Sun-valley Abashon and Malum City. It has been found that there is no river in Shornali Abashon and there is no lake in Sun-valley Abashon. Furthermore both the river and lake have been found in Malum City. Using descriptive statistics the maximum, minimum, mean and standard deviation of the distance between plots and physical and environmental attributes of Shornali Abashon, Sun-valley Abashon and Malum City have been described in this part of this thesis.

5.5.1 Summary of others physical environmental attributes in Shornali Abashon:

The distance of the lake, park or green open spaces, market or shopping, playground and primary or secondary school from the plots of Shornali Abashon are summarized in the table (Table: 5.8) below.

Table 5.8: Distance to Physical and Environmental Attributes from the Plots in Shornali Abashon

Variable name	Minimum (Meter)	Maximum (Meter)	Mean (Meter)	Standard Deviation
Distance to Lake	0.00	724.00	254.68	178.12
Distance to Park or green space	0.00	629.00	277.56	153.99
Distance to Market or shopping	9.00	1164.00	457.43	290.60
Distance to Playground	8.00	937.00	373.52	250.30
Distance to nearest Primary or secondary school	0.00	907.00	318.27	232.59

Source: Based on data collected from the project office of Shornali Abashon

The minimum distance has been varied from 0.00 to 9.00 meters for each variable in Shornali Abashon. Conversely, the maximum distance has been observed between the

plots and the market or shopping is 1164.00 meters. The standard deviation specified the range of distance variation. In Shornali Abashon the maximum standard deviation for the distance between the plots and market or shopping (290.50 meters) indicates the maximum range of distance variations.

5.5.2 Summary of other physical environmental attributes in Sun-valley Abashon:

The river has been found in Sun-valley Abashon instead of the lake. The distance of the river, park or green open spaces, market or shopping, playground and primary or secondary school from the plots are summarized in the table (Table: 5.9) below.

Table 5.9: Distance to Physical and Environmental Attributes from the Plots in Sun-valley Abashon

Variables	Minimum (Meter)	Maximum (Meter)	Mean (Meter)	Standard Deviation
Distance to River	8.00	1117.00	330.90	249.05
Distance to Park or green space	0.00	692.00	222.41	145.49
Distance to Market or shopping	8.00	1241.00	459.10	274.03
Distance to Playground	0.00	577.00	195.07	118.14
Distance to nearest Primary or secondary school	0.00	523.00	186.48	114.55

Source: Based on data collected from the project office of Sun-valley Abashon

The minimum distance between plots and the physical and environmental attributes varies from 0.00 meters to 8.00 meters in Sun-valley Abashon. The maximum distance has been observed between the plots and market or shopping which value is 1241.00 meters. In Sun-valley Abashon the maximum standard deviation for the distance between the plots and market or shopping (274.02 meters) indicates the maximum range of distance variations.

5.5.3 Summary of others physical environmental attributes in Malum City:

The Malum City has both the river and Lake. The description has included both the distance from the lake and river. Conversely the distance of the park or green open spaces,

market or shopping, playground and primary or secondary school from the plots are summarized for the Malum City in the Table: 5.10.

The minimum distance has been observed in Malum City between the plots and river which is 18.00 meter because of riverside park and road. Maximum distance from the plots and attributes has been found between the plots and river which is 747.00 meter. The standard deviation is also for the distance between the plots and river which is 296.09.

Table 5.10: Distance to Physical and Environmental Attributes from the Plots in Malum City

Variables	Minimum (Meter)	Maximum (Meter)	Mean (Meter)	Std. Deviation
Distance to River	18.00	747.00	296.10	176.54
Distance from the Lake	6.00	651.00	258.10	162.71
Distance to Park or green space	6.00	486.00	169.11	107.72
Distance to market or shopping	0.00	525.00	230.75	118.85
Distance to Playground	6.00	588.00	185.51	135.58
Distance to nearest primary or secondary school	0.00	561.00	160.57	137.04

Source: Based on data collected from the project office of Malum City

5.6 Conclusion:

From the analysis of the chapter, it has been found that the average plot prices (46 *lakh* per *Katha*) are about the same for Shornali Abashon and Sun-valley Abashon. The plot price of Malum city is comparatively lower (41 *lakh* per *Katha*) than the others because it is located relatively far from the CBD which has been discussed in chapter four (study area profile). The minimum plot price (18.75 *lakh* per *Katha*) of Malum city is the lowest than the others as well. Standard deviation is comparatively higher in Shornali Abashon (9.12) than others. Thus, the plot price is more spread out from the average plot price of the site than the others. It has also been observed that maximum plots of all of the sites are north-south oriented to ensure the climatic benefits of the regional context. The corner plots are usually had more open spaces than others because of having roads on two or more sides.

From the analysis of the width of the access road and plot price, it has been found that Shornali Abashon has an access road from 25 feet to 200 feet, and the plots beside 200 feet road have the maximum mean value (60.5 *lakh* per *Katha*) than others. Standard deviation is comparatively higher for plots beside 25 and 30 feet roads because other environmental factors influence those plots prices as well. About 74.3% of sample plots of the site were besides 25 feet access road. For Sun-valley Abashon, the site has access roads ranging from 25 feet to 80 feet, and the plots beside 80 feet road have the maximum mean value (57 *lakh* per *Katha*) than the others. Standard deviation is comparatively higher for plots beside 25 and 40 feet roads because other environmental factors influence those plots prices. About 79% of sample plots of the site were besides 25 feet access road. For Malum city, the access road width range is the same as Sun-valley Abashon (from 25 feet to 80 feet), and the plots beside 80 feet road have the maximum mean value (51.25 *lakh* per *Katha*) than the others. Standard deviation is comparatively higher for plots beside 60 feet road. Thus, the plot price is comparatively spread out from the mean than others. About 79% of sample plots of the site were besides 25 feet access road.

From the analysis of physical-environmental variables, it has been found that the standard deviation is comparatively higher for all of the variables. It indicates that the distance of the amenities from the plot varies extensively. Thus, the samples were distributed in the sites in such a way that, it covers all types of plots.

CHAPTER 06
INFLUENCE OF PHYSICAL AND ENVIRONMENTAL ATTRIBUTES ON LAND PRICE IN PRIVATE RESIDENTIAL PROJECTS

6.1 Introduction:

The second objective aimed to study the influence of physical, topographical and environmental attributes on the land price of residential plots of the private real estate projects in Dhaka. As it was found that there were no significant topographical attributes that have been associated with plot price in the study projects of this research. Consequently, topographical attributes have not been considered in the analysis of this research. This chapter has described the influence of physical and environmental attributes on the price of residential plots.

Several statistical analysis has been done to find out the influential physical amenities and environmental elements on the price of plots in the private residential projects of Dhaka. Correlation Analysis, ANOVA (Tukey HSD) and Regression Analysis have been performed to study the relationship between the plot price and the physical as well as environmental attributes. Correlation analysis has been done to quantify the association between the physical and environmental attributes with plot price. ANOVA (Tukey HSD) has been done to access potential differences in plot prices according to the categories of the orientation of plots. Regression analysis was used to find out the influential environmental and physical attributes on the price of the residential plots in private residential projects.

6.2 Relationship of Physical and Environmental Attributes with Land Price:

The physical elements such as wide roads, markets or shopping centres, educational institutions, health care centres, services etc. are the physical amenities that add value to the residential plots (Islam et al., 2013). However the park, green spaces, river, lake, canals, playground, farmlands open spaces and climatic plot orientation etc. environmental elements which enhance the environmental quality of the residential plots (Baranzini & Schaerer, 2011). These environmental and physical elements have an association with the price of the residential land (Kadish and Nutesil, 2012). The study

projects; Shornali Abashon, Sun-valley Abashon and Malum City has been selected for having a maximum number of physical and environmental attributes for this research. The most common and prominent physical and environmental variables from these three projects have been marked to find out the association between the land price and physical as well as environmental attributes. In this study, the physical variables are the width of the access road, distance from the playground, distance from the nearest primary or secondary school, distance from the park, distance from the market or shopping centre, etc. Differently environmental variables are the distance from the river, distance from the lake, and distance from the park or green open space. Correlation analysis has been done to quantify the association of the physical and environmental variables with the residential plot price in this research.

6.2.1 Relationship of Physical and Environmental Attributes with Land Price in Shornali Abashon:

In the Shornali Abashon, the dependent variable was "Plot price" and the independent variables (physical amenities and environmental elements) are presented in Table: 6.1. The correlation matrix among the variables have been shown in Table: 6.2 to define the relationship between the dependent and independent variables.

Table 6.1: Dependent and Independent Variables in Shornali Abashon

Dependent variables:	Independent variables:
Plot Price (*Lakh/Katha*)	▪ Width of the access road ▪ Distance from the park or green open space ▪ Distance from the playground ▪ Distance from the nearest primary or secondary school ▪ Distance from the lake ▪ Distance from the market or shopping

All of the independent variables except the width of the access road are related to the distance between the variables and the sample plots of Shornali Abashon. The shortest physical pathway distance has been measured in meters from the digitized map of Shornali Abashon for the correlation analysis. The width of the access road was taken in feet (Table: 6.1). Correlation analyses have been performed among the dependent and the independent variables in this stage. The following Table: 6.2 has explained the relationship between the residential plot prices and the environmental elements and physical amenities. The relationship between plot price and variables were expressed by

low or weak relationship, moderate relationship and strong or high relationship in this analysis (Table: 6.2).

Table 6.2: Relationship of Physical and Environmental Attributes with Land Price in Shornali Abashon

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
Width of the access road	0.332**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is positive, the plot price will be increased when the width of the access road increased.
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and the width of the access road.
Distance from the park or green open space	- 0.612**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the park or green open space increased.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and distance from the Park or Green open space.
Distance from the playground	- 0.511**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the playground increased.

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and distance from the playground.
Distance from the nearest primary or secondary school	- 0.602**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the nearest primary or secondary school increased.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and Distance from the nearest primary/secondary school.
Distance from the lake	**- 0.735***	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the lake increased.
			Strength of the relationship: The value of the coefficient shows that there is a **strong/high correlation** between the plot price and Distance from the lake.
Distance from the market or shopping centre	0.556**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is positive, the plot price will be increased, when the distance

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
			from the market or shopping centre increases.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and distance from the market or shopping centre.

Source: Based on data collected from the project office of Shornali Abashon

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The positive value of the correlation coefficient has indicated the positive relationship and the negative value of the correlation coefficient has indicated the negative relationship. From Table: 6.2, it has been found that there was a strong or high negative relationship between the distance from the lake and the price of the residential plots. It has indicated that, the price of the plots increased with the decrease of the distance between lake and plots.

Moreover, there was a weak or low positive correlation between the residential plot price and the width of the site adjacent or access road which mean the price of the plots increased with the increase of the road width. Others attributes have a moderate correlation (positive/negative) with the price of the residential plots in Shornali Abashon. There was a moderate positive correlation between the plot prices and the distance of the market or shopping centres from the residential plots in Shornali Abashon (Table: 6.2).

6.2.2 Relationship of Physical and Environmental Attributes with Land Price in Sun-valley Abashon:

There was a river instead of the lake in Sun-valley Abashon. In the Sun-valley Abashon dependent variable was “Plot price” and the independent variables were given in Table: 6.3. The correlation matrix among the variables has been given in the Table: 6.4 to describe the relationship between the dependent and independent variables. The correlation values of different variables (environmental and physical attributes) have explained the status of the relationship of these attributes in the study project Sun-valley Abashon (Table: 6.4).

Table 6.3: Dependent and Independent Variables in Sun-valley Abashon

Dependent variables:	Independent variables:
Plot Price (*Lakh/Katha*)	▪ Width of the access road ▪ Distance from the park or green open space ▪ Distance from the playground ▪ Distance from the nearest primary or secondary school ▪ Distance from the river ▪ Distance from the market or shopping

All of the independent variables except the width of the access road are related to the distance between the variables and the sample plots which have been organized in the Table: 6.3. The shortest physical distance has been measured in meters from the digitized map of Sun-valley Abashon. The width of the access road was taken in feet (Table: 6.3). Correlation analyses have been performed among the dependent and the independent variables in this stage.

The following Table: 6.4 has explained the relationship between the residential plot prices and the environmental elements and physical amenities for Sun-valley Abashon. The relationship between the environmental and physical attributes and residential land price have been expressed by low or weak relationship, moderate relationship and strong or high relationship in this analysis (Table: 6.4).

Table 6.4: Relationship of Physical and Environmental Attributes with Land Price in Sun-valley Abashon

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
Width of the access road	.299**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is positive, the plot price will be increased when the width of the access road increased.
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and the width of the access road.

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
Distance from the park or green open space	**-.579****	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the park or green open space increased.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and distance from the Park or Green open space.
Distance from the playground	-.019**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the playground increased.
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and distance from the playground.
Distance from the nearest primary or secondary school	-.200**	0.002	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the nearest primary or secondary school increased.

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and Distance from the nearest primary/secondary school.
Distance from the river	**-0.548***	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be decreased, when the distance from the river increased.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and Distance from the lake.
Distance from the market or shopping centre	.304**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is positive, the plot price will be increased, when the distance from the market or shopping centre increases.
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and distance from the market or shopping centre.

Source: Based on data collected from the project office of Sun-valley Abashon

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The positive value of the correlation coefficient has indicated the positive relationship (plot price increases with the increase of the value of attributes) and the negative value of the correlation coefficient has indicated the negative relationship (plot price increases

with the decrease of the value of attributes) between the residential plot prices and environmental elements as well as the physical amenities. In this analysis, it has been found that the price of the residential plots has a moderate negative correlation with the distance from the river and the distance from the park or green open spaces which indicated the price increased with the decrease of the distance (distance to river, park or green open spaces). The correlation between the plot price and other variables were found low or weak (positive/negative) for the Sun-valley Abashon (Table: 6.4).

6.2.3 Relationship of Physical and Environmental Attributes with Land Price in Malum City:

There are both a river and a lake in Malum City. In Malum City dependent variable was "Plot price" and the independent variable was the environmental elements and physical amenities of Malum City which have been given in the Table: 6.5. The correlation matrix among the variables has been given in the below Table: 6.6.

Table 6.5: Dependent and Independent Variables in Malum City

Dependent variables:	Independent variables:
Plot Price (*Lakh/Katha*)	▪ Width of the access road ▪ Distance from the river ▪ Distance from the park or green open space ▪ Distance from the playground ▪ Distance from the nearest primary or secondary school ▪ Distance from the river ▪ Distance from the market or shopping

The width of the access road was taken in feet and other independent variables are related to the distance and were taken in meters for the correlation analysis of this research in this chapter. The shortest distance between the variables and the residential plots have been measured in meters from the digitized map of Malum City. Correlation analysis has been performed among the dependent (plot price) and the independent variables (physical and environmental attributes). The following table (Table: 6.6) has explained the relationship between the residential plot prices and the environmental elements and physical amenities of Malum City. The relationships between plot prices and attributes have been expressed by low or weak relationships, moderate relationships and strong or high relationships in Malum City (Table: 6.6).

Table 6.6: Relationship of Physical and Environmental Attributes with Land Price in Malum City

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
Width of the access road	0.112*	0.002	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is positive, the plot price will be increased when the width of the access road increased.
			Strength of the relationship: The value of the coefficient shows that there is a **low/ weak correlation** between the plot price and the width of the access road.
Distance from the river	**-.811****	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the river decreased.
			Strength of the relationship: The value of the coefficient shows that there is a **strong/high correlation** between the plot price and the distance from the river.
Distance from the park or green open space	**-.802****	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the park or green open space decreased.

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
			Strength of the relationship: The value of the coefficient shows that there is a **strong/high correlation** between the plot price and the distance from the park or green open space.
Distance from the playground	**-.900****	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the playground decreased.
			Strength of the relationship: The value of the coefficient shows that there is a **strong/high correlation** between the plot price and the distance from the playground.
Distance from the nearest primary or secondary school	**-.904****	**0.000**	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the nearest primary or secondary school decreased.
			Strength of the relationship: The value of the coefficient shows that there is a **strong/high correlation** between the plot price and the distance from the nearest primary or secondary school.
Distance from the lake	-0.103*	0.017	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.

Variables	Pearson Correlation	Significance p-value (2-tailed)	Result
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the lake decreased.
			Strength of the relationship: The value of the coefficient shows that there is a **low/weak correlation** between the plot price and the distance from the lake.
Distance from the market or shopping centre	-.600**	0.000	**Statistical significance:** The value of the coefficient is statistically significant since the p-value is lower than 0.05.
			The direction of the relationship: Since the value is negative, the plot price will be increased when the distance from the market or shopping centre decreased.
			Strength of the relationship: The value of the coefficient shows that there is a **moderate correlation** between the plot price and the distance from the market or shopping centre.

Source: Based on data collected from the project office of Malum City

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

As mentioned that, the positive value of the correlation coefficient has indicated the positive relationship and the negative value of the correlation coefficient has indicated the negative relationship between the residential plot prices and environmental elements and physical amenities. From Table: 6.6 it has been found that, the price of the residential plots has a very high/strong negative correlation with the distance from the river, distance from the park or green open space, distance from the playground and distance from the nearest primary or secondary school. It has indicated that the price of the plots increased with the decrease of the distance of these attributes (distance from the river, distance from the park or green open space, distance from the playground and distance from the nearest primary or secondary school) from the residential plots. There was a moderate negative

correlation between the price of the plots and distance from the market or shopping centre. The correlation between the plot price and others variables were found low or weak (positive/negative correlation) for Malum city (Table: 6.6).

6.2.4 Comparison of correlation between plot price and attributes (physical and environmental) in study projects:

From the table (Table: 6.2, 6.4, 6.6), it has been found that the environmental and physical attributes have a correlation with the price of the residential plots in three study projects; Shornali Abashon, Sun-valley Abashon and Malum city respectively. As mentioned the price of the residential plots was found with various categories based on the provided environmental and physical amenities in the study projects. The project authorities have made the price fixation in such a way that it could make maximum profits. Accordingly, the environmental elements and physical amenities were found with different positions and compositions with the residential plots in these three private residential projects. The value of the environmental elements and physical amenities have made the correlation with the price of the residential plots either positively or negatively with different results in the study projects. The variables which have a correlation with plot price has been shown in the below table (Table: 6.7).

Table 6.7: Correlation of Plot Price with Physical and Environmental Attributes in the Study Projects

Project name	Strong/ High Correlation	Moderate Correlation	Low/ Weak Correlation
Shornali Abashon	▪ **Distance from the lake**	▪ Distance from the park or green open space ▪ Distance from the playground ▪ Distance from the nearest primary or secondary school ▪ Distance from the market or shopping centre	▪ Width of the access road

Project name	Strong/ High Correlation	Moderate Correlation	Low/ Weak Correlation
Sun-valley Abashon		▪ **Distance from the park or green open space** ▪ **Distance from the river**	▪ Width of the access road ▪ Distance from the playground ▪ Distance from the nearest primary or secondary school ▪ Distance from the market or shopping centre
Malum City	▪ **Distance from the river** ▪ **Distance from the park or green open space** ▪ **Distance from the playground** ▪ **Distance from the nearest primary or secondary school**	▪ Distance from the market or shopping centre	▪ Width of the access road ▪ Distance from the lake

6.3 Influence of Plot Orientations on Plot Prices:

It has been observed from the literature and survey of the study projects that the price per *Katha* are not the same for all kinds of plot orientations. Prices can be varied between the plots with the same environmental and physical amenities because of the orientation of the plots. It was found that plot price varies accordingly for five types of plot orientations in Shornali Abashon, Sun-valley Abashon and Malum City (Table: 6.8).

Table 6.8: Categories of Plots Orientations

Project	Plot Orientation
Shornali Abashon	▪ North Oriented or North faced ▪ South Oriented or South faced ▪ East Oriented or East faced ▪ West Oriented or West faced ▪ Corner plot
Sun-valley Abashon	
Malum City	

This part of the chapter has been organized to identify the influential plot orientations on plot prices. ANOVA (Tukey HSD) test has been conducted in this study to find out the influential plot orientations on plot price. From the output of ANOVA analysis, the significance of the plot orientations on plot prices has been measured. Therefore multiple comparisons have been done. The Tukey post hoc test is generally the preferred test for conducting post hoc tests on a one-way ANOVA which has been conducted to identify the specific influential plot orientations on residential plot prices.

6.3.1 Influential plot orientations on plot prices in Shornali Abashon:

ANOVA (Tukey HSD) has been done to find out influential plot orientations (North, South, East, West, and Corner) on plot prices in Shornali Abashon. The price of the residential plots is varied for plot orientation between the orientations groups. Within the group, the plot prices are varied for the attachment of others attributes on residential plots.

In the research null hypothesis was "there is no significant difference of plot price with the change of orientation of the plots" and the alternate hypothesis was "there is significant difference of plot price with the change of orientation of the plots". If the result of the ANOVA test shows the significance value is less than .05, it means the null hypothesis would be rejected and alternate hypothesis would be accepted. Table: 6.9 has shown the output of the ANOVA analysis and whether there is a statistically significant difference between the group means.

Table 6.9: Significance of Plot Orientations on Plot Prices in Shornali Abashon

Groups	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2431.346	4	607.836	8.171	**.000**
Within Groups	17852.929	240	74.387		
Total	20284.275	244			

Source: Based on data collected from the project office of Shornali Abashon

The significance value is 0.000 (i.e., p = .000), which is below 0.05, thus, the null hypothesis (there is no significant difference of plot price with the change of orientation of the plots) has been rejected. Thus, there is a statistically significant difference in the plot price between the different orientations in Shornali Abashon (Table: 6.9). Multiple comparisons of the significance of plot orientation on plot price have been done in Shornali Abashon (Table: 6.10).

Table: 6.10 has provided some very useful descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (plot price) for each separate orientation (North, South, East, West and Corner plot), as well as when all groups are combined (Total). The Multiple Comparisons, showed which groups differed from each other in the study project Shornali Abashon.

Table 6.10: Multiple Comparisons of Influence of Plot Orientations on Plot Prices in Shornali Abashon

(I) Orientation of the plots	(J) Orientation of the plots	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
West	East	-4.87143	3.99251	.224	-12.7363	2.9934
	North	6.44109	2.47975	**.010**	1.5562	11.3260
	South	5.45165	2.47605	**.029**	.5741	10.3292
	Corner plot	-.61607	2.64651	.816	-5.8294	4.5973
East	West	4.87143	3.99251	.224	-2.9934	12.7363
	North	11.31252	3.38564	**.001**	4.6432	17.9819
	South	10.32308	3.38293	**.003**	3.6591	16.9871
	Corner plot	4.25536	3.50961	.227	-2.6582	11.1689
North	**West**	-6.44109	2.47975	**.010**	-11.3260	-1.5562
	East	-11.31252	3.38564	**.001**	-17.9819	-4.6432
	South	-.98944	1.28579	.442	-3.5223	1.5434
	Corner plot	-7.05716	1.58947	**.000**	-10.1883	-3.9261
South	**West**	-5.45165	2.47605	**.029**	-10.3292	-.5741
	East	-10.32308	3.38293	**.003**	-16.9871	-3.6591
	North	.98944	1.28579	.442	-1.5434	3.5223
	Corner plot	-6.06772	1.58369	**.000**	-9.1874	-2.9480
Corner plot	West	.61607	2.64651	.816	-4.5973	5.8294
	East	-4.25536	3.50961	.227	-11.1689	2.6582
	North	7.05716	1.58947	**.000**	3.9261	10.1883
	South	6.06772	1.58369	**.000**	2.9480	9.1874

Source: Based on data collected from the project office of Shornali Abashon
Dependent Variable: Plot price in *lakh* per *Katha*
ANOVA (Tukey HSD)

According to Table: 6.10, it has been noticed that, the significance values between different groups of plot orientations are below 0.05, which indicate there are differences in plot prices with the changes of plot orientations such as west faced plots group with north and south oriented plots. Similarly, there have been differences in price of the east

faced plots group with south and north oriented plots. Same changes have been seen in other plot orientation groups as well.

There was a statistically significant difference between groups was determined by one-way ANOVA (F (4, 240) = 8.171, p = .000). A Tukey post hoc test revealed that the North faced plot price [from Table-5.2]; (44.08 ± 8.51, p = .001) had been statistically significantly lower than East orientated plot (55.39 ± 7.84, p = .001), West oriented plots (50.52 ± 12.48, p = .010) and Corner plots (51.14 ± 8.28, p = .000). Moreover, Corner (51.14 ± 8.28) plots price had been statistically significantly higher than the North (44.08 ± 8.51, p = .000) faced and South faced plots (45.07 ± 8.26, p = .000) [from Table-5.2].

6.3.2 Influential plot orientations on plot prices in Sun-valley Abashon:

ANOVA (Tukey HSD) analysis has been done to find out influential plot orientations (North, South, East, West, and Corner) on plot prices in Sun-valley. The price of the residential plots is varied for plot orientation between the groups of plot orientations. Within the group, the plot prices are varied for the attachment of others attributes on residential plots.

For Sun-valley Abashon, the null hypothesis was "there is no significant difference of plot price with the change of orientation of the plots" and alternate hypothesis was "there is significant difference of plot price with the change of orientation of the plots". If the result of the ANOVA test shows the significance value is less than .05, it means the null hypothesis would be rejected and alternate hypothesis would be accepted. Table: 6.11 shows the output of the ANOVA analysis and whether there is a statistically significant difference between the group means.

Table 6.11: Significance of Plot Orientations on Plot Prices in Sun-valley Abashon

Groups	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1130.748	3	376.916	2.039	**.184**
Within Groups	43434.968	235	184.830		
Total	44565.715	238			

Source: Based on data collected from the project office of Sun-valley Abashon

The significance value is 0.184 (i.e., p = .184), which is higher than 0.05. Thus, the null hypothesis (there is no significant difference of plot price with the change of orientation of the plots) is accepted (Table: 6.11). And, therefore, there is no statistically significant difference in the plot price between different plot orientations for Sun-valley Abashon.

6.3.3 Influential plot orientations on plot prices in Malum City:

ANOVA (Tukey HSD) analysis has also been done to find out influential plot orientations (North, South, East, West, and Corner) on plot prices in Sun-valley. The price of the residential plots is varied for plot orientation between the groups of plot orientations. Within the group, the plot prices are varied for the attachment of others attributes on residential plots.

For Malum City, null hypothesis was "there is no significant difference of plot price with the change of orientation of the plots" and alternate hypothesis was "there is significant difference of plot price with the change of orientation of the plots". If the result of the ANOVA test shows the significance value is less than .05, it means the null hypothesis would be rejected and alternate hypothesis would be accepted. Table: 6.12 shows the output of the ANOVA analysis and whether there is a statistically significant difference between the group means.

Table 6.12: Significance of Plot Orientations on Plot Prices in Malum City

Groups	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	582.886	4	145.721	2.935	**.021**
Within Groups	11963.583	241	49.641		
Total	12546.468	245			

Source: Based on data collected from the project office of Malum City

From the results (Table: 6.12), the significance value is 0.021 (i.e., p = .021), which is below 0.05. Thus the null hypothesis (there is no significant difference of plot price with the change of orientation of the plots) is rejected. And, therefore, there is a statistically significant difference in the plot price between the different orientations in Malum City.

Multiple comparisons of the significance of plot orientation on plot price have been done in Table: 6.13. Table: 6.13 has given some very useful descriptive statistics, including the mean, standard deviation and 95% confidence intervals for the dependent variable (Plot price) for each separate orientation (North, South, East, West and Corner plot), as well as when all groups are combined (Total). Table: 6.13, Multiple Comparisons, shows which groups differed from each other.

According to Table: 6.13, it has been noticed that, the significance values between the corner plot group with north oriented plot is below 0.05, which indicates there is differences in plot prices in this group.

Table 6.13: Multiple Comparisons of Influence of Plot Orientations on Plot Prices in Malum City

(I) Orientation of the plots	(J) Orientation of the plots	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
West	East	-.91270	3.55068	.999	-10.6719	8.8465
	North	3.95737	2.76141	.607	-3.6325	11.5472
	South	1.68169	2.75202	.973	-5.8823	9.2457
	Corner plot	.12080	2.92432	1.000	-7.9168	8.1584
East	West	.91270	3.55068	.999	-8.8465	10.6719
	North	4.87007	2.45957	.279	-1.8902	11.6303
	South	2.59439	2.44901	.827	-4.1368	9.3256
	Corner plot	1.03350	2.64117	.995	-6.2259	8.2929
North	West	-3.95737	2.76141	.607	-11.5472	3.6325
	East	-4.87007	2.45957	.279	-11.6303	1.8902
	South	-2.27568	1.00784	.162	-5.0458	.4944
	Corner plot	-3.83657	1.41203	**.054**	-7.7176	.0444
South	West	-1.68169	2.75202	.973	-9.2457	5.8823
	East	-2.59439	2.44901	.827	-9.3256	4.1368
	North	2.27568	1.00784	.162	-.4944	5.0458
	Corner plot	-1.56089	1.39356	.796	-5.3911	2.2694
Corner plot	West	-.12080	2.92432	1.000	-8.1584	7.9168
	East	-1.03350	2.64117	.995	-8.2929	6.2259
	North	3.83657	1.41203	**.054**	-.0444	7.7176
	South	1.56089	1.39356	.796	-2.2694	5.3911

Source: Based on data collected from the project office of Malum City

Dependent Variable: Plot price in lakh per Katha

Tukey HSD

Table: 6.13 has explained that, there is a statistically significant difference in plot price between the plots that are in north orientation and the corner plot (p = 0.05). However, there were no differences between the groups of other orientations. Thus, there was a statistically significant difference between groups was determined by one-way ANOVA (F (4, 241) = 2.935, p = .021). The Tukey post hoc test is generally the preferred test for conducting post hoc tests on a one-way ANOVA which have been conducted to identify the specific orientation of plot which dominates the price of plots more compared to others. A Tukey post hoc test revealed that the north faced plot price [from Table-5.4]; (39.44 ± 6.97, p = 0.05) was statistically significantly lower than corner plot [from Table-5.4]; (43.27 ± 8.89, p = .05). There was no statistically significant difference between other orientations in Malum City.

6.4 Influence of Physical and Environmental Attributes over Plot Price:

The physical and environmental attributes have different degrees of influence on the residential plot price of private real estate projects in Dhaka. This chapter has been composed to mark out the influencing physical and environmental attributes on the plot prices of residential projects for the study sites of his research. Linear Regression analyses have been experimented with to find out the influence of the physical and environmental attributes on the price of the plots. From the value achieved from the linear regression analysis the influential physical and environmental attributes for the projects; Shornali Abashon, Sun-valley Abashon and Malum City have been delineated below.

6.4.1 Influential physical and environmental attributes over plot prices in Shornali Abashon:

The linear regression analysis has been done to find out the influential environmental and physical attributes for Shornali Abashon where the plot price per *Katha* has been considered as dependent variables and others are independent variables as described as environmental and physical attributes in Table-6.1. The independent variables are the width of the access road, distance from the lake, distance from the park or green open space, distance from the market or shopping centre, distance from the playground, distance from the nearest primary or secondary school. From liner regression analysis the model summary for Shornali Abashon has been found (Table: 6.14).

Table 6.14: Regression Model Summary for Shornali Abashon

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.924[a]	.854	.850	3.53106
a. Predictors: (Constant), the width of the access road, distance from the lake, distance from the park or green open space, distance from the market/ shopping, distance from the playground, distance from the nearest primary/ secondary school.				

Source: Based on data collected from the project office of Shornali Abashon

From the R^2 value (Table: 6.14), it has been found that about 85.4% of the variance in plot price can be predicted from the variables width of the access road, distance from the lake, distance from the park or green open space, distance from the market or shopping, distance from the playground, distance from the nearest primary or secondary school in Shornali Abashon.

It was found that the price of the residential plots of Shornali Abashon was very specific with the amenities attached to the plots. The price of the residential plots varies with the

changes in the quantity of the environment and physical attributes. Consequently, the R^2 value is comparatively higher for the study project Shornali Abashon. Simultaneously from the output of linear regression analysis the Table: 6.15 has shown the influential attributes of Shornali Abashon for pricing per *Katha* of the plots.

Table 6.15: Influential Physical and Environmental Attributes on Plot Prices in Shornali Abashon

Physical and Environmental Variables	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	52.623	1.083	-	.000
Width of the access road	**.095**	**.007**	**.364**	**.000**
Distance from the lake	**-.019**	**.002**	**-.368**	**.000**
Distance from the park or green open space	-.008	.002	-.138	.000
Distance from market or shopping	.007	.001	.229	.000
Distance from the playground	-.007	.001	-.193	.000
Distance from the nearest primary or secondary school	**-.010**	**.001**	**-.253**	**.000**

Source: Based on data collected from the project office of Shornali Abashon

The positive coefficient has indicated that the price of residential plots increases with the increase of the value of attributes. Therefore the negative coefficient has indicated that the price of residential plots increases with the decrease of the value of attributes. From Table: 6.15, it has been found that, the most significant variable is "width of the access road", the second most significant variable is "distance from the lake" as well as the third most significant variable is "Distance from the nearest primary or secondary school". Thus, these three variables have the most influence on land price for the site Shornali Abashon.

6.4.2 Influential physical and environmental attributes over plot prices in Sun-valley Abashon:

In Sun-valley Abashon the plot price per *Katha* has been considered as the dependent variable. The environmental and physical attributes which have been described in the previous section (Table-6.3) are the independent variables. The independent variable is the width of the access road, distance from the river, distance from the park or green open space, distance from the market or shopping, distance from the playground, distance from

the nearest primary or secondary school. From liner regression analysis the model summary for Sun-valley Abashon has been found (Table: 6.16).

Table 6.16: Regression Model Summary for Sun-valley Abashon

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.808[a]	.653	.644	8.16061
a. Predictors: (Constant), the width of the access road, distance to the river, distance to park or green open space, distance to market or shopping, distance to playground, distance to nearest primary or secondary school.				

Source: Based on data collected from the project office of Sun-valley Abashon

From the R^2 value (Table: 6.16), it has been found that about 65.3% of the variance in plot price can be predicted from the variables width of the access road, distance from the lake, distance from the park or green open space, distance from the market or shopping, distance from the playground, distance from the nearest primary or secondary school in Sun-valley Abashon. From the output of linear regression analysis, the Table: 6.17 has shown the influential attributes of Sun-valley Abashon for pricing per *Katha* of the plots. The positive coefficient has indicated that the price of residential plots increases with the increase of the value of attributes. Therefore the negative coefficient has indicated that the price of residential plots increases with the decrease of the value of attributes.

Table 6.17: Influential Physical and Environmental Attributes on Plot Prices in Sun-valley Abashon

Physical and Environmental Variables	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	41.279	1.366		.000
Width of the access road	**.275**	**.031**	**.353**	**.000**
Distance from the river	-.011	.002	-.348	.000
Distance from the park or green open space	-.017	.004	-.293	.000
Distance from the market or shopping	.009	.001	.290	.000
Distance from the playground	**.038**	**.006**	**.553**	**.000**
Distance from the nearest primary or secondary school	**-.039**	**.007**	**-.546**	**.000**

Source: Based on data collected from the project office of Sun-valley Abashon

From the Table: 6.17, it has been found that, the most significant variable is “Width of the access road”, the second most significant variable is “Distance from the nearest

primary or secondary school" and the third most significant variable is "Distance from the playground". These three variables attributes have the most significance on land price for the site Sun-valley.

6.4.3 Influential physical and environmental attributes over plot prices in Malum City:

In Malum City the plot price per *Katha* has been considered as dependent variables and others are independent variables that have been considered as described in the Table-6.5. The independent variable is the width of the access road, distance from the river, distance from the lake, distance from the park or green open space, distance from the market or shopping, distance from the playground, distance from the nearest primary or secondary school. From liner regression analysis the model summary for Malum City has been found (Table: 6.18).

Table 6.18: Regression Model Summary for Malum City

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.981[a]	.963	.962	2.80117
a. Predictors: (Constant), the width of the access road, distance to the river, distance to the lake, distance to park or green open space, distance to market or shopping, distance to playground, distance to nearest primary or secondary school.				

Source: Based on data collected from the project office of Malum City

It was found that the price of the residential plots was very specific with the amenities attached to the plots. The price of the residential plots varies with the changes in the quantity of the environment and physical attributes. Consequently, the R^2 value is comparatively higher for the study project Malum City also. From the R^2 value (Table: 6.18), it has been found that about 96.3% of the variance in plot price can be predicted from the variables width of the access road, distance from the lake, distance from the park or green open space, distance from the market or shopping, distance from the playground, distance from the nearest primary or secondary school in Malum City.

From the output of linear regression analysis, the Table: 6.19 has shown the influential attributes of Malum City for pricing per *Katha* of the plots. The positive coefficient has indicated that the price of residential plots increases with the increase of the value of attributes. Therefore the negative coefficient has indicated that the price of residential plots increases with the decrease of the value of attributes.

Table 6.19: Influential Physical and Environmental Attributes on Plot Prices in Malum City

Physical and Environmental Variables	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	53.457	.476	-	0.000
Width of the access road	**.091**	**.008**	**.171**	**0.000**
Distance from the river	**-.013**	**.001**	**-.318**	**0.000**
Distance from the lake	-.011	.001	-.259	0.000
Distance from the park or green open space	-.009	.002	-.130	0.000
Distance from the market or shopping	-.009	.001	-.157	0.000
Distance from the playground	-.009	.003	-.164	0.002
Distance from the nearest primary or secondary school	**-.019**	**.003**	**-.372**	**0.000**

Source: Based on data collected from the project office of Malum City

From Table: 6.19, it has been found that the most significant variable is "width of the access road", the second most significant variable is "distance from the primary or secondary school" and the third most significant variable is "Distance from the river". These three variables have the most significance on land price for the site Malum City.

6.5 Influential Physical and Environmental Attributes among all Study Projects:

In this part regression analysis has been performed among all the private residential projects (Shornali Abashon, Sun-valley Abashon and Malum City together) to find out the overall significance level (coefficient value of environmental and physical attributes) and influential attributes on the residential plot prices. From liner regression analysis the model summary has been found (Table: 6.20).

Table 6.20: Regression Model Summary of Private Residential Projects

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	**.981[a]**	**.963**	**.962**	1.40059

a. Predictors: (Constant), the width of the access road, distance from the river, distance from the lake, distance from the park or green open space, distance from the market/ shopping, distance from the playground, distance from the nearest primary/ secondary school.

Source: Based on data collected from the project office of Shornali Abashon, Sun-valley Abashon and Malum City

From the R^2 value (Table: 6.20), it has been found that about 96.3% of the variance in plot price can be predicted from the variables like distance from the lake, distance from the park or green open space, width of the access road, distance from the market or shopping centres, distance from the nearest primary or secondary school, distance from the river and distance from the playground.

In Table: 6.21 the p-value (0.000) is below 0.05, it can be said that the independent variables reliably predict the dependent variables. Thus, the group of variables mentioned above can be used to reliably predict the plot price (the dependent variable). This is an overall significance test assessing whether the group of independent variables when used together reliably predict the dependent variable, and does not address the ability of any of the particular independent variables to predict the dependent variable.

Table 6.21: Significance of Physical and Environmental Attribute on Plot Price in Private Residential Projects

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	**48318.393**	**7**	**6902.628**	**879.701**	**.000[b]**
	Residual	1867.481	238	7.847		
	Total	50185.874	245			
a. Dependent Variable: Plot price in *lakh per Katha*						
b. Predictors: (Constant), distance from the lake, distance from the park or green open space, width of the access road, distance from the market/shopping, distance from the nearest primary/secondary school, distance from the river, distance from the playground						

Source: Based on data collected from the project office of Shornali Abashon, Sun-valley Abashon and Malum City

The ability of each independent variable to predict the dependent variable is addressed in the table below (Table: 6.22) below where all of the individual variables are listed.

Table 6.22: Influential Physical and Environmental Attributes of Private Residential Projects on Plot Price

Physical and Environmental Variables	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	53.457	.476	-	.000
Width of the access road	**.091**	**.008**	**.171**	**.000**
Distance to River	**-.013**	**.001**	**-.318**	**.000**
Distance to Park or Green open space	-.009	.002	-.130	.000

Physical and Environmental Variables	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
Distance to Market or shopping	-.009	.001	-.157	.000
Distance to Playground	-.009	.003	-.164	.002
Distance to nearest Primary or Secondary school	**-.019**	**.003**	**-.372**	**.000**
Distance to Lake	**-.011**	**.001**	**-.259**	**.000**

Source: Based on data collected from the project office of Shornali Abashon, Sun-valley Abashon and Malum City

These estimations have explained the relationship between the independent variables and the dependent variable. Also, these have indicated the amount of increase in plot price that would be predicted by a 1-unit increase in the predictor. The coefficient value of the independent variables (environmental and physical attributes) indicated the association between plot prices and attributes. The coefficient value for the width of the access road indicated that the price of the residential plots grow with the increase of the width of the access road. Besides the negative value of the coefficient indicated that the price of the residential plots increases with the decrease of the value of attributes (distance from the lake, distance from the park or green open space, distance from the market or shopping centres, distance from the nearest primary or secondary school, distance from the river and distance from the playground) (Table: 6.22). From the table above, it can be seen that the width of the access road is the most prominent variable. In addition to that, distance from the nearest primary/ secondary school, distance from the river, and distance from the lake are other prominent variables that also influence the land price (Table: 6.22).

6.6 Conclusion:

From the Pearson correlation analysis, it has been found for Shornali Abashon that there was a very strong or high relationship between the distance of the river and the price of the residential plots. There was a weak or low relationship between the residential plot price and the width of the access road. Others attributes have a moderate relationship with the price of the residential plots in Shornali Abashon (Table: 6.2). In this analysis, it has been found that the price of the residential plots has a moderate relationship with the distance from the river and the distance from the park or green open spaces in Sun-valley Abashon. The relationship between the plot price and others variables were found low or weak for the Sun-valley Abashon (Table: 6.4). For Malum city, it has been found that the

price of the residential plots has a strong or high relationship with distance from the river, distance from park or green open spaces, distance from playground and distance from nearest primary or secondary school. The price of the residential plots has a moderate relationship with distance from the market or shopping. Others attributes have a moderate relationship with the price of the residential plots in Malum City (Table: 6.6).

The ANOVA (Tukey HSD) analysis showed whether the orientation of the plots has any statistically significant influence over the plot price. In Shornali Abashon, it has been found that the north faced plot price had been statistically significantly lower than East orientated plots, West oriented plots and corner plots. Moreover, corner plots price had been statistically significantly higher than the north faced and south faced plots in Shornali Abashon (Table: 6.10). For Sun-valley Abashon there has not been found a statistically significant difference in the plot price between the different orientations (Table: 6.11). Form Malum City, it has been found that that the north faced plot price was statistically significantly lower than the corner plot. There was no statistically significant difference between other orientations (Table: 6.13).

In addition to that, regression analysis showed which attributes have the most influence on the land price. For Shornali Abashon, the most influential attributes are “width of the access road”, “distance from the lake” and “distance from nearest primary or secondary school” compared to other attributes (Table: 6.15). The most influential attributes in Sun-valley Abashon are “width of the access road”, “distance from nearest primary or secondary school”, “Distance from the playground” and “distance from the river” compared to other attributes (Table: 6.17). In Malum City the most influential attributes have been found; “width of the access road”, “distance from the primary or secondary school”, “Distance from the river” and “Distance from the lake” have more influence on residential plot price compared to others attributes (Table: 6.19).

Moreover, regression analysis among all study projects has indicated that the width of the access road influences the residential plot price most compared to other physical and environmental attributes. It has also been found that the distance to the river, distance to nearest primary or secondary school as well as distance to the lake have a remarkable influence on residential plot price compared to other physical and environmental attributes in Shornali Abashon, Sun-valley Abashon as well as Malum City.

Thus the environmental elements and physical amenities influence the plot price of the private residential projects. The following chapter has presented the plot price in public residential projects and the process of price fixation. The following chapter has also described that how the environmental and physical attributes can also influence the plot price of public residential projects in the DMDP area.

CHAPTER 07
LAND PRICE VARIATIONS IN PUBLIC RESIDENTIAL PROJECTS

7.1 Introduction:

This chapter is organized to describe the price of the residential plots with the physical and environmental attributes as well as plot price fixation procedure in a public residential project in the DMDP area. Moreover, this chapter has described the prospects of plot price variation in public residential projects with the change of the physical and environmental attributes as it has been found that these attributes influence and make a variation in plot prices in private residential projects.

It has been found from the analysis performed in the previous chapter (chapter 5 and chapter 6) that physical and environmental attributes are associated with the price of the residential plots as well as these attributes have influenced the plot price in real estate projects (Shornali Abashon, Sun-valley Abashon & Malum City). However, it has also been noticed that the public residential project, Sector-15 of Purbachal New Township Projects has no significant variations in the sale price of residential plots, though this project has been provided with sufficient environmental elements and physical amenities.

In this circumstance, the environmental and physical attributes which are provided in this project are explained first. Afterwards, this chapter has explained the plot price as well as the price fixation process of the residential plots in Sector-15 of Purbachal New Township Projects. Furthermore, this chapter has explained how the price of the residential plots of Sector-15 of RAJUK Purbachal New Township Projects can be increased if the value of the environmental and physical attributes are considered in the price fixation process. Consequently, it has made the proper justification of distributing residential plots with justified price among the user group based on provided environmental and physical attributes to avoid malpractice in plot allocation procedures in public residential projects.

7.2 Sector-15 of RAJUK Purbachal New Township Projects:

Sector-15 (Figure: 4.6) is one of the attractive sectors of RAJUK Purbachal New Township Projects situated in the eastern part DMDP area (Figure: 4.5). This sector

consists, 540 numbers of residential and 60 numbers of commercial plots with various types of environmental elements and physical amenities (Figure: 7.1).

Figure 7.1: Project Area, Sector-15 of RAJUK Purbachal New Township Projects
Source: RAJUK Office and Google Earth

There are adequate green and open spaces with parks, playgrounds, etc. in this sector. There is a natural lake that has enriched the residential quality in Sector-15 of RAJUK Purbachal New Township Projects. Most of the plots are placed in north and south orientation in this sector for getting maximum climatic benefits. There are also physical attributes such as market, hospital, clinic, educational institutions such as primary or secondary schools etc. The maximum road width is 100 feet and the minimum road width is 30 feet in Sector-15 of RAJUK Purbachal New Township Projects (Table: 7.2).

Sector-15 of RAJUK Purbachal New Township Projects has distributed its land for different functions. Though the maximum land has been dedicated for residential plots

and roads. The following Table: 7.1 has shown the distribution of land for different functions in Sector-15 of RAJUK Purbachal New Township Projects.

Table 7.1: Distribution of Land in Sector-15 of Purbachal New Township Project

Category	Percentage of Land (%)
Residential	38.74
Road	25
Administrative & Commercial	6.41
Institutions	3.2
Green and Open Spaces	6.6
Lake & Canals	7.1
Sports and Playground	2.5
Education	6.9
Others Services	3.55
Total	**100**

Source: Based on data collected from the RAJUK

The maximum number of plots are beside 30 feet wide road and a minimum number of plots are besides 100 feet wide road. The width of the roads does not have any association with the price of the residential land as it has been found that the price of the residential plots flat in Sector-15 of Purbachal New Township Projects (Table: 7.2).

Table 7.2: Plots with Road Width in Sector-15 of Purbachal New Township Project

Adjacent Road Width (Feet)	Number of Plots	Percentage of Plots (%)	Plot Price (*Lakh/ Katha*)
100	40	7.4 %	**Plot prices are similar for all residential plots**
75	**105**	**19.4 %**	
54	91	16.85 %	
44	50	9.2 %	
40	49	9.0 %	
30	**205**	**37.9 %**	
Total	**540**	**100 %**	

Source: Based on data collected from the RAJUK

As is mentioned, maximum plots of Sector-15 of Purbachal New Township Projects are north and south oriented. However, the orientation of the residential plot does not have

an influence on the residential land price of Sector-15 of Purbachal New Township Projects as these plots are being given to the clients with a flat rate for all kinds of plots in this project. Table: 7.3 has presented the numbers of plots according to the orientation of the residential plots in Sector-15 of Purbachal New Township Projects.

Table 7.3: Plots with Orientation in Sector-15 of Purbachal New Township Project

Plot Orientation	Number of Plots	Percentage of Plots (%)	Plot Price (*Lakh/ Katha*)
East	74	13.7 %	**Plot prices are similar for all residential plots**
West	72	13.3 %	
North	**156**	**28.8 %**	
South	**158**	**29.4 %**	
Corner	80	14.8 %	
Total	**540**	**100 %**	

Source: Based on data collected from the RAJUK

However, RAJUK has planned to develop the area as a complete new township with all modern facilities and physical as well as environmental amenities, which have no impact on plot prices in sector-15 of Purbachal New Township Projects because all of the plots are distributed at the same prices among the selected populations.

7.3 Plot price in Sector-15, RAJUK Purbachal New Township Projects:

Distribution of Land in Sector-15 of RAJUK Purbachal New Township Projects does not have any intention to get economic benefits rather it is targeted to accommodate the maximum number of populations with all kinds of environmental and physical facilities. The value of physical amenities and environmental elements have not been considered in the fixation of plot price (*lakh* per *Katha*) in Sector-15. Therefore, these attributes did not influence the price of the residential plots in these public residential projects. Only the increase of project development budget with the phase of time (1st phase to 2nd phase) had caused the increase of plot price accordingly for all plots of that phase. The plots were distributed by lottery among specific groups of citizens (e.g. public representatives, government service holders, ethnic and social deprived peoples).

According to the RAJUK, the price (*lakh* per *Katha*) of the plots were fixed at 3 *lakhs* in the first phase of the project development when the total project cost was BDT 3312

Crores (33.12 Billion). The project development budget increased to BDT 7742 Crores (77.42 Billion) in the second phase of the project development. Consequently, the price of the plot was fixed at 5 *lakh* per *Katha* in the second phase in Sector-15 of RAJUK Purbachal New Township Projects (RAJUK, 2019; RAJUK 2020).

However, the RAJUK has designed this project by providing adequate environmental elements and physical amenities. This chapter of the research has also investigated the prospects of the association of physical amenities and environmental elements with the plot price of public residential projects. The following analysis parts of this chapter have explained how the environmental and physical attributes can contribute to making variations in plot prices in public residential projects also.

7.4 Plot Price Variations Considering Physical and Environmental Attributes in Public Residential Projects:

The environmental elements and physical amenities are not considered to define the plot price of public residential projects in Dhaka. However, it has been found in analysis chapter (Chapter: 5 and 6) the environmental and physical attributes have contributed to making land price variations in real estate projects of Dhaka. This section has explained how the environmental and physical attributes can make plot price variation in public residential projects also (i.e. Sector-15, RAJUK Purbachal New Township Projects).

From Sector-15 of RAJUK Purbachal New Township Projects, two plots; plot number: 15-302E-007 (Figure: 7.2) and plot number: 15-403C-007 (Figure: 7.3) have been taken as samples to explain the prospects of plot price variations in public residential projects. These two plots are situated in separated places in Sector-15 of RAJUK Purbachal New Township Projects with different environmental elements and physical amenities. Moreover, the multiple regression land value model was used to find out the price of the land in several empirical research. This model is used to find out the land value (i.e. dependent variables) by considering the independent variables (i.e. physical and environmental attributes) and the coefficient value of the physical as well as environmental attributes. The coefficient value of physical and environmental attributes indicates the influence of these attributes on the residential land price. The prices of the plots vary for different values of environmental and physical attributes (Zheng, 2003; Ping Ai, 2005). The multiple regression land value model to determine the price of the residential plots has been described below in this section.

- **Multiple regression land value model:**

$$\mathbf{Y_{predicted} = X_0 + B_1*X_1 + B_2*X_2 + B_3*X_3 + B_4*X_4 + B_5*X_5 + B_6*X_6 + \ldots\ldots\ldots\ldots\ldots\ldots}$$

Where, the dependent variable is,

- $Y_{predicted}$ = Plot price

And the independent variables are,

- X_0 = Constant
- X_1 = Width of the access road
- X_2 = Distance to park or green open space
- X_3 = Distance to market or shopping
- X_4= Distance to the playground
- X_5= Distance to the nearest school
- X_6= Distance to Lake

Moreover, the coefficient value of independent variables (i.e. physical amenities and environmental elements) are,

- B_1 = Coefficient value for the width of the access road
- B_2 = Coefficient value for distance to park or green open space
- B_3 = Coefficient value for distance to market or shopping
- B_4= Coefficient value for distance to playground
- B_5= Coefficient value for distance to the nearest school
- B_6= Coefficient value for the distance from the lake

(Eckert, 1990; Zheng, 2003; Ping Ai, 2005).

By using the equation above, the plot price in the private residential projects could be predicted by considering the value of physical and environmental attributes as well as the coefficient values obtained from the regression analysis among all private residential projects (Table: 6.22). These values are applicable for similar projects in a similar location to determine the price of residential plots while using the multiple regression land value model.

- **Plot number: 15-302E-007 and Plot number: 15-403C-007:**

Plot number: 15-302E-007 (Figure: 7.2) is comparatively closer to the environmental elements and has better physical amenities than the plot number: 15-403C-007 (Figure: 7.3) in Sector-15 of RAJUK Purbachal New Township Projects. In these plots, the physical amenities and environmental elements are considered independent variables and the price of the residential plots are taken as dependent variables.

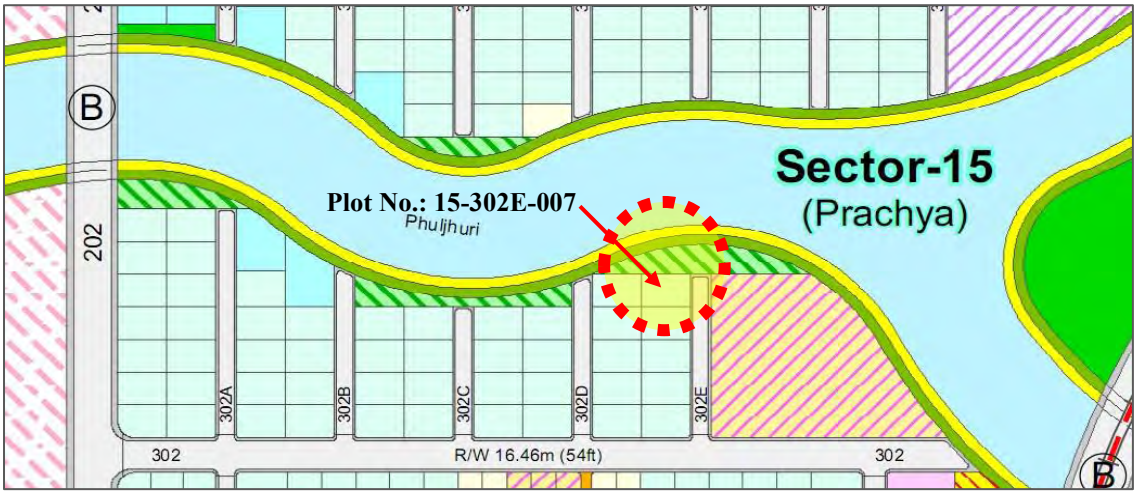

Figure 7.2: Sample Plot (Plot No: 15-302E-007) of Sector-15

Source: RAJUK Office

Figure 7.3: Sample Plot (Plot No: 15-403C-007) of Sector-15

Source: RAJUK Office

The values of the independent variables (physical and environmental attributes) have been measured from the digitized maps using GIS. These values are compiled in the following table (Table: 7.4).

Table 7.4: Independent Variables of Plot number: 15-302E-007 and 15-403C-007

Independent Variables		Plot number: 15-302E-007	Plot number: 15-403C-007
X_1	Width of the access road	30 feet	30 feet
X_2	Distance to park or green open space	0.00 meter	250 meter
X_3	Distance to market or shopping	300 meter	380 meter
X_4	Distance to playground	8 meter	35 meter
X_5	Distance to the nearest school	8 meter	35 meter
X_6	Distance to lake	12 meter	280 meter

Source: Based on data collected from RAJUK

Table: 7.4 in above has displayed the value of different environmental and physical attributes of plot number: 15-302E-007 and 15-403C-007 in Sector-15 of RAJUK Purbachal New Township Projects. It has been found in the analysis of private residential projects in chapter number 6 that, these values could influence the land price in the multiple regression land value model.

The multiple regression land value model has indicated that if the value of environmental and physical attributes as well as the coefficient value of physical and environmental attributes of Sector-15 of RAJUK Purbachal New Township Projects are considered in price calculation procedure, the price of the plots will be increased or decreased in public residential projects also. Moreover, the environmental and physical attributes of plot number: 15-302E-007 is better than plot number: 15-403C-007. Consequently, it indicates that, the price of plot number: 15-302E-007 will be higher than the plot number: 15-403C-007. Thus this analysis has explained the prospects of land price variations in Public residential projects within the site of the projects also.

7.5 Conclusion:

The public residential projects are designed with adequate environmental elements and physical amenities. The public agencies do not consider these environmental and physical attributes to fix the price of the residential plots. Consequently, there is no variation in plot prices of public residential projects. This chapter has explained that these environmental and physical amenities can also contribute to making the variation in the residential plot price in public residential projects by considering the environmental and physical attributes. Thus this can ensure justification of residential plot pricing in public residential projects. Furthermore, it can help to avoid malpractice in plot allocation procedures in public residential projects in Dhaka city.

CHAPTER 08
MAJOR FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

8.1 Introduction:

The research has studied the land price of private residential projects; explored the association of environmental elements and physical amenities with residential land price as well as the influence of these amenities on land price within the site of the residential projects in Dhaka. Moreover, this research has also explained the land variation in public residential projects by comparing it with private residential projects based on provided environmental elements and physical amenities. This chapter has been organized, to sum up, the analysis and provide potential findings as well as recommendations from the findings. Finally, the research has been ended up the conclusion by providing the directions to future research.

8.2 Major Findings of the Research:

Three private residential projects from the real estate companies (i.e. Shornali Abashon, Sun-valley Abashon and Malum City) have been studied in this research. The analysis of this research has found a wide range of land price variations due to variation of physical amenities and environmental elements within the site of these private residential projects in Dhaka (Chapter-5). The association and the influence of physical as well as environmental attributes on residential plot prices have also been determined from the analysis of the research (Chapter-6). Also, the analysis of this study has indicated that the physical amenities and environmental elements can make variations in residential plot prices of public residential projects of Dhaka (Chapter-7).

It has been found that these real-estate companies focused their target on the economical justifications of providing the physical and environmental attributes in their residential projects and the sale prices of residential plots were significantly associated and dependent on the provided physical amenities as well as environmental elements within the site of the projects. The sale price of the residential plots attached or closer to the river or lake was higher than the others plots. The basic services as primary or secondary schools, markets or shopping centres have also increased the sale price of residential plots of Shornali Abashon, Sun-valley Abashon and Malum City. Plots with wide adjacent roads were sold at higher prices than other plots in these private residential projects. It

has been also observed that the park and playground also made variations in plot prices of Shornali Abashon, Sun-valley Abashon and Malum City. Same plots having the same environmental and physical amenities but with different orientations caused variations in plot prices. Usually, corner plots were found at higher prices than the other orientations.

The various physical amenities and environmental elements have made different combinations among themselves or between together in Shornali Abashon, Sun-valley Abashon and Malum City. It has been observed from the research that, the combinations of provided environmental and physical attributes made a wide range of sale price categories. The better combination of environmental and physical amenities provided higher sale prices. The table below (Table: 8.1) has been prepared from the findings of the research to describe the influential attributes on the price of residential plots in private residential projects.

Table 8.1: Most Influential Attributes on Residential Land Price

Private Projects	Influential Physical Attributes	Influential Environmental Attributes
Shornali Abashon	▪ Width of the access road ▪ Distance from the nearest primary School ▪ Distance from the market or Shopping	▪ Distance from the lake ▪ Corner plot ▪ Distance from the park or green open space ▪ Distance from the playground
Sun-valley Abashon	▪ Width of the access road ▪ Distance from the nearest primary or secondary school	▪ Distance from the playground ▪ Distance from the river ▪ Distance from the park or green open space
Malum City	▪ Width of the access road ▪ Distance from the nearest primary or secondary school ▪ Distance from the market or shopping	▪ Distance from the river ▪ Distance from the lake ▪ Corner plot ▪ Distance from the playground ▪ Distance from the park or green open space

Source: Based on the analysis in (Table: 6.2, 6.4, 6.6, 6.7, 6.10, 6.13, 6.17, 6.19, and 6.21)

It is already mentioned that, Sector-15 of RAJUK Purbachal New Township Projects has been studied as public residential projects in this research. It has been found that the Purbachal New Township projects have been designed with a lot of environmental elements and physical amenities (Table: 7.1). There are wide roads around the project

(Table: 7.2). The project has also a natural lake, canals, park, playground, educational institutions, market and others services. These environmental and physical attributes have no influence on the residential land price in Sector-15 of RAJUK Purbachal New Township Projects because of the land pricing system of the RAJUK. The residential plots have been given at the same price for all types of residential plots to the specific user groups by the RAJUK. There are no variations in residential land prices in public residential projects of Dhaka for environmental elements and physical amenities. However, it has been observed from the analysis that, environmental elements and physical amenities are significantly associated with the price of the residential plots in private residential projects of Dhaka. Also, this research has explained that the residential plot prices of public agencies can also be influenced by the provided environmental elements and physical amenities if these attributes have been considered in the price fixation process in public residential projects.

8.3 Recommendations of the Research:

The findings of this research have included some important recommendations both for the real estate companies and public agencies which are operating residential projects in the DMDP area of Dhaka. This research has also recommended the development and policy-making authorities as these agencies play important role in the operation of residential projects in the DMDP area.

This research has recommended that private real estate companies provide better physical amenities and environmental elements in their residential projects as well as calculate and get the economic benefits of the services and amenities through the pricing of land.

The public agencies do not have the intention of economical profit while they operate residential projects. It has been found that residential plots are given a flat price for all types of plots in public real estate projects though, each plot is attached to different kinds of environmental and physical attributes. This research recommends that public agencies to incorporate the physical and environmental amenities in public residential projects and include the value of these environmental and physical attributes in the pricing of the residential plots which can ensure justification in residential plot pricing. Furthermore, it can help to avoid malpractice in plot allocation procedures in public residential projects. This research has recommended the development authority (RAJUK, City Corporation, REHAB) and policy-making agencies to incorporate the association of environmental

elements and physical amenities on land price in residential land development policy as this will be beneficial both for the public agencies and real estate companies. In addition, this research recommends the client or user groups be focused on the land price variations with the changes of provided environmental elements and physical amenities. This will be helpful for the client to make self-justification to select their residential land.

8.3 Conclusion:

This research has investigated price variations of residential plots and the reasons behind the variation of plot prices in private and public residential projects in Dhaka. The physical amenities and environmental elements are significantly associated with the price of residential plots of real estate companies in Dhaka. These physical amenities and environmental elements can also add value to the residential land of public residential projects in Dhaka. Thus this research has given justification for providing physical amenities and environmental elements both for the residential projects of public agencies and real estate companies in Dhaka. This study has added a new dimension in academic experiments also. Future researchers can be inspired to focus their research on various research topics in this field. There are so many opportunities for further research in this field such as research on built environmental quality, conservation of environmental and topographical elements in residential projects etc.

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APPENDICES A
LIST OF PLOT PRICE

N.B.

1. Plot price is in *lakh* per *katha*
2. Access road width is in feet
3. Plot orientation-
    a. 1= West
    b. 2= East
    c. 3= North
    d. 4= South
    e. 5= Corner plot
4. Distance from river, lake, park, and market, play-ground and nearby school is in meter.

A-1. Plot Prices of Shornali Abashon:

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
1	41.25	30	5	310	290	9	387	240
2	35.75	30	4	417	408	9	600	457
3	35.75	30	4	453	444	9	636	493
4	35.75	30	4	488	479	24	671	528
5	35.75	30	4	524	514	70	706	563
6	38.5	25	5	415	550	30	527	407
7	33	25	3	485	510	100	545	455
8	33	25	3	530	465	145	500	500
9	33	25	3	575	420	190	455	545
10	33	25	3	620	375	150	410	495
11	35.75	25	4	464	519	79	494	389
12	35.75	25	4	519	574	134	549	444
13	35.75	25	4	574	629	189	604	499
14	38.5	25	5	625	326	170	357	445
15	33	25	3	555	445	150	508	349
16	33	25	3	610	390	205	411	404
17	35.75	25	4	665	335	258	356	459
18	41.25	30	5	425	368	126	280	165
19	35.75	25	4	530	431	157	462	358
20	35.75	25	4	585	376	204	407	538
21	35.75	25	4	640	321	251	352	427
22	38.5	25	5	689	265	286	300	388

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
23	35.75	25	3	582	388	206	419	506
24	35.75	25	3	629	341	159	372	459
25	35.75	25	3	676	294	112	325	412
26	41.25	25	5	550	390	174	422	250
27	38.5	25	4	579	375	204	410	350
28	38.5	25	4	634	286	259	320	406
29	46.75	40	5	575	340	200	366	240
30	44	40	4	688	280	316	315	300
31	44	40	4	724	227	352	255	348
32	46.75	60	5	220	200	178	234	160
33	44	60	4	305	297	240	325	270
34	44	40	4	372	300	256	333	267
35	44	40	4	432	250	308	278	327
36	44	40	4	485	193	362	224	311
37	38.5	25	3	210	190	245	222	167
38	38.5	25	3	265	245	300	277	222
39	38.5	25	3	320	223	355	257	277
40	38.5	25	3	375	168	410	202	287
41	44	25	5	430	117	448	150	238
42	41.25	25	3	378	155	245	186	274
43	44	25	4	267	245	288	278	224
44	44	25	4	319	219	335	247	266
45	44	25	4	360	172	393	200	288
46	44	25	4	409	120	440	155	242
47	46.75	25	3	180	151	366	183	129
48	46.75	25	3	222	192	323	227	173
49	46.75	25	3	264	179	365	209	217
50	46.75	25	3	313	132	525	175	263
51	46.75	25	3	335	93	467	124	212
52	52.25	25	5	113	94	354	125	71
53	49.5	25	4	183	162	314	260	151
54	49.5	25	4	228	208	346	241	187
55	49.5	25	4	278	143	501	179	268
56	46.75	25	3	320	96	451	124	211
57	57.75	25	5	91	75	396	83	28
58	55	25	3	133	112	356	37	9
59	55	25	3	184	79	494	8	11
60	55	25	3	235	34	585	8	55

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
61	55	25	3	280	7	540	14	100
62	56.65	40	5	30	13	408	54	0
63	55	25	4	100	85	571	21	8
64	55	25	4	172	42	634	8	46
65	58.85	25	5	34	12	560	167	112
66	53.35	25	3	97	78	557	210	176
67	53.35	25	3	165	58	696	88	175
68	55	25	4	55	35	514	167	114
69	55	25	4	121	100	574	227	175
70	58.85	25	5	33	16	637	227	173
71	53.35	25	3	106	96	633	306	253
72	53.35	25	3	170	154	782	370	316
73	55	25	4	42	33	671	300	240
74	55	25	4	106	99	640	331	277
75	55	25	5	174	151	794	178	266
76	53.35	60	3	80	126	740	327	273
77	53.35	60	3	141	127	731	408	355
78	60.5	40	5	0	0	620	207	153
79	60.5	40	5	0	0	770	270	148
80	57.75	25	4	63	52	791	385	261
81	55	25	4	109	97	810	432	305
82	55	25	4	155	143	837	234	351
83	52.25	25	3	107	103	816	278	233
84	52.25	25	3	181	175	861	210	330
85	52.25	25	3	197	193	906	188	297
86	60.5	25	5	64	45	860	240	121
87	55	25	4	90	105	794	285	213
88	55	25	4	135	150	839	240	260
89	55	25	4	180	195	884	195	305
90	52.25	25	3	145	130	950	268	157
91	52.25	25	3	191	175	899	224	199
92	52.25	25	3	230	215	945	170	271
93	52.25	25	3	281	265	990	130	238
94	60.5	25	5	23	26	955	193	68
95	55	25	4	124	144	855	270	165
96	55	25	4	205	190	1010	208	217
97	55	25	4	208	235	972	150	265
98	55	25	5	290	275	1080	100	201

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
99	52.25	25	3	90	71	1001	255	130
100	52.25	25	3	105	101	1016	160	145
101	52.25	25	3	180	161	1164	97	215
102	60.5	25	5	20	14	914	119	12
103	55	25	4	74	195	986	194	109
104	55	25	4	120	101	1031	160	160
105	55	25	4	165	298	1036	100	200
106	57.75	25	5	210	191	1083	30	148
107	57.75	25	3	100	267	1024	36	9
108	57.75	25	3	150	128	1040	8	18
109	57.75	25	3	194	350	1085	90	60
110	57.75	25	5	240	218	860	8	8
111	55	25	5	28	238	816	125	9
112	52.25	25	4	114	326	894	71	9
113	52.25	25	4	200	182	920	17	8
114	52.25	25	4	225	430	1007	9	22
115	55	25	5	124	107	805	182	41
116	49.5	25	3	235	216	850	156	130
117	49.5	25	3	148	312	875	153	177
118	49.5	25	3	325	306	940	66	151
119	60.5	40	5	0	54	626	196	56
120	52.25	25	4	162	195	806	266	126
121	52.25	25	4	209	263	851	164	170
122	52.25	25	4	252	285	896	126	212
123	52.25	25	5	312	345	890	66	252
124	49.5	25	3	103	162	743	234	163
125	49.5	25	3	140	206	778	194	210
126	49.5	25	3	193	252	833	144	230
127	55	25	5	34	76	660	256	152
128	49.5	25	4	113	188	758	195	211
129	55	40	3	24	74	640	355	215
130	58.85	40	5	0	66	630	226	366
131	57.75	40	5	10	120	328	165	245
132	55	30	4	55	165	373	238	155
133	55	30	4	114	174	488	170	90
134	52.25	30	3	84	283	319	23	100
135	52.25	30	3	146	348	385	10	36
136	52.25	30	3	218	311	435	27	10

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
137	55	40	5	10	260	170	124	202
138	53.35	30	4	38	287	268	76	155
139	53.35	30	4	87	279	310	30	107
140	49.5	25	3	74	375	218	106	186
141	49.5	25	3	120	415	265	60	137
142	49.5	25	3	165	466	309	15	92
143	53.35	25	4	43	361	176	137	214
144	46.75	25	4	103	405	236	92	170
145	46.75	25	4	150	452	267	46	122
146	49.5	25	4	193	495	226	8	80
147	49.5	25	4	240	540	360	9	30
148	41.25	25	3	103	400	140	257	214
149	41.25	25	3	146	450	185	187	163
150	38.5	25	3	194	498	233	165	122
151	38.5	25	3	236	540	275	97	73
152	38.5	25	3	286	582	321	73	31
153	60.5	200	1	46	341	129	186	262
154	60.5	200	1	91	154	150	523	560
155	60.5	200	1	125	214	85	470	492
156	46.75	25	5	86	390	83	315	255
157	44	25	4	130	427	148	277	199
158	44	25	4	176	480	173	225	166
159	41.25	25	3	163	467	90	333	395
160	41.25	25	3	214	511	140	358	384
161	44	25	4	157	454	73	308	330
162	44	25	4	205	508	96	352	374
163	46.75	25	5	160	458	12	308	330
164	41.25	25	3	240	508	36	387	409
165	41.25	25	3	280	578	81	428	450
166	60.5	200	5	206	319	111	496	517
167	60.5	200	2	279	395	160	537	560
168	60.5	200	2	345	454	226	599	621
169	33	25	3	420	532	379	703	738
170	34.1	25	4	410	470	320	705	727
171	35.75	25	5	346	459	251	636	657
172	33	25	3	427	541	338	712	745
173	33	25	3	387	501	298	672	705
174	34.1	25	4	343	462	258	632	665

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
175	34.1	25	4	383	502	292	660	700
176	34.1	25	4	343	462	252	620	660
177	33	25	3	302	421	211	579	619
178	33	25	3	360	473	268	642	675
179	33	25	3	320	432	227	601	634
180	34.1	25	4	392	504	268	642	675
181	34.1	25	4	351	463	257	664	642
182	34.1	25	4	310	422	216	623	601
183	33	25	3	392	504	268	642	675
184	38.5	60	3	343	462	262	647	668
185	38.5	60	4	298	417	217	602	623
186	33	25	1	292	406	219	592	614
187	60.5	200	1	3	0	407	792	587
188	46.75	40	4	179	177	474	859	846
189	46.75	40	4	146	144	441	826	813
190	44	40	3	179	177	474	859	846
191	44	40	3	153	133	830	445	790
192	46.75	40	5	123	103	800	415	740
193	35.75	25	4	198	179	511	896	834
194	35.75	25	4	165	146	478	863	801
195	33	25	3	230	210	542	927	865
196	33	25	3	197	177	509	894	832
197	38.5	25	5	183	155	443	828	822
198	35.75	25	4	257	236	545	918	888
199	35.75	25	4	224	203	512	885	855
200	34.1	30	1	199	180	492	865	834
201	34.1	30	1	237	218	530	903	872
202	33	25	3	241	220	529	902	872
203	33	25	3	208	187	496	869	839
204	33	25	1	276	255	564	937	907
205	34.1	25	4	243	222	531	904	874
206	60.5	30	1	0	21	681	697	197
207	57.75	30	2	55	217	695	562	319
208	59.4	30	5	52	354	608	500	303
209	60.5	25	4	3	179	668	532	302
210	60.5	25	3	3	430	684	576	379
211	60.5	25	4	3	430	684	576	379
212	60.5	30	1	3	113	480	435	250

No	Price (*Lakh Per Katha*)	Access road width (meter)	Plot orientation	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
213	60.5	30	1	3	70	335	489	230
214	60.5	200	2	178	222	117	528	116
215	60.5	200	5	109	181	416	571	90
216	60.5	200	2	36	114	343	636	260
217	60.5	25	1	0	266	427	766	248
218	44	25	2	165	266	427	766	248
219	44	25	2	110	212	419	717	173
220	44	30	1	149	247	457	749	92
221	46.75	30	5	177	278	485	659	35
222	45.1	30	1	238	338	546	578	9
223	46.75	40	3	429	530	737	745	71
224	47.85	40	5	371	472	679	687	7
225	45.1	25	5	305	406	613	716	7
226	44	25	3	306	359	563	692	7
227	41.25	25	4	325	418	625	769	129
228	41.25	25	4	279	372	579	723	83
229	40.15	25	3	325	418	625	769	129
230	40.15	25	3	270	363	570	714	74
231	41.25	25	4	260	349	556	787	202
232	41.25	25	4	205	294	501	732	147
233	35.75	30	4	446	414	12	579	525
234	35.75	30	4	475	460	9	544	515
235	35.75	30	4	545	452	53	482	570
236	33	25	3	490	470	64	540	484
237	33	25	3	487	478	127	513	460
238	33	25	3	563	407	201	441	537
239	38.5	25	5	445	500	60	475	370
240	35.75	25	4	530	465	145	500	500
241	35.75	25	4	605	387	220	410	500
242	33	25	3	545	443	152	475	390
243	33	25	3	623	345	242	373	463
244	38.5	25	5	500	480	123	515	315
245	35.75	25	4	580	398	199	429	398

A-2. Plot Prices of Sun-valley Abashon:

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
1	30	25	5	755	592	426	365	401
2	30	25	5	660	519	383	309	344
3	30	25	3	834	663	527	452	486
4	31.2	25	4	762	623	473	403	440
5	31.2	25	4	807	668	518	448	485
6	31.2	25	5	735	582	406	345	381
7	30	25	3	720	584	450	374	410
8	30	25	3	765	629	495	419	455
9	31.2	25	4	702	567	431	356	392
10	31.2	25	4	747	612	476	401	437
11	30	40	3	554	419	284	209	245
12	30	40	3	509	374	239	164	200
13	34.2	40	4	597	444	280	218	254
14	34.2	40	4	552	399	235	173	209
15	34.2	40	5	487	334	170	108	144
16	31.2	25	3	471	336	200	126	162
17	31.2	25	3	426	291	155	81	117
18	33	25	4	482	347	207	137	173
19	33	25	4	446	311	171	101	137
20	34.2	25	5	405	238	99	51	87
21	39	25	3	455	310	169	8	8
22	39	25	3	420	275	134	8	37
23	42	25	4	410	286	148	15	8
24	42	25	4	362	221	86	8	30
25	36	25	3	390	255	123	201	237
26	36	25	3	335	190	53	149	186
27	57	80	5	220	25	8	120	150
28	57	80	5	220	0	28	200	240
29	48	25	4	407	107	294	240	209
30	52.2	25	5	367	67	254	184	153
31	51	25	4	313	21	255	182	152
32	52.2	25	4	278	8	220	270	240
33	52.2	25	4	243	8	185	305	275
34	48	25	4	208	26	150	344	314
35	45	25	5	158	115	115	290	325
36	40.8	25	3	348	113	328	166	136
37	42	25	3	273	96	293	174	143
38	42	25	3	237	132	257	210	179
39	43.2	25	3	201	168	221	246	215

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
40	45	25	3	165	151	185	282	251
41	46.2	25	3	129	115	149	318	287
42	43.2	25	4	138	103	328	176	146
43	46.2	25	5	300	95	310	155	125
44	45	25	4	256	122	262	184	153
45	45	25	4	220	212	226	220	189
46	46.2	25	4	184	176	190	256	225
47	48	25	4	148	140	154	292	261
48	45	25	3	338	190	390	170	140
49	46.2	25	5	298	135	335	130	100
50	48	25	3	250	158	312	160	130
51	48	25	3	215	193	277	195	172
52	48	25	3	180	228	232	237	206
53	48	25	3	140	190	190	285	255
54	49.2	25	5	102	140	140	310	290
55	46.2	25	4	300	167	370	123	93
56	48	25	4	240	159	327	120	90
57	48	25	4	204	195	291	156	126
58	48	25	4	168	231	255	192	162
59	49.2	25	4	132	206	219	228	198
60	51	25	4	96	170	183	264	234
61	45	25	5	230	158	370	100	70
62	51	25	5	231	151	367	92	61
63	49.2	25	4	195	187	331	128	97
64	51	25	4	159	223	295	164	133
65	54	25	4	123	245	259	200	169
66	57	25	4	87	209	223	236	205
67	60	25	5	8	137	210	218	195
68	40.2	25	4	483	405	634	76	152
69	40.2	25	4	438	360	589	31	107
70	45	25	4	236	247	410	30	0
71	43.2	40	5	423	342	709	106	196
72	42	40	3	375	290	629	31	150
73	42	40	3	339	245	593	15	104
74	51	40	3	177	150	440	32	15
75	54	40	3	121	203	402	90	73
76	54	40	3	74	165	360	136	118
77	60	40	5	28	126	291	182	165
78	51	25	4	195	217	334	118	88
79	51	25	4	100	206	300	164	134
80	48	40	5	410	310	712	107	195

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
81	48	40	4	366	269	667	62	150
82	48	40	4	321	224	622	19	105
83	49.2	40	4	276	179	577	12	60
84	51	40	4	231	134	532	12	17
85	52.2	40	4	176	137	489	27	14
86	54	40	4	131	182	434	71	54
87	55.2	40	4	86	224	389	117	100
88	60	40	5	8	86	310	181	164
89	42	25	3	356	246	718	220	220
90	42	25	3	311	201	673	175	175
91	42	25	3	266	155	640	132	129
92	45	25	3	219	109	581	83	83
93	46.8	25	5	158	76	532	35	34
94	45	25	3	120	121	473	100	100
95	46.8	25	3	75	117	428	145	145
96	48	25	3	30	72	383	190	190
97	45	25	4	370	250	715	248	248
98	45	25	4	323	213	695	201	200
99	46.8	25	4	278	159	641	157	157
100	46.8	25	4	233	114	596	112	112
101	48	25	5	185	47	560	66	65
102	51	25	4	130	98	494	96	96
103	51	25	4	87	129	442	142	141
104	51	25	4	41	188	400	177	177
105	45	25	5	362	230	800	210	304
106	42	25	3	318	185	728	258	258
107	42	25	3	273	140	683	213	213
108	42	25	3	228	95	638	168	168
109	42	25	3	183	50	593	123	123
110	58.8	25	3	126	8	540	121	121
111	60	25	3	81	8	495	76	76
112	60	25	3	36	8	450	31	31
113	45	25	5	240	390	855	130	290
114	43.2	25	4	348	209	666	311	260
115	43.2	25	4	312	173	702	275	224
116	45	25	4	276	137	717	239	188
117	45	25	4	240	101	681	203	152
118	45	25	4	204	65	645	167	116
119	37.2	25	3	434	297	493	176	197
120	37.2	25	3	398	261	529	140	233
121	43.2	25	5	354	211	865	112	186

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
122	42	25	3	323	172	606	300	219
123	42	25	3	287	136	642	264	183
124	42	25	3	251	100	678	228	147
125	43.2	25	3	215	64	670	192	111
126	43.2	25	3	179	28	634	156	75
127	39	25	4	465	324	460	196	172
128	39	25	4	420	279	505	151	217
129	40.2	25	5	380	233	594	87	158
130	43.2	25	4	316	175	604	300	222
131	43.2	25	4	271	130	649	255	177
132	45	25	4	226	85	694	210	132
133	45	25	4	181	40	713	165	87
134	55.2	60	5	445	340	450	180	253
135	54	60	3	394	294	464	135	208
136	54	60	3	349	249	509	90	163
137	54	40	3	292	192	563	48	105
138	54	40	3	247	146	608	17	60
139	54	40	3	202	100	653	34	12
140	54	40	3	157	54	698	80	12
141	57	60	4	419	335	411	174	120
142	57	60	4	368	274	515	113	187
143	37.2	25	5	410	367	447	211	272
144	36	25	3	350	307	507	151	212
145	42	25	5	290	247	567	91	152
146	39	25	4	342	313	469	157	218
147	39	25	4	281	252	530	96	157
148	37.2	25	3	365	335	485	188	193
149	37.2	25	3	304	274	546	127	254
150	57	60	5	200	156	580	0	60
151	54	25	4	200	170	672	17	76
152	55.2	25	4	155	125	717	17	31
153	57	25	4	110	80	762	7	17
154	60	25	4	56	21	788	46	8
155	51	25	3	166	169	660	132	206
156	52.2	25	3	121	124	705	177	161
157	54	25	3	76	79	750	222	116
158	54	25	4	98	98	645	271	332
159	54	25	4	144	156	700	149	209
160	55.2	25	4	98	114	745	204	265
161	57	25	4	55	66	790	187	100
162	52.2	25	3	157	217	701	168	227

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
163	54	25	3	112	172	746	213	272
164	57	25	3	67	127	791	258	130
165	60	25	5	10	50	836	173	85
166	46.2	25	4	213	282	707	181	242
167	54	25	4	155	230	707	178	261
168	55.2	25	4	110	185	752	223	216
169	58.2	25	4	65	140	797	268	171
170	45	25	3	225	340	965	230	291
171	49.2	25	5	180	295	920	185	246
172	55.2	40	3	122	237	765	234	274
173	57	40	3	77	192	810	280	229
174	58.2	40	3	32	147	855	325	184
175	46.2	25	4	225	340	965	230	291
176	49.2	25	5	180	295	935	185	246
177	45	25	3	234	356	825	299	360
178	55.2	60	5	236	106	935	229	290
179	60	40	5	11	193	1085	317	230
180	49.2	25	5	150	337	805	272	333
181	51	40	5	72	300	840	284	255
182	58.2	25	3	54	400	1093	512	424
183	58.2	25	3	99	445	1138	557	469
184	58.2	25	4	42	370	1196	498	410
185	58.2	25	4	87	415	1241	543	455
186	58.2	25	3	42	370	1196	498	410
187	58.2	25	3	87	415	1241	543	455
188	58.2	25	4	45	274	1100	577	489
189	60	25	5	11	240	1066	368	280
190	58.2	25	3	61	290	1116	418	330
191	51	40	5	678	151	91	294	43
192	51	40	1	850	198	140	166	0
193	52.2	25	4	984	360	300	7	7
194	52.2	25	4	939	405	255	47	7
195	42	25	3	943	335	273	204	84
196	42	25	3	898	290	228	159	39
197	43.2	25	4	1063	340	287	198	102
198	43.2	25	4	1017	294	241	152	56
199	45	25	5	943	227	170	138	12
200	42	25	3	963	243	183	226	73
201	45	25	5	923	200	146	160	12
202	43.2	25	4	963	243	183	226	73
203	45	40	3	965	110	75	354	199

No	Price (Lakh per Katha)	Access road (meter)	Plot orientation	Dis from River (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
204	45	40	3	807	160	100	294	138
205	52.2	60	5	936	18	8	360	202
206	52.2	40	5	865	90	32	267	112
207	51	25	3	815	70	8	353	160
208	54	60	5	1117	0	35	481	325
209	30	25	3	855	692	526	465	501
210	31.2	25	5	755	592	426	365	401
211	31.2	25	4	834	663	527	452	486
212	30	25	3	702	567	431	356	392
213	31.2	25	5	692	543	373	321	358
214	31.2	25	4	115	192	419	86	69
215	33	40	3	539	404	269	194	230
216	33	40	3	857	518	538	286	523
217	34.2	40	4	537	384	220	158	194
218	31.2	25	3	482	347	207	137	173
219	33	25	5	467	314	150	88	124
220	33	25	4	464	323	187	127	91
221	42	25	5	491	344	205	32	8
222	36	25	3	426	271	135	25	7
223	45	25	5	360	213	77	0	36
224	45	25	5	320	176	38	16	51
225	36	25	3	331	196	75	166	203
226	57	80	3	319	24	75	180	215
227	57	80	5	365	66	206	210	180
228	51	25	5	348	43	290	200	168
229	52.2	25	4	259	7	172	261	231
230	52.2	25	4	260	12	136	297	267
231	45	25	4	224	62	100	333	303
232	40.8	25	5	337	82	270	170	140
233	42	25	3	269	129	249	195	165
234	43.2	25	3	215	225	225	279	248
235	46.2	25	3	158	139	139	304	274
236	43.2	25	4	330	117	332	164	134
237	45	25	4	271	118	270	194	164
238	45	25	4	207	213	213	233	203
239	46.2	25	4	171	177	177	169	239

A-3. Plot Prices of Malum City:

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
1	22.5	60	5	674	417	486	486	588	561
2	22.5	60	4	646	390	469	469	561	534
3	22.5	60	4	619	363	442	442	534	507
4	25	60	4	592	336	415	415	507	480
5	31.25	60	5	551	294	364	364	466	439
6	30	60	4	524	259	329	329	430	405
7	32.5	60	4	496	231	301	301	402	377
8	36.25	60	4	468	203	273	273	374	349
9	37.5	60	4	443	186	256	256	348	331
10	37.5	60	4	415	158	228	228	320	303
11	42.5	60	4	375	146	216	188	266	261
12	42.5	60	4	348	173	243	161	239	234
13	42.5	60	4	321	200	270	134	212	207
14	45	60	4	294	227	266	107	185	180
15	46.25	60	4	267	254	239	80	158	153
16	46.25	60	4	240	281	212	53	131	126
17	48.75	60	4	213	277	185	26	104	99
18	18.75	25	5	721	367	436	506	533	506
19	18.75	25	3	683	350	419	480	519	515
20	22.5	25	3	656	323	392	453	492	488
21	23.75	25	3	629	296	365	426	465	461
22	28.75	25	5	601	247	316	386	413	386
23	30	25	3	561	227	297	358	397	392
24	30	25	3	533	249	269	330	369	364
25	30	25	3	505	221	241	302	341	336
26	35	25	3	474	138	208	286	305	278
27	37.5	25	3	446	110	180	258	277	250
28	37.5	25	3	412	113	183	209	248	243
29	37.5	25	3	404	136	205	182	219	219
30	41.25	25	3	376	164	233	154	191	191
31	41.25	25	3	348	192	248	126	163	163
32	41.25	25	3	320	220	220	98	135	135
33	43.75	25	3	296	244	196	74	111	111
34	46.25	25	3	249	261	168	47	86	81
35	20	25	4	691	352	422	492	521	515
36	23.75	25	4	654	315	385	455	484	478
37	25	25	4	617	278	348	418	447	441
38	31.25	25	4	561	222	292	362	391	385
39	32.5	25	4	523	184	254	324	353	347

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
40	35	25	4	485	146	216	286	315	309
41	38.75	25	4	447	108	178	248	277	271
42	38.75	25	4	407	112	181	203	234	228
43	42.5	25	4	368	149	219	165	195	190
44	42.5	25	4	331	188	240	127	158	152
45	45	25	4	288	225	200	89	118	112
46	47.5	25	4	256	258	165	53	83	77
47	52.5	60	5	240	200	111	20	30	30
48	20	25	3	747	304	374	525	478	451
49	22.5	25	3	710	267	337	488	441	414
50	30	25	5	627	230	300	450	400	384
51	30	25	3	616	173	244	394	347	321
52	32.5	25	3	578	135	206	356	309	283
53	37.5	25	3	540	97	168	318	171	245
54	42.5	40	5	460	62	132	272	237	210
55	41.25	25	3	457	87	157	269	189	162
56	41.25	25	3	420	126	195	198	151	125
57	43.75	25	3	381	163	200	159	113	86
58	43.75	25	3	344	201	170	122	76	49
59	45	25	3	307	226	133	85	38	13
60	43.75	40	5	500	37	106	276	214	187
61	42.5	25	4	448	94	164	223	176	150
62	42.5	25	4	410	132	200	185	138	110
63	45	25	4	372	170	240	147	100	74
64	45	25	4	335	214	150	110	64	37
65	47.5	25	4	298	216	120	72	27	0
66	40	25	3	434	44	113	307	187	162
67	42.5	25	3	397	82	152	269	150	125
68	42.5	25	3	358	120	189	231	112	86
69	45	25	3	321	158	143	194	74	49
70	46.25	25	3	284	199	106	157	37	12
71	43.75	25	4	398	65	135	285	155	130
72	45	25	4	347	120	190	220	100	75
73	47.5	25	4	289	174	112	176	47	22
74	48.75	25	4	235	150	58	122	7	0
75	41.25	25	3	360	12	7	306	215	144
76	43.75	25	3	328	80	6	270	178	108
77	46.25	25	3	280	125	7	198	106	35
78	53.75	60	5	131	154	23	152	63	30
79	48.75	60	1	208	130	35	75	14	14

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
80	46.25	60	1	233	209	110	0	30	32
81	43.75	25	2	140	140	102	138	177	142
82	41.25	25	2	179	220	180	60	253	220
83	52.5	25	5	70	88	60	193	131	96
84	41.25	25	1	165	166	156	116	202	167
85	51.25	60	5	111	273	73	26	143	153
86	43.75	25	2	103	169	93	165	219	184
87	43.75	25	2	111	246	73	87	204	200
88	40	25	1	72	145	63	194	310	306
89	40	25	1	128	215	90	118	234	231
90	43.75	25	2	18	119	8	217	224	189
91	43.75	25	2	62	194	6	140	256	252
92	40	40	5	460	7	106	301	305	230
93	41.25	25	4	400	7	135	370	270	184
94	37.5	25	3	411	88	176	440	274	188
95	36.25	25	4	378	6	160	431	332	307
96	42.5	40	5	426	58	160	258	297	211
97	41.25	25	4	385	70	190	314	260	174
98	40	25	4	360	33	209	351	222	137
99	43.75	25	4	322	6	171	389	184	99
100	43.75	25	4	278	6	131	426	147	62
101	38.75	25	3	398	198	248	246	248	165
102	38.75	25	3	361	161	211	283	211	128
103	41.25	25	3	318	123	168	326	173	90
104	43.75	25	3	280	85	130	360	129	56
105	50	40	5	240	23	88	343	93	8
106	46.25	25	3	193	34	40	367	112	6
107	46.25	25	4	232	6	80	389	143	56
108	41.25	40	5	407	144	260	240	264	178
109	41.25	25	4	385	70	190	314	260	174
110	41.25	25	4	335	136	181	306	179	103
111	46.25	25	4	298	99	144	269	142	66
112	46.25	25	4	261	62	107	232	105	29
113	36.25	25	3	448	235	236	203	206	166
114	41.25	25	3	411	198	199	166	169	129
115	42.5	25	3	327	196	161	270	132	90
116	43.75	25	3	280	134	122	314	86	50
117	50	40	5	250	86	80	310	50	10
118	41.25	25	4	378	172	223	215	186	154
119	42.5	25	4	341	198	186	252	149	117

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
120	43.75	25	4	304	161	149	289	112	80
121	45	25	4	267	124	112	326	75	43
122	42.5	40	5	412	298	282	152	177	124
123	41.25	25	3	375	260	285	190	140	87
124	40	25	3	374	223	207	221	104	50
125	43.75	25	3	337	186	170	258	64	13
126	45	25	3	300	149	133	295	29	6
127	45	25	3	256	137	120	268	6	22
128	46.25	25	3	169	170	76	316	25	59
129	48.75	25	5	130	100	24	380	76	110
130	48.75	25	4	190	68	33	330	68	7
131	47.5	25	4	150	47	6	361	105	6
132	48.75	25	5	100	62	7	406	118	50
133	42.5	25	1	115	120	40	366	81	115
134	48.75	25	5	90	50	7	446	136	60
135	45	25	2	74	87	44	380	193	118
136	51.25	60	5	54	45	7	426	161	85
137	45	40	2	30	104	17	378	135	169
138	48.75	25	5	45	135	34	350	100	133
139	48.75	40	2	27	174	14	287	65	88
140	50	25	5	88	150	67	311	62	96
141	45	25	1	88	213	66	260	51	64
142	47.5	25	5	115	120	40	366	81	115
143	47.5	25	4	169	170	76	316	25	59
144	50	25	5	88	150	67	311	62	96
145	45	25	3	125	195	113	344	26	60
146	50	25	5	88	150	67	311	62	96
147	46.25	25	4	126	211	125	253	26	60
148	47.5	25	4	162	191	150	216	6	23
149	45	25	3	134	230	122	235	73	85
150	42.5	25	3	153	267	131	209	109	130
151	51.25	40	5	185	197	160	180	24	26
152	41.25	25	3	318	293	281	158	129	75
153	43.75	25	3	280	250	270	190	90	37
154	43.75	25	3	246	217	196	230	54	0
155	42.5	25	4	358	255	239	196	128	75
156	42.5	25	4	316	227	205	233	91	37
157	46.25	25	4	278	183	161	282	53	0
158	40	25	3	356	294	335	85	187	185
159	38.75	25	3	319	323	298	122	150	148

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
160	41.25	25	3	282	286	261	159	113	111
161	43.75	25	3	245	249	224	196	76	74
162	42.5	40	5	360	342	354	84	178	124
163	41.25	25	4	334	305	290	146	140	87
164	43.75	25	4	293	272	257	177	104	50
165	43.75	25	4	256	235	220	214	64	13
166	46.25	25	4	219	198	183	251	30	6
167	51.25	80	4	200	297	148	75	113	88
168	51.25	80	4	160	282	110	114	75	50
169	51.25	80	4	124	304	72	153	37	12
170	43.75	25	3	192	440	148	75	113	88
171	43.75	25	3	145	414	107	117	72	47
172	47.5	25	4	116	379	72	153	37	12
173	45	25	4	196	455	156	69	121	96
174	46.25	25	4	82	418	119	105	84	69
175	47.5	25	4	122	381	82	142	48	23
176	48.75	25	4	78	344	46	178	13	0
177	42.5	25	3	159	487	143	118	170	97
178	42.5	25	3	123	450	107	128	133	60
179	46.25	25	3	86	414	70	191	98	23
180	43.75	25	5	233	499	183	80	158	120
181	43.75	25	4	474	146	131	130	158	85
182	45	25	4	437	109	94	167	121	48
183	47.5	25	4	74	386	58	210	86	23
184	41.25	25	5	180	540	164	118	228	130
185	41.25	25	3	146	519	131	167	195	96
186	42.5	25	3	109	482	94	204	158	59
187	45	25	4	69	445	58	247	122	24
188	41.25	25	5	180	540	164	118	228	130
189	42.5	25	4	143	519	131	167	195	96
190	43.75	25	4	106	482	94	204	158	59
191	45	25	4	69	445	58	247	122	24
192	41.25	25	3	156	563	143	136	117	97
193	40	25	3	120	526	106	166	155	135
194	42.5	25	3	82	488	69	209	190	170
195	42.5	25	4	166	578	153	128	110	89
196	41.25	25	4	139	551	126	155	137	116
197	42.5	25	4	112	524	99	182	174	143
198	42.5	25	4	85	497	72	209	211	170
199	42.5	25	4	58	470	45	236	248	197

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
200	41.25	25	4	31	443	18	263	285	224
201	42.5	25	3	176	610	152	92	74	53
202	41.25	25	3	149	583	125	119	101	80
203	41.25	25	3	122	556	98	146	128	107
204	42.5	25	3	95	529	71	173	155	134
205	42.5	25	3	68	502	44	200	182	161
206	41.25	25	3	41	475	17	227	209	188
207	43.75	25	4	179	610	153	91	83	52
208	43.75	25	4	152	583	126	118	100	79
209	42.5	25	4	125	556	99	145	127	106
210	43.75	25	4	98	529	72	172	154	133
211	43.75	25	4	71	502	45	199	181	160
212	42.5	25	4	44	475	18	226	208	187
213	41.25	25	3	207	651	153	59	7	7
214	42.5	25	3	180	624	126	86	6	16
215	43.75	25	3	153	597	99	113	12	43
216	43.75	25	3	126	570	72	140	38	70
217	45	25	3	99	543	45	167	65	96
218	43.75	25	3	72	516	18	194	91	123
219	45	25	4	158	597	99	106	9	41
220	45	25	4	131	570	72	133	36	68
221	45	25	4	104	543	45	160	63	95
222	45	25	4	77	516	18	187	90	122
223	43.75	25	3	175	645	99	6	9	41
224	43.75	25	3	148	618	72	6	36	68
225	45	25	3	121	591	45	13	63	95
226	46.25	40	3	94	564	18	40	90	122
227	22.5	60	4	655	390	460	467	546	541
228	23.75	60	4	610	345	415	422	501	496
229	30	60	5	569	312	385	381	482	457
230	30	60	4	515	258	328	328	420	403
231	36.25	60	4	479	222	292	292	384	367
232	37.5	60	4	434	177	247	247	339	322
233	42.5	60	5	385	122	203	197	317	290
234	42.5	60	4	340	183	252	151	230	225
235	43.75	60	4	302	219	265	115	194	188
236	46.25	60	4	257	264	219	70	149	143
237	48.75	60	4	212	291	184	25	104	98
238	18.75	25	3	697	367	448	498	537	532
239	20	25	3	661	331	412	462	501	496

No	Price (*Lakh per Katha*)	Access road width (meter)	Plot orientation	Dis from river (meter)	Dis from lake (meter)	Dis from park (meter)	Dis from market (meter)	Dis from play-ground (meter)	Dis from school (meter)
240	23.75	25	3	625	295	376	426	465	460
241	26.25	25	3	575	245	326	376	416	410
242	31.25	25	3	530	200	281	331	371	365
243	33.75	25	3	485	155	236	286	326	320
244	41.25	40	5	411	106	175	235	272	245
245	38.75	25	3	390	132	201	191	228	223
246	41.25	25	3	368	172	240	146	183	183

APPENDICES B

PHOTOS OF THE STUDY SITE

B-1. Project View of Shornali Abashon of Swadesh Properties Ltd.:

Photo: Entrance View of Shornali Abashon, Swadesh Properties Ltd.
Source: Project office of Swadesh Properties Ltd.

Photo: Prject View of Shornali Abashon, Swadesh Properties Ltd.
Source: Survey of the Shornali Abashon

Photo: Project View of Shornali Abashon, Swadesh Properties Ltd.
Source: Project office of Swadesh Properties Ltd.

Photo: Project View of Shornali Abashon, Swadesh Properties Ltd.
Source: Survey of the Shornali Abashon

Photo: Project View of Shornali Abashon, Swadesh Properties Ltd.
Source: Survey of the Shornali Abashon

B-2. Project View of Sun-valley Abashon of Swadesh Properties Ltd.:

Photo: Entrance View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Project office of Swadesh Properties Ltd.

Photo: Entrance View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Survey of the Sun-valley Abashon

Photo: Project View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Project office of Swadesh Properties Ltd.

Photo: Project View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Survey of the Sun-valley Abashon

Photo: Project View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Project office of Swadesh Properties Ltd.

Photo: Entrance View of Sun-valley Abashon, Swadesh Properties Ltd.
Source: Survey of the Sun-valley Abashon

B-3. Project View of Malum City of Malum Group:

Photo: Project View of Malum City of Malum Group
Source: Project office of Malum Group.

Photo: Project View of Malum City of Malum Group
Source: Survey of the Malum City

Photo: Survey Photos of Malum City
Source: Survey of the Malum City

B-4. Project View of Sector-15, RAJUK Purbachal New Township Projects:

Photo: Project View of the RAJUK Purbachal New Township Projects
Source: RAJUK

Photo: Project View of the RAJUK Purbachal New Township Projects
Source: RAJUK

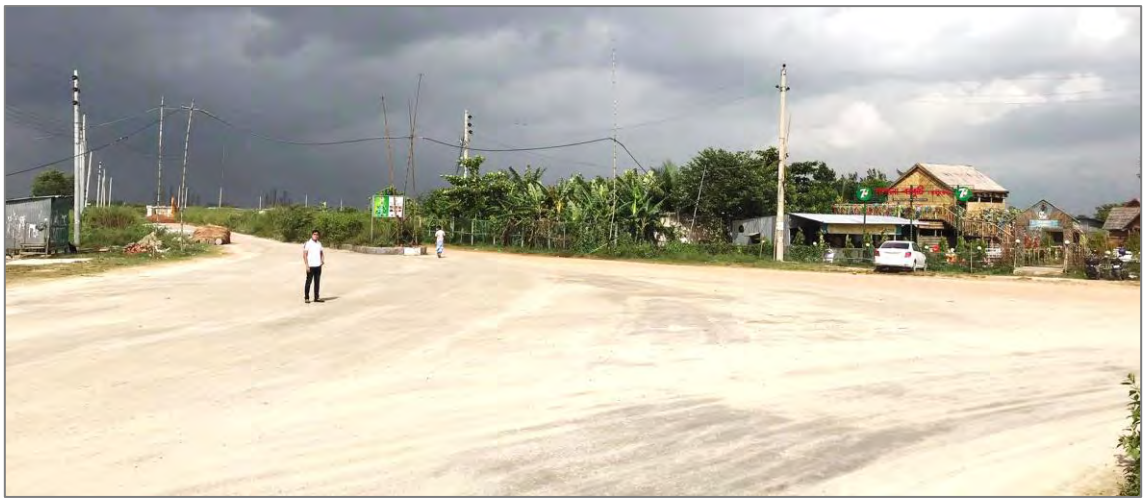

Photo: Project View of Sector-15, RAJUK Purbachal New Township Projects
Source: Survey of the Sector-15, RAJUK Purbachal New Township Projects

Photo: Project View of the Sector-15, RAJUK Purbachal New Township Projects
Source: Survey of the Sector-15, RAJUK Purbachal New Township Projects