An Evaluation on Sustainable Brownfield Regeneration Opportunities in Periphery Area of Nicosia Buffer Zone

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ABSTRACT

Previously developed lands, which are now vacant and/or abandoned, are widely referred to the term brownfield, which is the opposite of the undeveloped lands (greenfields). These sites mainly have started to appear after Second World War, which was combined with rapid growth of population and urban environment, and changes in industries and technology. One of the significant causes of urban crisis within the cities is the appearance of brownfields. After many years of urban decays, the idle land-uses became a golden opportunity for further developments of cities and also it was realized that by re-using them it reduces the pressure on greenfields, therefore in 1990's the term brownfield was born to emphasise these properties.

Accordingly, this study reviews the critical principles related to brownfield issues and exploring the recent discussions on the topic. Afterwards, example studies will help to understand the impacts of sustainable brownfield regeneration (SBR). According to the issues that have been discussed in this research, a guideline as a product of theoretical framework for process for sustainable brownfield regeneration program has been produced. This guideline has been developed to show how complex and comprehensive is the SBR program. In this regard, the inner part of the city of Nicosia, which is the last divided city in Europe, is selected as the field study in general and in particular the peripheral of buffer zone within the city. Because of many reasons (e.g. Buffer zone, military areas, political conflicts, and etc.) the study area has been faced serious urban declines. For these purposes the examinations and evaluations have been done by means of physical, environmental, social, cultural, economic, and political dimension to draw a framework for first step of sustainable

brownfield regeneration program. This first step framework consists of recognition and examination of existing situation related to brownfield issues, which identify, decode, and de-contextualize the soul of the problem.

The methodology for data collection of this study is based on qualitative and quantitative data collection from physical environment of the site, local community, and official authorities. For data analysis and evaluations, the statistic results and qualitative analysis categorized in positive and negative issues to decode and identify the existing situation and problems towards brownfield issues. The outcome of the analysis have been formed a clear understandings of the existing problems within the study area, therefore as the result and conclusion of this study, which is based on regeneration principles, a conceptual guideline model which demonstrated the process of SBR program has been suggested.

Keywords: Land-use Policies, Urban Regeneration, Sustainable Development, Brownfield, Nicosia

ÖZ

Şu anda terk edilmiş veya boş olan gelişmiş araziler gelişmemiş arazilerin (greenfield) tam tersi olan Brownfield olarak adlandırılırlar. Bu alanlar, 2. Dünya Savaşı'ndan sonra hızlı nüfus artışı, şehirlerin gelişimi ve endüstri ve teknolojinin gelişmesi sayesinde görülmeye başlandı. Şehirlerdeki sorunların en önemli sebeplerinden birisi de brownfield'ların ortaya çıkışıdır. Şehirlerin bozulmalarından yıllar sonra terk edilmiş alanların kullanılması şehirlerin gelişimi adına altın fırsatlar sunmaktadır, ve anlaşılmıştır ki bu alanların tekrar kullanılmaları yeşil alanlar (greenfields) üzerindeki baskıyı azaltmaktadır. Bu yüzden, 1990'larda bu mülkleri tanımlamak adına brownfield terimi doğmuştur.

Bu bağlamda, bu çalışma brownfield konuları hakkındaki önemli prensipleri gözden geçirmektedir, ve konu hakkındaki yeni tartışmaları incelemektedir. Daha sonra, örnek çalışmalar sürdürülebilir brownfield'ların etkilerini anlamamızda yardımcı olacaktır. Bu araştırmada tartışılan sorunlar ışığında, sürdürülebilir brownfield yenileme programı için uygulanacak işlemlerin teorik çerçevesini oluşturan bir kılavuz hazırlanmıştır. Bu kılavuz SBR programının ne kadar karışık ve geniş çaplı olduğunu göstermek amacıyla geliştirilmiştir. Bu bağlamda, Avrupa'nın bölünmüş son şehri olan Lefkoşa'nın iç kısmı genel anlamda ve tampon bölgenin uç kısımları da hususi anlamda çalışma alanı olarak seçilmiştir. Birçok sebepten dolayı (örneğin tampon bölge, askeri alanlar, siyasi çekişmeler vs…), çalışma alanı şehircilik açısından düşüşe geçmiştir. Bu sebepten dolayı, bir sürdürülebilir brownfield yenileme programının çizilebilmesi için gerekli olan ilk adımları atmak adına yapılan araştırma ve değerlendirmeler fiziksel, çevresel, sosyal, kültürel, ekonomik ve siyasi

açılardan ele alınmıştır. Bu ilk adımlar brownfield ile ilgili halihazırdaki durumun görülmesi ve incelenmesini içermektedir, ki bu incelemeler problemlerin temelini tanımlamakta, çözmekte ve bağlamlarından ayırmaktadır.

Bu çalışmanın bilgi toplama yöntemi bölgenin fiziksel çevresi, yerel halk ve resmi otoritelerden niteliksel ve niceliksel bilgi toplamaya dayanmaktadır. Bilgi analizi ve değerlendirmesi için istatistiksel veriler ve niteliksel analizler, halihazırdaki durumun ve brownfield problemlerinin anlaşılması için olumlu ve olumsuz olarak kategorilere ayrılmıştır. Analizin sonuçları çalışılan bölgedeki halihazırdaki sorunların anlaşılmasını sağlamıştır. Bu yüzden, yenileme prensiplerine dayalı bu çalışmanın sonucu olarak, SBR programının işlemlerini gösteren içeriksel bir kılavuz model önerilmiştir..

Anahtar Kelimeler: Alan kullanım mevzuatları, Kentsel Dönüşüm, Sürdürülebilir gelişim, Brownfield, Lefkoşa

To People of Cyprus Who Deserve Better Quality of Life

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Chapter 1

INTRODUCTION

1.1 Definition of the Problem

In general, urban crisis, which started in 1950's, had many dimensions, and variety of reasons. The conflicts of the Second World War and Cold War ruined the structure of many cities in the world, and on the other hand the rapid growth of science and technology led fast population growth and mass productions. Sprawl developments took the place of traditional neighbourhoods, and consequently the inner parts of the cities have experienced serious declines; moreover, the rapid development on the greenfields loaded the big amount of pressure on natural environment and resources. Meanwhile, because of the rapid growth of urban environments, residential and commercial areas surrounded the factories, which were at the edges of the cities. This was one of the main reasons for shutting down the factories to make sure the environment and people are protected from pollutions.

Commonly these industrial areas became vacant and abandoned, and subjected to new status, which referred to the term "Brownfield". Brownfield is the terminology that is used in policies, laws, and guidelines related to land use policies, to define previously developed lands, which are now vacant and/or abandoned. Because of the nature of this terminology, from one country to another country there are differences in definition of the term. To be more specific, the history of this terminology dates back to 1980's, when the value of land in the United States, Europe, and some other countries increased and old factory sites and military bases became attractive to developers. Suddenly those abandoned properties turned into valuable pieces of real

estate. The term brownfield was born in the late 1990's to describe those sites that are not being used to its fullest potential because of contamination, opposite of term Greenfield which describes uncontaminated or undeveloped rural lands (Maczulak, 2009).

The main common former land-use of brownfields was industrial. However in variety of cases, because of different conflicts and events such as wars, civil wars, ethnical/ religious/ political conflicts, many properties became vacant and abandoned. If these previously developed lands were not located in historical places, then widely they were referred to brownfield status (PPS3, 2010).

According to variety of brownfield definitions, one of the important problems of this topic is to recognize the brownfield sites and choose the right solution and action for them, since there are different types of brownfield sites, such as previously developed land which is now vacant or derelict, vacant or derelict buildings, land or buildings currently fully or partially in use with redevelopment potential, and some other types by different definition of brownfield, we need significant strategy for each type of land that can be applicable in local and global scale. Furthermore after recognition of these sites within the cities the first important step is to clearly understand and realize the actual existing situation of the area by means of all dimensions such as physical, environmental, social, cultural, economic, and political dimensions.

Although many people think that there are disadvantages in using previously developed lands or buildings, many potentials are shining within those sites such as being close to the core of the cities, and usually they have some infrastructures on the

site or nearby. The regeneration of these sites does not only decrease the pressure on greenfields, but also clean up contaminated sites and transform the vacant, abandoned, and idle properties to beneficial use (Nichols & Laros, 2009).

Solo vision, thinking, and mentality are an unfortunate fact in process of many decision systems. This is another key problem related to brownfield issues, which limits corporation and multidisciplinary approaches. Therefore in regeneration processes the partnership and positive communication between all stakeholders is an essential (Dixon, Raco, Catney, & Lerner, 2007). On the other hand the urban environment consist of variety of confusing problems which usually are not appeared in greenfields, therefore to succeed the regeneration projects and using the full potentials out of the possibilities, attention to democratic partnership is an important issue (Russ, 2002).

1.2 Research Question, Aims, and Objectives

In Cyprus, city of Nicosia, which remains as the last divided city in the Europe, is the selected city in this thesis as the study area. In 1958, ethnical and religious conflicts between two communities who live in the island formed a barrier between both Turkish and Greek Cypriots. Additional political conflicts ended up in 1974 with intervention of Turkish army to the island as the guarantor for safety of Turkish Cypriots and the island has been divided horizontally into two parts. Then Turkish Cypriots moved to northern part of the island and in 1983 they have formed and established a new republic, which has been called Turkish Republic of North Cyprus (TRNC).

As a result of the conflict in 1974, the border between two communities has became sharper and a physical border appeared and crossed the country, which is referred to UN buffer zone or green line. Although they have called the buffer zone as the peace line, according to this study, it has acted as killing line for the urban environment. At any point where buffer zone crossed the cities/settlements, a big portion of properties in the middle of these cities/settlements have been covered and remains vacant and abandoned for many years. Not only the properties, which have been closed by the function of border, are suffering from urban declines, but also the peripheral of buffer zone has been negatively impacted from those dead areas. One of the significant cities in this scenario is the city of Nicosia, which is the capital of Cyprus; however it was divided into two parts. The northern part is the capital of TRNC and the southern part remained as the capital of Republic of Cyprus.

The exact field study of this research is at peripheral area of Nicosia buffer zone in TRNC. Because of physical barrier within the city, this area that used to be the city centre has been located at the southern edge of Nicosia in Turkish part. As the natural response of the city to the impacts of buffer zone and political, economic, and social issues in the new republic, these areas have been faced serious urban declines. Gradually the original users of those neighbourhoods have been moved to newly developed areas in suburbs of Nicosia where progressively has been attached to the city. These vacant properties have been rented with low price to the immigrants and refugees, therefore another social problem occurred with the no sense of belonging to the area. As a result, the area has been changed to the poor urban environment, which was perceived as a slum condition or refugee camps. On the other hand, most of the industrial and commercial activities have been closed down and left empty for many

years, however about the level of contamination within those sites, there is no information and they never uncontaminated.

The main aim of this study is to recognize the potential brownfield lands in peripheral of Nicosia buffer zone, and then in regards to brownfield issues, produce a clear understanding of existing situation and related problems of those areas. Therefore this study tries to make the first step for sustainable brownfield regeneration approaches throughout identifying and examining the problems in the study area. In this regard, the final product of this research will be a guideline for sustainable brownfield regeneration, which will consist of several steps. These steps will lead to main research question, which is "how should sustainable brownfield regeneration program be developed and applied for the first time?" and the answer to this question will be interpreted in the case of Nicosia. The objectives to achieve this first step are listed below:

- To explore the international disciplines related to brownfield issues, and review recent related discussions to identify efficient and effective solutions for brownfields with focus on inner part of cities, that shows how motivating and vibrant places can be produced from problematic places throughout different types of regeneration policies and practices.

- To evaluate the role of stakeholders and importance of their participation to these projects as a multidisciplinary task with respect to democratic issues.

- To identify the affected areas in peripheral of Nicosia buffer zone and analyse their characteristic to provide an initial evaluation for brownfield sites where

technical and social disciplines can be brought together to provide success in sustainable brownfield regeneration program.

1.3 Research Methodology and Delimitations

This study will be utilized based on theoretical researches and analytical methods. Investigation on the study area and the theoretical frameworks will be developed according to legal policies, example studies, documentary researches and surveys. The study will be started with theoretical reviews on discussions, important issues and legal policies. Then reviewing the example studies, documentary researches and qualitative and quantitative surveys will shape a framework to approach sustainable brownfield regeneration. This method and technique will examine the study area as a model to evaluate the existing situation. Then a table of positive and negative issues with three dimensions of physical/environmental, socio-economic, and economic concerns will demonstrates existing situation of study area to decode and de-contextualize the nature of the problem.

According to the method, time, restricted military areas, and policy limitations, the research content has been limited to potential brownfield lands within the peripheral of Nicosia buffer zone. Although the initial site surveys will evaluate the physical conditions and community perspectives, this study has been limited itself with the surveys, data, and information exist in the municipality as the main operational body of other official stakeholders (official authorities) related to urban environment.

1.4 Structure of the Thesis

This study consists of five chapters which all come in sequence; the first chapter is the introduction of the study which will explain the main content of problem, the field study, research question, aims and objective of the research, the applied methodology for data collection and analysis, and explain the limitations of the research.

The second chapter makes a comprehensive review on history of brownfield issue and then it will explore the variety of definition of the term in different countries. Then the study will focus on contemporary issues related to brownfield sites. At this point a critical review on the issues of "RE" concept and especially urban regeneration and sustainability concerns provides basis for option of brownfield regeneration. Also concerns of urban regeneration and sustainable development will form a framework for the idea of sustainable brownfield regeneration (SBR).

The focus of the third chapter is on sustainability and brownfield regeneration which provides a theoretical framework throughout exploring main important elements in the process of SBR program, such as related stakeholders and their role, benefits and barriers to the program, and risk related issues. Afterwards the positive impacts of sustainable brownfield regeneration program will be discussed, and then two examples of SBR program with both urban, and building scale will be evaluated. This chapter will identify the profits, advantages and also the threats to SBR programs throughout the result of two successful examples. As the conclusion of chapter three and the final product of theoretical framework, a guideline for process

of SBR program will be developed to show all complex and comprehensive stages of that program.

In chapter four, the field study will be examined and evaluated in initial stage to emphasise the problems and importance of brownfield regeneration. In this chapter the history of Nicosia will be reviewed in general, and, in particular, the issues and impacts of brownfields within the study area will be discussed. In this regard, a variety of data, which has been collected from the site, will be examined and evaluated to show the findings out of existing situation of study area.

Chapter five, which is the final chapter, summarizes and connects all discussions to achieve a holistic approach for the initial step of sustainable brownfield regeneration programs. In this regard, the outcomes of this study will demonstrate the opportunities and importance of SBR programs in the city of Nicosia.

In summary, it can be said that this research structured to make a comprehensive and analytic review on literature, knowledge, and experiences related to brownfield issues to develop a guideline for further studies and adopt a case (Nicosia) to the first initial step of that guideline (Figure 1).

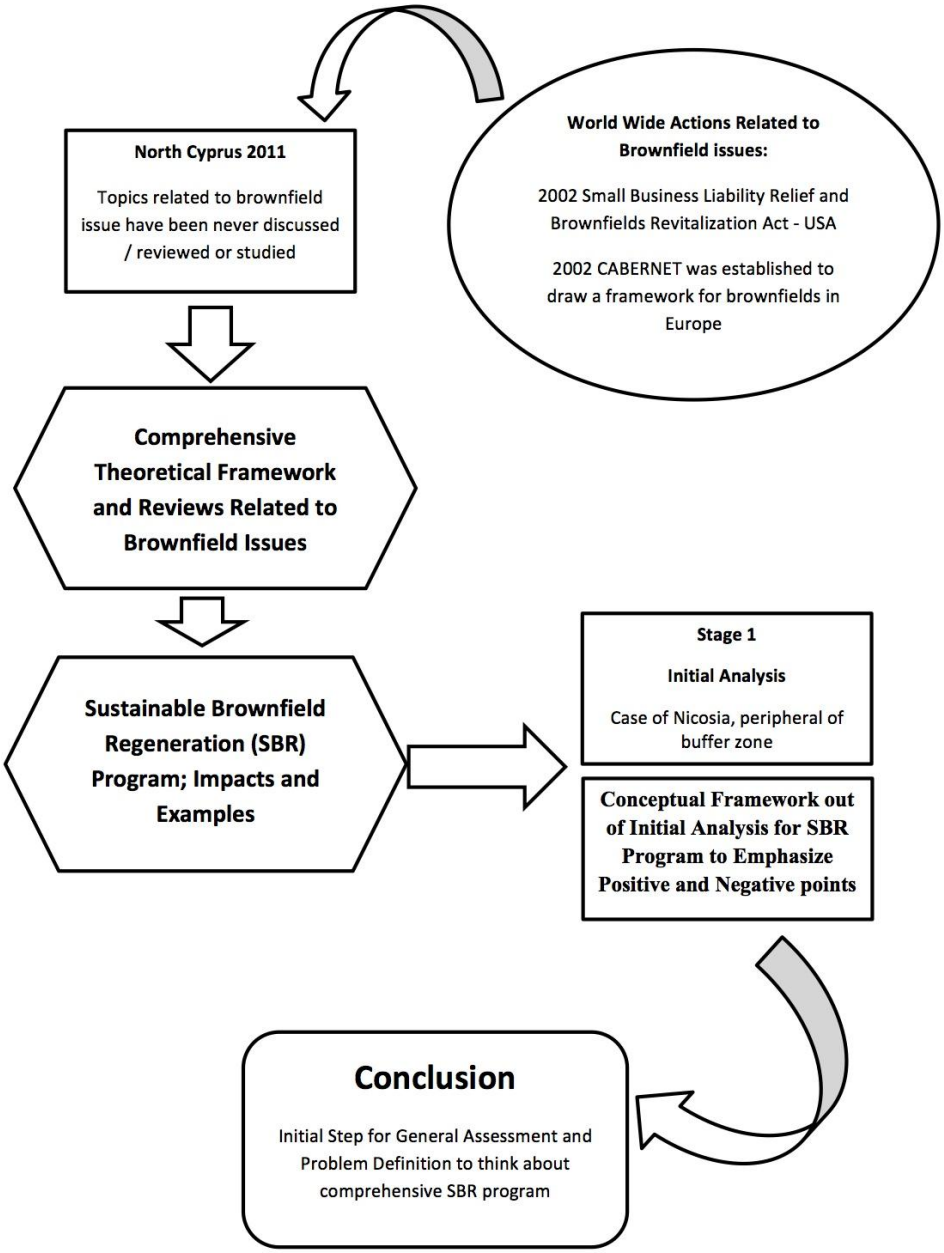

Figure 1: Structure of the thesis

Chapter 2

A REVIEW ON BROWNFIELD REGENERATION

2.1 Introduction

In this chapter, the focus of study is on theoretical discussions on brownfield issues, regeneration and sustainability concerns, and collects recent data and debates about brownfield issues in macro level, and also in particular it wills overview the history of brownfield, and evolution of policies, which have arisen in respect to these problematic locations. Then it will study the types of brownfields and strategic implementation programs.

Accordingly variety of brownfield's definitions will be explored and an overall definition of brownfield sites will be offered in this chapter, to be a base for this study. Then the sites with brownfield status will be classified according to their character. This classification will help to identify brownfield sites within the problematic urban environments. Finally impacts of brownfield sites will be explored and option of regeneration will be discussed to finalize the summary of this chapter which will connect all these general studies to make a solid conclusion, decoding, and grouping the findings to provide a basis for next chapter, which will focus on sustainable brownfield regeneration (SBR) and its impacts in different dimensions.

Accordingly, it will explore the relationship between urban regeneration and sustainable development, and then the summary and conclusion section will connect all these general studies to make a solid conclusion, decoding, and grouping the

findings to provide a basis for next chapter, which will focus on the impacts of brownfield regeneration in different dimensions. These impacts will be explored according to the example studies.

2.2 History of Brownfields

19th Century to Mid-20th Century

The storyline of brownfield sites started from the beginning of industrial cities at the glance of industrial revolution in 18th and 19th century. The most important of the changes, were the invention of machines, the use of steam, and the adoption of the factory system (Hackett, 1992). The towns and cities in North America and Western Europe grown up intended with industrial process and there were the product of industrialism. New way of production that human have never experienced before, brought by mass production. And one of the needs of factories and mass production was huge armies of workers who needed accommodation and many other basic needs. In mid-19th century, those industrial cities became a fairly poor place, because of all their noise, affluence, pollutions, stenches and all those consequences which were the side effect of factories, and people did not want to live anymore close to those areas[1].

The shared beliefs and moral attitudes, which operate as a unifying force within those societies, brought the idea that the cities are not a very good place to live. The alternatives were the city and the countryside. First, suburbs in the late 19th century, which was an estate in a park, was made by the upper class, to get away from those problems and workers society. By the beginning of 20th century, eventually those

[1] For more information see the documentary movie "*The End of Suburbia: Oil Depletion and the Collapse of the American Dream"*, directed by Gregory Greene in 2004

suburb areas became a wonderful neighbourhood just out of centre of cities. Public transportation, railways and automobile movement, made the idea of suburb much more mature than only a countryside.

In mid-20th century suburb development projects were interrupted by the great depression of Second World War. Because of housing crisis[2] after end of the WWII, in North America a promise of emergency housing program to help solve housing emergency was lunched. The target of that program was 2,700,000 homes and apartments by the end of 1947, just two years after WWII. (OHE, 1941-53)

Similarly, Western Europe was dealing with the same housing crisis. Heavy bombing from 1940 onwards made millions of people homeless and when the war ended, large number of troops returned, therefore lunching a comprehensive emergency housing program was the priority orders of governments. Also, since 1945 in Australia the same strategy has been applied.

Early Discussions on Brownfield Issues (1950s - 1990s)

As the result of suburb development idea and emergency housing program, from 1950s to 1960s, urban populations spread into suburban areas and then, rural land and places once reserved for heavy industry and waste disposal suddenly became the closed by area for new community at suburbs. Those industrial zones were affecting the new community health; therefore the time had come for new and strong laws against environmental polluters. Follow those laws manufacturing plants began shutting down, and after several years because of political reasons of post-World

[2] By the summer of 1946, about 10 million men and women had been released from the armed forces. Veterans along with the rest of American society settled down to rebuild their lives and one of their main needs was a place to live. For more information see American history about post WWII.

War II and the Cold War, the military bases also began closing, leaving behind polluted land with explosives and munitions.

In the 1980s, the value of land in the North America and Western Europe increased and old factory sites and military bases became attractive to developers. Suddenly those abandoned properties had turn into valuable pieces of real estate. The term brownfield was born in the late 1990s to describe those sites that are not being used to its fullest potential because of contamination. This term is also used opposite of term greenfield which describes uncontaminated or undeveloped rural lands. (Maczulak, 2009)

In 1990s, the identification of sustainable approaches to redevelopment[3] of inner part of industrial cities, where has started to refer as Brownfield sites, became an important issue in sustainable urban environmental planning process. These sustainable approaches clearly had been shown the associated issues, problem and potentials of brownfield sites and also helped to all stakeholders (Public authorities, private companies, community, and professionals/academics) to understand the importance of this issue (Beer & Higgins, 2000). Annual conference of mayors of the United States of America for the first time in 1993 entered the term brownfield into conversation. Mayor of Chicago claimed that in his city there are around 2000 sites that can be identified as brownfield. Next year the term Brownfield was coined as a contrast to Greenfield in morning call newspaper (Kunsman, 1994), a year after that

[3] "Our Common Future, Chapter 2: Towards Sustainable Development" Report of the World Commission on Environment and Development (1987) stated that Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: (1) the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and (2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. For more information see sustainable development section in http://www.un-documents.net

US Environmental Protection Agency (EPA) introduced the Brownfields Economic Redevelopment Initiative, hence in 1995 hundreds of towns and cities soon identified sites within city limits as potential restoration projects. (Maczulak, 2009)

Evolution and Development of Rules, Regulations and Policies in Brownfield Issues (1996 – 2010)

US Environmental Protection Agency (EPA) formed a multidisciplinary team in 1996 across the different department in government to work on brownfields to draw a national plan, which guides the future related works. EPA brownfield program aimed to support official authorities, communities and all stakeholders to work integrated by means of fastest possible time to clean up those properties and apply sustainable solution to reuse brownfields (CERCLA, 1996-2010). But in contrasting to EPA working group at the late 90s, an environmental committee[4] of UK parliament stated that it would be pointless having a policy to concentrate development in urban areas and brownfield sites when there is still no clear and strong definition of these areas available to official authorities and national government (Alker, Joy, Roberts, & Smith, 2000).

In 1999 the National Brownfield Association was created in Chicago, and nine years after the first time usage of the term Brownfield, in 2002 laws[5] related to the brownfield issue has been signed to the US government. These laws support and protect developers and landowners, which they are not responsible for any contamination discovered after they purchase property. (Maczulak, 2009)

[4] The UK Parliamentary Select Committee on Environment, Transport and Regional Affairs (1998)
[5] Small Business Liability Relief and Brownfields Revitalization Act was signed into law by President George W. Bush (2002)

Since environmental activists and professionals were lobbying to sign brownfield issue into law of USA, till present time Environmental Protection Agency (EPA) took over the main role of brownfield act in United States (North America). EPA's Office of Brownfields and Land Revitalization (OBLR) states that their main goals are to empower community revitalization and the sustainable redevelopment of contaminated properties by providing technological and financial support for the clean-up of contaminated properties to efficiently use them again (EPA, 2009).

According to Western European policies and acts about brownfield issues, in United Kingdom Planning Policy Guidance Note 3 (PPG3), which was published first time in 1992 towards the Urban Renaissance by the United Kingdom's Urban Task Force and the revision version of it in 2000, was the main guidance for brownfield issue till 2006. In 2006 the duties of the Office of the UK's Deputy Prime Minister (ODPM) shifted to the Department for Communities and Local Government (DCLG). Then after that duty shifts in 2006 the PPG3 has been replaced by Planning Policy Statement 3: Housing (PPS3). The third edition, which was published June 2010, has now replaced the first edition of PPS3 and now it is the main policy statement of brownfield issue in United Kingdom. At the same time in 2006 English Partnerships[6] published a comprehensive brownfield guide to assist government for enhancing high quality sustainable growth in England. Until 2011, this guide is one of the main guidance of brownfield issues in UK.

[6] English Partnerships is the UK's national regeneration agency which helping the Government to support high quality sustainable growth in England.

2.3 Definition of Brownfield

According to this research the definition of brownfield will be explored and categorized by two main areas of action, which are North America and Western Europe. USA, UK and European Union are the selected territories for exploration of Brownfield's Definition within their policies. Through history of brownfield regeneration it is proved that these two countries and European Union were the first bodies that investigate on researches and action plans of brownfield issues in the world. British, Europeans and American definition of the term "Brownfield" will be explained in following sections.

2.3.1 Exploration in Diversity of Brownfield's Definition

(A)- British Definition (PPS3)

In the UK, the term brownfield refers to previously developed land (PDL), and also the main housing policy objectives in UK, which provide the framework for planning through development plans and Planning Policy Statements 3 (PPS3) has drawn strategic decisions. According to PPS3 planning system should be flexible, and use the lands more effective and efficient, and in particular it should put its efforts to reuse brownfields. The definition of "Brownfield Sites" or in other words the PDLs in PPS3 has been replaced the Planning Policy Guidance Note 3 (PPG3) in November 2006. The slogan of PPG3 and also PPS3 is Brownfield first, Greenfield last, focused to draw a series of policy on sustainable development to make a better quality of life. The latest British definition, which has drawn by PPS3, is presented here:

> Previously developed land is that which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure. The definition includes defence buildings, but excludes:

- Land that is or has been occupied by agricultural or forestry buildings.
- Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
- Land in built-up areas such as private residential gardens, parks, recreation grounds and allotments, which, although it may feature paths, pavilions and other buildings, have not been previously developed.
- Land that was previously-developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings).

> There is no presumption that land that is previously-developed is necessarily suitable for housing development nor that the whole of the curtilage should be developed. (PPS3, Annex B)

(B)- European Union's Definition (CABERNET Network)

Europe's sustainable Brownfield regeneration network, CABERNET[7] which is the European expert network where located in United Kingdom, addressing the multidisciplinary approaches that are raised through brownfield regeneration issues. The aim of CABERNET is to improve the rehabilitation of brownfield sites through sustainable approaches to this issue and sharing experiences from across Europe. CABERNET has defined brownfields (CABERNET, 2006) as sites which:

> -have been affected by former uses of the site or surrounding land;
> -are derelict or underused;
> -are mainly in fully or partly developed urban areas;
> -require intervention to bring them back to beneficial use; and
> -may have real or perceived contamination problems (CABERNET, 2006)

The reason that in this definition CABERNET used '*may'* for contamination problems is to realize that any site with the characteristic of brownfield should be consider as brownfield site and it is not necessary to have contamination within the site.

[7] Concerted Action on Brownfield and Economic Regeneration Network (CABERNET) is a multidisciplinary network comprising six expert Working Groups that aims to facilitate new practical solutions for urban brownfields. for more information see http://www.cabernet.org.uk

(C)- American Definition, EPA

Since mid-1990s, US Environmental Protection Agency (EPA) Program related to brownfields issues has investigated programs that have changed the way contaminated, underused and previously developed properties/lands are perceived, addressed, and managed. Through signing brownfield policies into US laws, the effective related policies of EPA, which has been developed in several years, have been applied into that law. According to US public law (107-118 - H.R. 2869), the term Brownfield sites in general means:

"Real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (EPA, 2009).

Sustainable brownfields regeneration supported by brownfield related laws to act as the new tools for private and public partnership. EPA defines brownfield sites as "abandoned, idled or under-used industrial or commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination" (EPA, 2009).

2.3.2 Overall Definition of Brownfield Sites

The definitions' exploration of the term "Brownfield" clearly shows that there is no exact common definition for this term. Although some sites under the British definition can be considered as brownfield, at the same time it would not be under another definitions such as European and/or US definition. Correspondingly Nathanail (2011) developed comparison table (Table 1) of Brownfield definitions according to UK, USA, and Europe.

Table 1: Comparison table of Brownfield definitions (Nathanail, SBR, 2011)

Site Type	Land use		Definition		
	Land Type	Current Function	Europe	UK	US
Former Department Store	Derelict	Place of worship	No	Yes	Yes
Former landfill	Derelict, contaminated, geotechnical unstable	Mixed commercial and retail	Yes	Yes	Yes
Former mine	Derelict and locally contaminated		Yes	No	Yes
Historical Fortress	Monument	Monument	No	No	No

According to this research and base on definitions which are discussed above the term "Brownfield Sites" is defined as previously developed land which are real (estate) properties and may occupied by a permanent structure in both built-up and rural locations. These areas have been affected by former activities on the site or nearby lands. Brownfield Sites generally are abandoned, derelict, idled or underused, and may have real or perceived contamination problems, where require intervention to bring them back to beneficial use.

This definition exclude agricultural/forestry buildings, undeveloped lands (Greenfield), previously developed lands, which have blended into the landscape in the process of time, land with special landscape in built-up areas, and minerals extraction or waste disposal lands.

2.4 Exploration in Contemporary Issues of Brownfield Sites

Since the definition of brownfield is related to the laws and policies, there are some differences in the definition from one country to another one (Nathanail, SBR, 2011). Classification of brownfield sites is depending on the definition and the viewpoint to its regeneration process. The classification of these sites can be varying from country to country, and region to region. According to this research brownfield sites are classified (Figure 2) base on their types regarding to overall definition by this research. Also is good to consider that this classification is relatively similar to identified categories of brownfield lands by National Land Use Database (NLUD)[8] of UK. (LDA, n.d.)

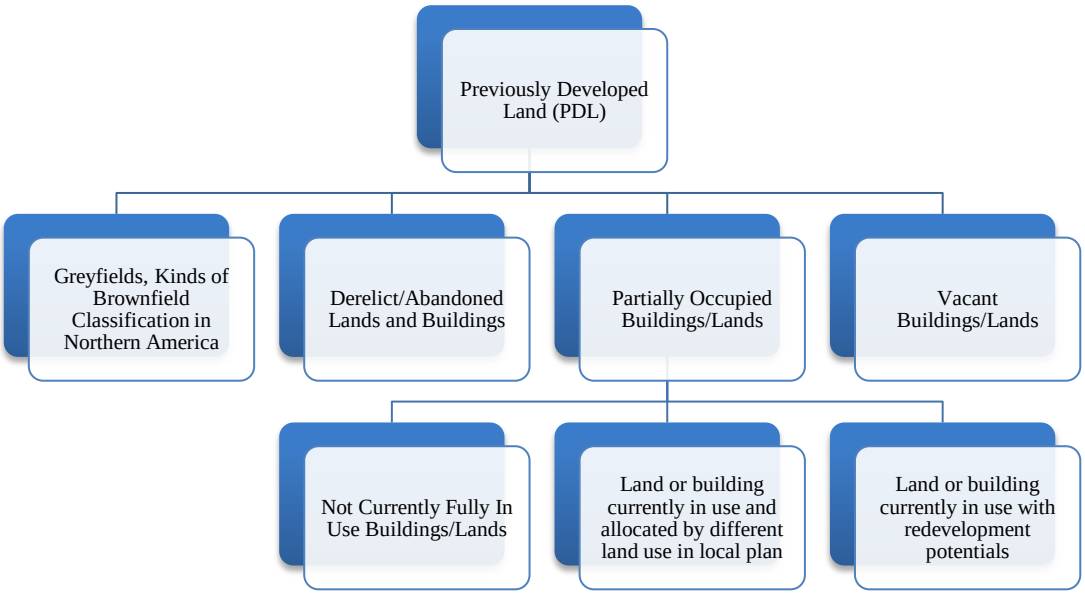

Figure 2: Classifications of Brownfield Sites

[8] NLUD manages the National Land Use Database of Previously Developed Land (NLUD-PDL) on behalf of UK's government. The database contains information on previously developed land and buildings in England that may be available for development and is updated annually (NLUD, 2008-2010). For more information see http://www.homesandcommunities.co.uk

2.4.1 Previously Developed Land (PDL)

Although in the United Kingdom they are using the term "brownfield" as synonym to previously developed land or simply "PDL", it cannot be said that all PDLs are brownfields and also these lands do not have to be derelict or abandoned. Accordingly PDLs has been defined as a base for definition of brownfield sites, in case that the PDLs be derelict, abandoned and vacant. Also these kinds of sites may have been affected by its previous use, which can have real or perceived contamination, and need multidisciplinary intervention to bringing back those problematic spaces to beneficial use. The intervention process should be done by participation of all stakeholders who are officials, land owners, consultants, developers, funders, insurers, researchers, educators, investors, technology providers, lawyers and, community groups (Nathanail, General approach of Brownfields, n.d.). The important issue in this process is respecting democracy in participation.

2.4.2 Derelict/Abandoned Lands and Buildings

As the result of urban development of post-World War II and expansion of cities toward the rural areas, which has been explained in history section of this research, there are many industrial/commercial buildings and their related lands which are left over for many years, these types of previously developed lands which are now abandoned and derelict is known as "brownfield sites". These kinds of properties are damaged by previous activities that make them unable for effective use without intervention and treatment. Mostly these buildings[9] and lands (PDL) have private owners who wish not to reopen them or reinvest in those areas, and there are derelict and abandoned for many years. Because these properties had been left over without

[9] Include constructed area and its surrounding lands

cleaning up, many of them still have contamination issues, and also it is expensive to un-contaminating those sites, therefore it has problems in attracting new investors.

Consequently as the impact of these lands, there is high unemployment rate, in those areas, which cause socio-economic problems and has adverse effects on urban life. These social conflicts may appear as somehow slum neighbourhood in those sites or the sites, which were affected by them in those areas. This cause decrease in tax income and it is worsening the situation. Examples for these kinds of properties are closed factories, former military bases, disused warehouses, closed petrol stations, derelict office blocks, discarded railway lands, and etc. (NLUD, 2008-2010).

2.4.3 Vacant Buildings/Lands

The terms “vacant” and “abandoned” are often used when talking about brownfields and we should know that there is significant difference between vacant and abandoned/derelict buildings or lands. Oxford Dictionary defines “vacant” as “empty; not occupied” and the word “abandon” is defined as “leave (a place or vehicle) empty or uninhabited, without intending to return; give up completely”. Therefore it can be conclude that the difference is related to owner behaviour.

A vacant building/land is a property that may be empty or unoccupied, but there exists an owner with an expressed interest in the building. An abandoned building/land is a place where there is no clear owner of the place or the owner will not take reasonable steps to maintain the property, the main characteristics of abandoned places are unsecure environment and physically poorly maintained. Consequently abandoned places should always be vacant, but vacant properties are not necessarily abandoned (Daley, 2011). In vacant properties when the issue is

specifically about lands it should be consider that vacant land have no permanent structure or have buildings with low value. (Parker, Juntunen, Goodman, & Coddington, 2009)

Examples for these kinds of properties are unoccupied residential complexes, closed or bankrupt properties in macro or micro scales such as military or civilian's airports, old fashion/technology factories (in macro scale) which are closed and need loan or new investment to upgrade and reopen, and many other properties which have left empty for long time. In micro scale houses that are empty for sale/rent (transition[10] of ownership) or just extra property as some kind of family investment can be a good example. The vacant properties include buildings that are not functioning any more or where they do not have permission for their former use.

2.4.4 Partially Occupied Buildings/Lands

Partially occupied lands can be referred to partially vacant land. In both phrases somehow part of the land is occupied and other parts are left empty. The portion of vacant part of these lands is large enough for further development. These lands can be categorized in three categories; (1) not currently fully in use, (2) land or building currently in use and allocated by different land use in local plan, and (3) land or building currently in use with redevelopment potentials. These lands in some way occupied by a use but contain enough land for further subdivisions, but may not be capable for further development without intervention.

[10] One example that fire departments use, is "transitional building" that is in the process of changing ownership, but is uninhabited, such as the sale and transfer of ownership of a single-family residential dwelling to other ones. (Daley, 2011)

Correspondingly, the characteristics of these lands are significant with physical, environmental or infrastructure limits to development. In discussions about partially vacant lands, sometimes it is referred to "Constrained Land", where its Physical constraints include manmade steep topography, and may contain some contaminations. Environmental constraints of these lands include on-site wetlands, floodplains or significant riparian areas, and infrastructure constraints include inadequate public facilities. (Parker, Juntunen, Goodman, & Coddington, 2009)

Not Currently Fully In Use Buildings/Lands

These types of properties are the lands that partially occupied and may contain a low value of improvements relative to the value of the land. This can refer to type of definition of brownfield[11] sites which have been offered by London Metropolitan University; it says "brownfield are the site which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized" (LMU, 2007).

Land or building currently in use and allocated by different land use in local plan

This type of brownfields explain the sites which are currently in use, however there are some buildings within the site that may have been vacant or unregistered/temporary structures which has no proper or permitted function in land use of local plan. These sites mostly are the result of derelict properties, which have

[11] Brownfield Land is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. The land may also be vacant, derelict or contaminated but excludes parks, recreation grounds, allotments and land where the remains of previous use have blended into the landscape, or have been overtaken by nature conservation value or amenity use (LMU, 2007). For more information see http://www.londonmet.ac.uk

been occupied by self-decisions of users. According to this research if these sites are not in historic urban quarters, then it can be marked as brownfield sites.

Land or building currently in use with redevelopment potentials

These types of brownfields are located in potential areas for redevelopment, which have no planning permission. These areas include sites which are currently in use, however there are some buildings within the site that have been vacant for a portion of time and the owners of these properties are not willing to reinvest or making any redevelopment/renovation in following years. (LDA, n.d.)

These sites are mainly currently in use in poor condition and users are mainly low profile people. The difference between these sites and the sites that are currently in use and allocated by different land use in local plan is that these site are not considered or allocated in local redevelopment plan and it may have random development by non-owners of these properties, however other discussed sites have planning permission and allocated in local plan, but because of abandoned situations, they have misused functions and problems.

2.4.5 Greyfields, Kinds of Brownfield Classification in Northern America

Different terms have been used for different types of development sites. “Greenfields” are undeveloped land; “Brownfields” are previously developed land, which may contaminated by its former activities and land use. In scientific and legal discussions about brownfield issues, the term “Greyfields” which is a new term is used interchangeably in documents published in North America, which means USA and Canada. In these regions they differ between contaminated previously developed lands (PDL) and uncontaminated PDL, they categorized Brownfield sites as

previously developed land which has kinds of contaminations; however Greyfields are marked as previously developed land which has no contamination at all.

In-depth study about the appearance's reasons of Greyfield sites shows that these types of PDLs are the result of changes since mid-20th to 21st century, which discussed in history section of this research. Changes included rapid expansion of cities, suburbs, sudden changes of demographical forms of urban setting and changes in post-World War II industries and technology. In the case of American dead shopping malls it is good to know that these properties mainly developed from 1950s to 1970s on Greenfield sites to be a good resource for suburbs. Because of development of roads and high ways, these sites were surrounded by mass of hard pavement instead of urban settlements and consequently it caused reduction in number of customers and no other option was available rather than closing them and leaves them behind (GQGP, n.d.).

Definition that offers by department of conservation and natural resource[12] of State of Pennsylvania says that Greyfields are "previously developed properties that are not contaminated. They are usually, but not exclusively, former commercial properties that may be underutilized, derelict or vacant" (Glossary of DCNR, n.d.). This definition is similar to overall definition offered by this research for Brownfields, which pointed out that brownfield sites May have contaminations, that means if the site is not contaminated then still it can consider as brownfield.

[12] For more information see the glossary of department of conservation and natural resource of State of Pennsylvania, USA, http://www.dcnr.state.pa.us

Moreover the guidelines of NAHB model of green home building guidelines[13] of US defined Greyfields as "any site previously developed with at least 50% of the surface area covered with impervious material" (NAHB Guidelines, SITE PLANNING AND LAND DEVELOPMENT, n.d.). This definition has been covered by the classification of Brownfields, which has discussed in pervious sections of this study; partially occupied land, which is not currently fully in use. These types of PDLs are usually abandoned, obsolete and old commercial areas, where left behind many spaces of commercial area which surrounded by grey asphalt. Unique real estate and community development challenges are the most important issues of these types of properties (Chilton, 2004). Accordingly the main characteristics of these kinds of PDLs are low levels of pedestrian activity, a high level of store vacancies, a large amount of unused parking, and declining building conditions.

2.4.6 Impacts of Brownfield Sites

The negative impacts of brownfield sites it not limited to the site itself, it may cover the lands that originally are not defined under brownfield sites; however they have obsolescence in different dimensions as the impacts of brownfields on them. Therefore the impacts of Brownfield lands to its surrounding environment make a bigger decline in whole environment. In more simple way it can be said that the sites next to or nearby brownfields are affected by the negative impacts of brownfield sites. In this section the study aims at reviewing the negative impacts of brownfields, which are affecting itself and its surrounding environment.

[13] For more information see National Association of Home Builders (NAHB) website, http://www.nahb.org

In one perspective brownfields are vacant and abandoned which are suffering from all those declines, but the bad scenario is, that is not only brownfields are suffering from decline situation, but also surrounding environment, which most of the time has no relation to the site is suffering from a bigger decline, which is the side effect of brownfields. In another perspective, sometimes these side effects are creating greater problems than the brownfield itself. These sites, which are under the pressure of brownfield's impacts, usually suffer from different dimension such as physical/environmental, socio-economic, and economic issues.

Problems of physical and environmental issues, which aroused by impacts of brownfields, caused decline in quality of social and economic structure of these areas. Almost low degree of interest in participation or reinvestment in those neighbourhoods, low rate of rent prices, leave of local inhabitants which caused no sense of belonging, changes in structure of ownership, lack of community support, and growth of crime is the most common characteristic of these areas.

All of these factors are taking role to make barriers for improvement of these decayed places. Risks that have associated with brownfield sites and its surrounding environment have shown in a report[14] (2007) of HSRC[15] to identify some important barriers. One of the important barriers is weak market demand for the affected area which makes the area lose its value due to decreasing in interest of investment, reduction of population and employment. The other barrier is actual or perceived investment risk which developers may see the enhancement action costs, the possibly

[14] Greyfield Sites and Greyfield Redevelopment Report (Environmental Update #27) Published by the Hazardous Substance Research Centers/South & Southwest Outreach Program in June 2007.
[15] The HSRC (Hazardous Substance Research Centers) is an EPA-funded consortium led by Louisiana State University, with the cooperation of the Georgia Institute of Technology, Rice University, Texas A&M University, and the University of Texas at Austin. For more information see http://www.hsrcssw.org

overvalue costs compare to original value of the land, and investment in a multi-disciplinary development program is risky in the market. Another barrier to the improvement of these areas is lack of leadership and sponsorship which communities may find it difficult to find the resources for further improvements (HSRC, 2007).

2.5 An Essential Review on Basics of Brownfield Regeneration

In the literature there are many proposals for the brownfield sites. The aim of all those solutions is to turn brownfields to functional and liveable space where it can function in beneficial use. All these solutions are relevance to the words with prefix "RE" which Nathanial (2011) call it "RE Concept", such as remediation, reclamation, redevelopment, and regeneration (Figure 3). According to recent discussions about brownfield issues, these solutions are most accepted tools. Related to the condition and type of brownfield sites, one or combination of these tools can be applicable.

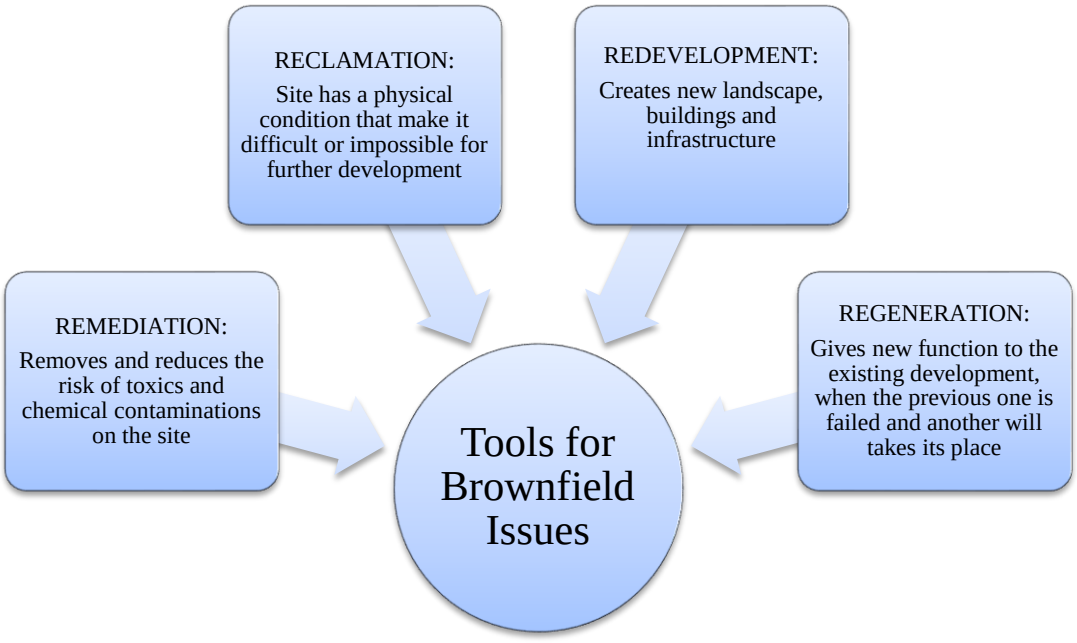

Figure 3: Solutions for Brownfield Sites

Most often in the case of contaminated site, the (1) remediation techniques will apply to remove and reduce the risk of toxics and chemical contaminations on the site. Another technique which is (2) reclamation is applied where the site has a physical condition that make it difficult or impossible for further development to turn it back to beneficial use. Then the other technique is (3) redevelopment, which is the step after reclamation and/or remediation, where it can create new landscape, buildings and infrastructure. As a final point the technique of (4) regeneration is applied to gives new function to the existing development, when the previous one is failed and another will takes its place, however the redevelopment option will not be effective, and consequently some restoration or renovating may be necessary. For example, Millennium Dome of London in 2000 had many visitors for its previous function, which was the exhibition centre, but after its failure to attract more visitors now it has changed to one of the popular music venue in the world (Nathanail, SBR, 2011). In this study the focus is on regeneration programs and the issues related to this concern will be explored in following sections.

2.5.1 Urban Regeneration

It is highlighted that since post World War II the evolution of methodologies and terminologies for development schemes has the main role in shaping urban transformation. In 1950s "Reconstruction" terminology has applied to reconstruction and extension of older part of cities, which were often based on master plan and suburban growths. 1960s was the age of "Revitalization" which was the continuation of reconstruction period and early attempt of rehabilitation. 1970s the focus went on neighbourhood scheme and the term "Renewal" was applied for it. 1980s was the years of major strategies and orientation of key diagrams of development and redevelopment flagship. These strategies have been applied in both inner part and

outside of cities, and widely in literature this period referred to the period of "Redevelopment". Since 1990s this urban transformation moved toward comprehensive form of policy and it focuses on integrated treatments in practice, which took the name of "Regeneration" period (Beswick & Tsenkova, 2002).

The word 'regeneration' is defined in Oxford dictionary as "the action or process of regenerating or being regenerated" which in the case of a place it means the action that gives a new function to an existing structures. The policies, which have arisen upon this term, are defined by the views of the politicians and professionals.

It is important to mention that urban decays, accelerated by rapid economic and social differentiation, which coupled with deterioration of the urban fabric in poor communities. Correspondingly, the evolution of policies and strategies to respond to these urban problems conclude that, the regeneration is an essential complex solution to solve these problems (Tsenkova, Urban Regeneration, 2002). In general, regeneration is defined as the improvement process of a place through physical, social, economic, and cultural investment. Respectively RegenWM[16] categorized regeneration to five categories, which are (1) Economic Regeneration, (2) Physical Regeneration, (3) Rural Regeneration, (4) Social Regeneration, and (5) Urban Regeneration. These categories identify the steps to a successful regeneration process, which is often happening by combination of all these key issues (Figure 4).

[16] RegenWM is an organization to promote and develop regeneration excellence in the West Midlands of UK. For more information see: http://www.regenwm.org

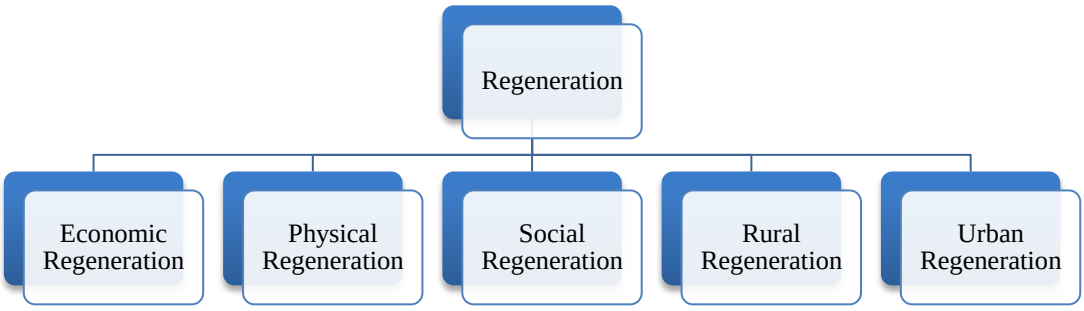

Figure 4: Categories of Regeneration by RegenWM

Exploration of these steps by RegenWM pointed out that *economic regeneration* is about interventions to failure of economic in declined areas such as physical and environmental improvements, supporting growing businesses, and developments of skills of people within their society to promote more job opportunities. Other step of regeneration is the *physical regeneration* which is the progress of enhancing problematic physical environments within a specific area to interest investors. The next step is *social regeneration* that aims to deal with poverty, deprivation and social exclusion in declined area, or within a specific group of people. This identification shows also the *rural regeneration*, which is out of our discussion however Tsenkova (2002) stated that one of the key factors in challenges of regeneration is environmental actions and green policies.

The main destination of regeneration process is the *urban regeneration*, which is the combination of all those key issues. RegenWM identified that urban regeneration process aims to turning declined communities and areas to fresh urban environment, which should be done through a holistic approach by means of physical, social, and economic regeneration programmes. In this scenario the participation of local

community in the decision making processes and public/private participation (PPP) are essential. It is what Tsenkova (2002) called it cities/places which are competitive, liveable, fiscally sounds good, and socially inclusive, which is the outcome of combination of all those actions. Correspondingly he stated that these actions in economic issues need new economic opportunities, economic diversification, and support for new and existing firms, and in social issues it need employment retraining, improvement in education and healthcare services. Additionally to these ones the parallel physical improvement is needed such as rebuilding city centre, improvement of housing, new social facilities, transportation, and etc. (Tsenkova, Urban Regeneration, 2002)

Achieve the Success in Urban Regeneration Program

A clear vision is what Tsenkova (2002) belives that is fundamental to urban regeneration and besides successful regeneration seems to involve a process of balanced incremental development. He emphasises five key instrumental factors of success in urban regeneration (Figure 5). These factors are (1) partnerships which are powerful factor for accelerating the process of change, (2) public sector that has a key role in providing strong leadership, (3) public investment which is a catalyst for change, (4) regenerating people, rather than places, and (5) most importantly the sustainability of result is the final key. It is important to know that relationship between the economic, social and political forces shaping urban regeneration and its impact in different cities. In the regeneration programs, diversity of approaches, sustainability of results and partnerships is the key, and it will result in successful urban experience. (Tsenkova, Urban Regeneration, 2002)

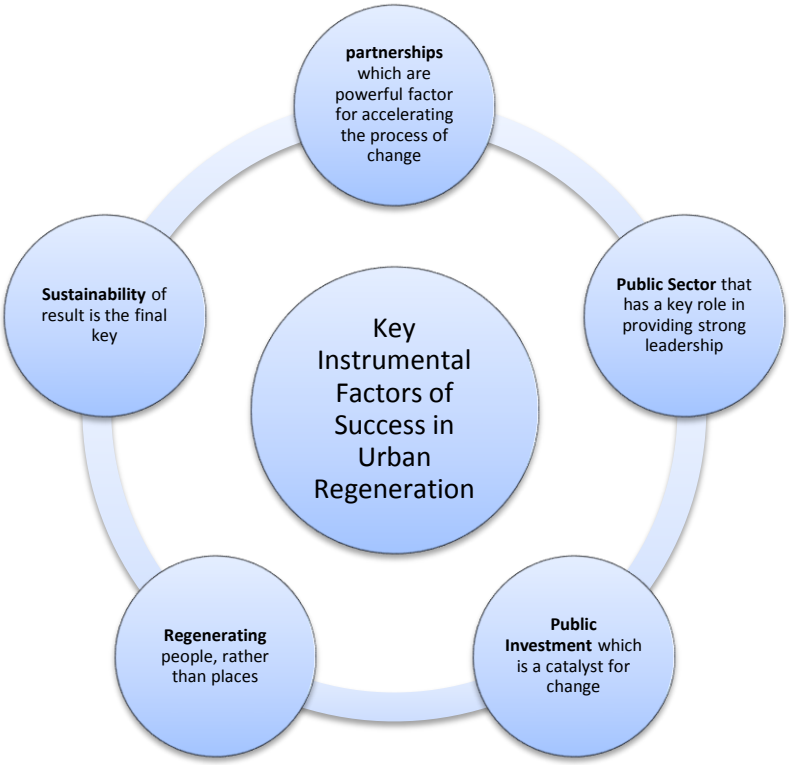

Figure 5: Tsenkova (2002) Five Key Instrumental Factors Of Success In Urban Regeneration

As Roger Madelin's[17] famous quote says that "Development is easy, but regeneration requires partnership" most successful urban regeneration is delivered when there is a balance in partnership between public authorities, private investors/companies (PPP), and of course the community. Correspondingly it can conclude that the key success in urban regeneration is social, professional/technical partnership based on the integrated moral vision of politicians and professionals, which are acceptable, widely by the community. Therefore the role of social and cultural issues is crucial alongside all economic and physical concerns.

According to this study, it can be suggested that a practical regeneration program should happen in a holistic way and based on multi-disciplinary understanding of the

[17] Roger Madelin is the chief executive of Argent Group. For more information see http://www.argentgroup.plc.uk/

social, cultural and economic issues affecting urban environment and the physical form of cities. Consequently it is better to concern socio-economic and socio-cultural issues rather than taking separately each of social and cultural and economic issues into consideration. These concerns will shape the core of urban regeneration alongside of regeneration process of physical environment (Figure 6). Despite of fact urban regeneration at many levels affecting the urban physical environment, so if it can catch the successful results, then it will protect and enhance the city's identity, local culture, community, and the built environment. Besides this partnership process will deliver a unique experience of spiritual and responsive relationships between people and urban spaces.

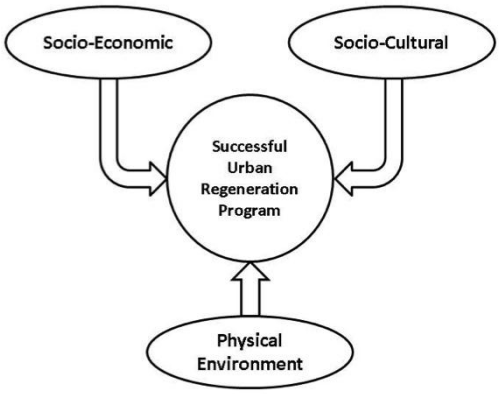

Figure 6: (Successful Urban Regeneration Process)

2.6 Summary and Conclusion

Brownfields are the footprint of industrial movements and began their appearance after the events of Second World War. Basically brownfield sites defined as previously developed land, which is abandoned, derelict, vacant, or partially occupied. Besides, these lands may have some kind of contamination. The term brownfield is defined in policies and laws of countries, then from one country to another country, and sometimes within a country there is some difference in the

definition. Overall accepted definition of brownfield, which is offered by this study, is based on European definition (CABERNET) with additional consideration to British and American ones.

According to this study which has discussed the overall accepted definition of brownfield sites in section 2.3.2 “Brownfield Sites” is defined as previously developed land which are real (estate) properties and may occupied by a permanent structure in both built-up and rural locations. These areas have been affected by former activities on the site or nearby lands. Brownfield Sites generally are abandoned, derelict, idled or underused, and may have real or perceived contamination problems, where require intervention to bring them back to beneficial use.

Parallel to the term brownfield, the term Greyfield is discussed in this chapter. This terminology has used in North America (US and Canada) to refer to the dead shopping malls, which are partially occupied land and have the huge vacant asphalt area. Since the characteristics of Greyfields are within the overall definition of brownfield sites, this study suggested that this terminology could also be used for sites that are nearby or next to brownfield sites, and are suffering from impacts of brownfields.

Accordingly the tools for brownfield sites has been discussed which act as solutions in different situations of brownfields, however depend of situation of the sites one or combination of all the tools should be used to turn those problematic sites to beneficial use. Therefore out of the strong idea of “RE” concept the option of regeneration and its different types, which are the tools for problematic urban

environment, has been explored, and the urban regeneration became the more dominant focus of this chapter. A clear vision is what Tsenkova (2002) belives that is fundamental to urban regeneration and besides successful regeneration seems to involve a process of balanced incremental development. In this regard the importance of partnership in urban regeneration programs has been emphasised to show the key instrumental factors of success in urban regeneration (Figure 5).

Chapter 3

SUSTAINABILITY AND BROWNFIELD REGENERATION: CRITICAL ELEMENTS, IMPACTS, AND EXAMPLES

3.1 Introduction

Unfortunately not only the real characteristics and problems of brownfields, but also in many areas the impacts of brownfields on urban environments are not clearly understood. Previous chapter discussed the issues related to brownfield sites and their impacts on surrounding environments. This chapter will explore the relationship between urban regeneration and sustainable development, which provides the base for sustainable brownfield regeneration (SBR). Since brownfields are the golden opportunities for cities and at the same time they are problematic places, the clear and deep understanding on impacts of sustainable brownfield regeneration (SBR) programs are essential.

SBR programs are not only reducing negative impacts of brownfield sites, but also improving the quality of life and enhancing urban environment. Accordingly there are three dimensions in SBR programs, which are affecting the urban system. These are physical/environmental, socio-economic, and economic dimensions, which have very important impacts on urban environment. The satisfaction and benefit/advantage of these impacts out of SBR programs become really important when the program is applied on vacant and/or abandoned brownfield sites, where the regeneration project is not profitable (Ferber, Grimski, Millar, & Nathanail, 2006). In

this condition, public sector is the major actor like a catalyser to provide an acceptable situation for private sectors and community partnership.

Beside the impacts of SBR program, this study will make an overview on critical elements in process of sustainable brownfield regeneration (SBR) program such as stakeholders and their role, benefits and barriers to SBR programs, and the brief information on risks in the process, and the way of assessment and management of the risks. These three elements will be explored in the beginning of this chapter to show the initial issues in steps of SBR program.

Accordingly the aims of this chapter are to provide a clear understanding of sustainable brownfield regeneration (SBR) programs and explore its impacts in different dimensions, to give a better understanding of the issue about transformation of brownfields to effective urban land use. Besides through exploration in successful examples of SBR programs, this research will review the practical issues to make better understanding of the impacts of SBR programs and finally produce a guideline for process of SBR program out of all discussed theoretical issues.

3.2 Sustainable Development and Brownfield Regeneration

The term Sustainability in urban and development discussions is often related to the term Sustainable Development. When the focus of sustainable development comes to brownfield issue, the role of development will replace with the role of regeneration. Accordingly, Dixon (2006) pointed out that the term “Sustainable Brownfield Regeneration” (Figure 7) is widely used in the globe, which consists of the “Sustainable Development” and “Brownfield Regeneration” as the two main key

policies. However still there are some debates about sustainability that says it is not clear what should be sustains? These issues will be explored in following sections.

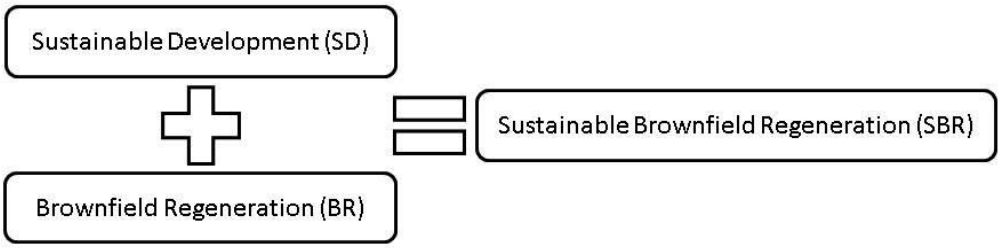

Figure 7: (SD) + (BR) = (SBR)

3.2.1 Debates on Sustainability and Sustainable Development

Although the main theme of sustainability and accordingly sustainable development is "Securing the Future" (HM Government, 2005), Dixon (2006) identified that there is a big question on sustainable development which says that "which elements of a development need to be sustainable?" Is it the regeneration process, the planning, or in the micro level is it the building itself? Moreover, there are questions such as what should be sustained and how should it sustain?

About 30 years ago there is many lobbying for sustainability in environmental and development departments of many governments, in many cases the practical result of current model of development are unsustainable. Marcuse (1998) argued that sustainability should not be a goal for a development program, which has seen that several bad programs are sustainable, and then he suggested that rather than taking sustainability as the goal for any program, it should be one of the criteria's of achieving the goal. According to his argument nowadays is cleared that if sustainability become a goal who actually has everything will gain benefit out of

sustainability, in other way in the case of environmental and urban decays the problem is not that the situation cannot be sustained, the problem is that these conditioned should not be sustained. (Marcuse, 1998)

The fact in sustainability concerns and sustainable development is the journey, which is the most important key factor in this issue, which can be related to the sustainable regeneration journey (Nathanail, SBR, 2011) rather than destination and target. This journey should sustain in meets the essential needs of people for now and future with the balance within all indicators such as social, physical, economic, and environmental concerns.

3.2.2 Sustainable Brownfield Regeneration (SBR)

Sustainable brownfield regeneration, as it was discussed in previous sections, is the result of combination of sustainable development and brownfield regeneration. This regeneration program is for turning back the insufficient land (brownfields which may or may not contaminated) to beneficial use. Through the journey of sustainability and by following the principles of triple bottom line, the vision of brownfield regeneration should be sustainable for the long-term. Indeed it is important to mark that the main theme of sustainable development agendas for purpose of brownfield regeneration is the reminder of "how future generations can enjoy similar resources and opportunities to the ones we presently enjoy?" (Dixon, Raco, Catney, & Lerner, 2007)

Brownfield sites often located in the inner part of cities, and they are the golden opportunity for governments to find the solution for growing population and need of new lands for development. Moreover regenerating brownfields will reduce the

pressure on greenfields and preventing urban sprawl, which make the cities more sustainable compact urban areas. These decays, which are resulted of brownfields in inner part of cities, have caused urban poverty, neighbourhood with low-income residents and high rate of unemployment. (Barnekov, Boyle, & Rich, 1989). Therefore, brownfield regeneration can be considered as relationship between technical and socio-economic concerns.

Within the framework of triple bottom line, RESCUE (2003) delivered a European widely accepted definition of sustainable brownfield regeneration:

> The management, rehabilitation and return to beneficial use of brownfields in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context" (RESCUE, 2003).

The exploration in this definition shows that this new methods of development need a reconsideration of the complex relationship between economic growth, the planning and implication of new urban environments, the reformation of government strategies, and the enhancement of place identity (Raco, Henderson, & Bowlby, 2007). Then Raco et al. (2007) have suggested that the successful sustainable brownfield regeneration need to have a clear and strong vision, which is very important in scheme of development practices. The strong vision defines the direction and time of correct development program, and correspondingly it help to draw the form of final result and assessing its impact. Their debates in favour of strong and clear vision for sustainable brownfield regeneration program pointed out that, the vision defines success, failure and policy directions.

In many developed countries, a key component in a new "green agenda" is the sustainable brownfield regeneration. This is what that Dixon *et al.* (2007) stated the "brown is the new green" and then he noted that ways of regeneration brownfields is really critical, because the development and built environment that it provide should sustain over the time and delivers liveable space. Accordingly he raised a big question, which he believes only time will tell the true answer to it: "Can we develop sustainable cities that really will stand the test of time?" (Dixon, Raco, Catney, & Lerner, 2007).

3.2.3 Brownfield Regeneration as a Tool to Achieve Sustainable Development

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987); this is the widely accepted definition of sustainable development from Report of the World Commission on Environment and Development (WCED) which popularised the concept of sustainable development since 1987. The key concept of this definition is "satisfaction of human needs and aspirations in the major objective of development" and the goal of it, is to achieve the better quality of life.

The clear requirements of sustainable development are economic growth, social justice and socio-cultural development to ensure equal opportunities for everyone. Furthermore the main objection of sustainable development is against the way of life that compromises the ability of future generation to meet their essential needs. It also cleared in the report of WCED that none of the major problems such as poverty, environmental decay, and population growth can be solved in an isolation method, they all need to develop alongside of each other to achieve success in their development program. Accordingly, Dixon (2006) states that sustainable development attempts, promotes economic growth, with enhancement of social

inclusion and reduces environmental impact. These concerns are what often referred to “Triple Bottom Line” which draws the main policy of sustainable development. Triple bottom line has defined by three elements, which are social, environment, and economic factors, and in some places it referred to the similar elements, which are planet, profit, and people.

Six “Core Ideas” of sustainable development that noted by Jacobs (1999) have shown the structure of the term. These core ideas are (1) environment-economy integration, (2) Futurity, (3) Environmental protection, (4) Equity, (5) Quality of life, and (6) Participation. (1) Environment-economy integration is about leads the programs to ensure that economic growth and environmental protection is integrated in all development programs. (2) Futurity concerns are other key factor of these core ideas, which are about the impact of in progress actions on future generations. Moreover the (3) environmental protection focuses on controlling the sufficient use of resource and reducing the environmental deprivation. Till here the main focus was on environmental and economic concerns, then the other next three core ideas are about social and justice issues which lead the idea to (4) equity to meets the basic needs of current generation and between future generations. Furthermore another core idea in this regard is (5) quality of life, which pointed out that people welfare, needs more than just economic growth. Then as the last item in these core ideas, the (6) participation of all stakeholders is required in any development program to structure sustainable journey. (Jacobs, 1999)

According to this study, as it was discussed before, in the case of brownfield sites, role of development would be replaced with regeneration program. Indeed, as Nathanail (2011) said, *sustainable regeneration program is a journey, not a target*.

This means that the journey of sustainable regeneration in brownfield sites includes many series of remediation, reclamation, redevelopment, refurbishment, and many other "Re Concepts" of development issues. Therefore it can be stated that right regeneration is regeneration that sustain in its successful results. Correspondingly Dixon *et al.* (2007) noted that economic policies should not be isolated from social and environmental issues; therefore the principle of sustainable development is fundamental in macro level's key factor of public policies.

3.3 Three Critical Elements in Process of Sustainable Brownfield Regeneration (SBR)

In the process of any SBR programs there are many critical issues that should be considered in the strategic planning and implementation process, these issues are based on social, cultural, economic, and environmental perspectives that it discussed in previous sections. Correspondingly according to literature it can be summarize that there are three critical elements that should be involved in any SBR programs, and people who involve in strategic planning stage should be aware of them. These elements are (1) Actor's Network, (2) Benefits and Barriers to SBR, and (3) Risk Assessment and Risk Management" which shape the form of final result of SBR programs.

As it has been noted before, to be aware of these elements has an important role in decision-making process. Level of awareness in macro and micro scale of benefits and barriers to any SBR programs, clearly help in decision making process to identify the realistic dimensions of it and to know what will they gain and how limited they are. Another important element is the actor's network or what often

referred to stakeholders. The role and shares of all stakeholders in the process has a key factor in success of any SBR program, in this regard the concerns of democratic participation is another key. Then assessment and management of potential risks in the process and also in the result will help to reduce and prevent trends in the project.

3.3.1 Stakeholders' Network and Their Role in SBR programs

In brownfield regeneration programs there are many stakeholders who participate in the process, and generally the range of stakeholders is related to the size and complexity of program. Exploration in policies and academic literatures show that many types of groups and organizations take an important role in SBR programs. These organizations and groups can be categorized in three categories. These three categories are (1) public sector, (2) private sector, and (3) community organizations, and there are many actors involved in these groups (Tsenkova, Partnership in Urban Regeneration, 2002).

In this regard, public sector provides tax incentive, subsides, grants, financial supports, knowledge/expertise in urban planning, social service, and infrastructure to ensure the participation of private sector. Moreover Tsenkova (2002) noted that public sector should make balance in challenges between principles of productivity and equity. Public sector is covering by all related departments in national and local level of government and governmental institutions such as environmental agencies, planning agencies, economic departments, local governments, and etc.

Accordingly the private sector, which corporate to coordinate the decisions has two main characteristics, first characteristic is that they have the ability to assume development risk, and also they provide job opportunities and skill trainings for local community. Private sector, which simply is the market, includes investors, such as

trust and loan companies, banks, insurance companies, properties developers, technical consultants, legal counsels, and businesses (Tsenkova, Partnership in Urban Regeneration, 2002).

Community organizations, which are basically non-profit organization, are willing to participate in decisions. According to the concept of voluntary groups, community organizations are independent from governmental system and they will act as advocates in SBR programs. These kinds of community organization include charities, NGOs, interest groups, community representatives, and non-profit organizations.

Similar to these three groups, which were identified by Tsenkova (2002) in Canadian literatures, respectively CABERNET that is a European network of experts identified eight stakeholder groups who act in SBR programs. CABERNET believes that in this multi-stakeholder manner, democratic participation and equity are the key items that drive the SBR program. These eight working groups are:

1. **Financiers** (representing banks, funding organisations, insurers, etc.)
2. **Technology Suppliers** (representing contractors and technical, etc.)
3. **Academics and other researchers** (representing technical institutes, universities, etc.)
4. **Landowners** (representing leaseholders, private sector landowners, etc.)
5. **Developers** (representing private and public sector developers, etc.)
6. **Regulators and Policy Makers** (representing national ministries, regional authorities, local authorities)
7. **Community Groups** (representing NGOs, etc.)
8. **Professional Advisors** (representing architects, consultants, engineers, environmental specialists, property specialists, etc.) (CABERNET, 2006).

Accordingly Nathanail (2011) noted that these multi-disciplinary approaches to SBR programs need expert people with special skills, who have the ability of democratic

teamwork, strong communication skill to communicate, understand, and respect different perspectives of other team members and stakeholders, and having special willingness to the program. These groups will shape the actors' network, and this network can be significant to drive the SBR program towards positive ways (Doak & Karadimitriou, 2007).

In matter of democratic participation inside the network, all stakeholders equally should be aware of economic necessities, governmental policies, program requirements, risks, and opportunities within the program, which structuring the process of SBR. Consequently this structure within the process of SBR effect actors' behaviour, however actors' decisions shape the structure of SBR process (Doak & Karadimitriou, 2007). In this regard Doak *et al.* (2007) identified a network of actors and main driving forces which structuring the process of SBR. Through combination of network of actors and driving forces, a complex set of relationship network (Figure 8) with variety of inputs and outputs will appear. This complex relationship network explores the role of stakeholders and structures in SBR programs. Actors in this network are:

- Investors
- Developers
- Landowners
- Utility companies
- Government agencies
- Local authorities
- Amenity/Environmental groups

- Residents/Communities
- Occupiers
- Construction companies
- Engineers
- Agents
- Architects/Urban Designers
- Lenders

According to Doak's *et al.* (2007) study, five driving forces, which are structuring the process of SBR, are (1) economic forces, (2) political forces, (3) legal forces, (4) ideological forces, and (5) cultural forces. The element within each force (Table 2) shown in a table that adopted from that study.

Table 2: Five driving forces, which are structuring the process of SBR (Doak & Karadimitriou, 2007)

	Forces				
	Economic	**Political**	**Legal**	**Ideological**	**Cultural**
Elements within the Forces	Demand/supply	State institutions	Property rights	Values	Professional norms/codes
	Market institutions	Other institutions of governance	Citizenship rights	Political ideas	Forms of knowledge
	Accumulation imperative	Policy processes	Legislation	Conceptions of justice	Language
	Development costs	Policy objectives	Case law		
		State powers and resources	Legal challenge		

As it was noted before, these forces influence the behaviour of actors in SBR programs, and through their decisions, SBR program will shape its structure. These forces and decisions have an interchangeable relation, which forms the comprehensive setting of relationships. These setting of relationships between forces and actors have drawn the concept of partnership, which in many policies and academic literature widely referred to public-private partnership (PPP). This kind of partnership includes public sector, private sector, and community, which are the soul of concept of sustainable regeneration process.

Although partnership and democratic participation has many benefits such as more effective use of resources, combination of powers, evaluation of urban problems in more complex condition, equal involvement of different perspectives, and production of more concentrated action plan, there are number of disadvantages caused by diversity of partnerships' setting. One of the disadvantages is difficult condition to manage and coordinate the different perspectives; sometimes there are unequal influential power and capacities of partners, which is another disadvantage, and also variety of interest may cause different objectives and priority of action (Tsenkova, Partnership in Urban Regeneration, 2002). Then to cure these disadvantages it strongly suggested having an equal balance in partnership, which may be led by fair and willingness public sector. Therefore as Tsenkova (2002) noted the "public sector has a key role in providing strong leadership" (pp. 83) and he believes that the catalyst for change is strongly available through participation of public sector in investment, beside supporting private sector, and to make sure the community involve in the process of SBR programs. All these discussions led the direction of public-private partnership to complexity thinking of all actors that needs the dynamic relationship (Doak & Karadimitriou, 2007). As a result it can be stated that

successful SBR strategies and implementation can be achieved through structure of democratic partnership approaches.

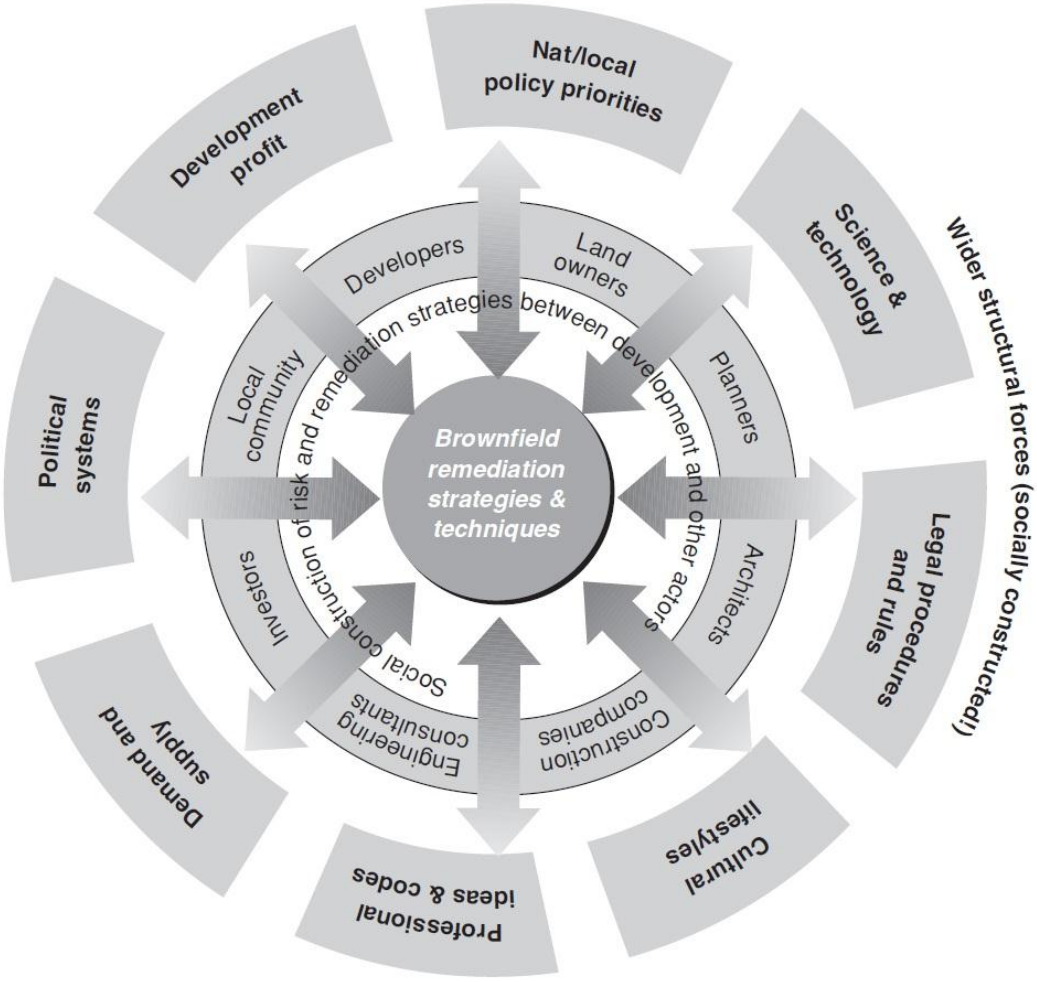

Figure 8: "exploring the role of 'agency' and 'structure' in the brownfield regeneration process" (Doak & Karadimitriou, 2007).

3.3.2 Benefits and Barriers to SBR

Benefits of SBR Programs

Benefits that come with any SBR program are usually not easy to be measured in a quantitative method, however the benefits will acquire in a long-term results and it is more qualitative. Of course there are some short-term benefits through improvement

of physical environment, but as the long-term returns, regenerated area will gain social, cultural, economic, and environmental improvement.

Due to rapid growth of population in most of developed and developing countries the resources become more limited, therefore as it was noted before, brownfields are a golden opportunity for further developments.

In this regard, Dixon (2006) noted that benefits of returning brownfields to sufficient area is not limited to beneficial use of available lands and preventing the pressure on greenfields, but also reuse and improvement of existing infrastructure and aiding to regeneration of deprived places and communities. In this regard, from micro level to macro level of government and community, will gain benefits out of SBR programs. The range of group, which are achieving benefit out of these programs, is started from neighbourhood, municipal and local government level to provincial level and also national level.

In 2003, National Round Table on Environment and the Economy (NRTEE)[18] of Canada drew a brownfield redevelopment strategy, which clearly marked the benefit's dimensions in SBR programs. These dimensions are the same as the area of sustainable development and it's a kind of practice of it, which are economic, social, and environmental (Table 3) that will be explored in this study.

The potential benefits within economic dimension are floating from the process of SBR programs which offer many job opportunities to community and it goes to final

[18] The National Round Table on the Environment and the Economy (NRTEE) was created to "play the role of catalyst in identifying, explaining and promoting, in all sectors of Canadian society and in all regions of Canada, principles and practices of sustainable development." Specifically, the agency identifies issues that have both environmental and economic implications, explores these implications, and attempts to identify actions that will balance economic prosperity with environmental preservation. For more information see http://www.nrtee-trnee.com/

results that increase the income and capital taxes for all level of government and attract new investor to the area which make it a competitive place. Furthermore because usually brownfields located within the cities, governments have the opportunity to use existing infrastructures and not to develop and invest for new ones.

The benefits, which are laid in social dimension, can lead the society to experience more sustainable community, which promotes a healthy social life. These can be happened by full participation of all stakeholders through developing affordable housing, mixed-use neighbourhood, and compact form of urban spaces which will improve the quality of life of residents. This scenario will regenerate neighbourhoods and communities, bring the new community places, and locating recreational facilities and work places closer to residential areas, besides it promote more job opportunities in the area.

Table 3: Benefits of SBR (NRTEE, 2003)

Dimension of Benefits in SBR Programs		
Economic	Social	Environmental
• creation and retention of employment opportunities • increased competitiveness for cities • increased tax base for all three levels of government	• improved quality of life in neighbourhoods (people can live closer to work and recreational facilities) • removal of threats to human health and safety • Access to affordable housing.	• reduced urban sprawl pressures on greenfield sites around a community • restoration of environmental quality in the community • Improved air quality and reduced greenhouse gas emissions in urban areas.

Basically developments on greenfields associated with pressure on nature and rural areas; also it is not friendly with public transit and pedestrian paths, therefore in environmental dimension the focuses are on preventing urban sprawl, improving environmental quality, health, and safety. The SBR programs which often applied to older inner sites of cities can be an alternative opportunity to urban sprawl through cleaning up the contaminated sites, restore environmental quality, support transit oriented development (TOD), and promote more vibrant, liveable, walkable, and compact urban environment. According to literature, general benefits out of any SBR program are:

- Promoting sustainable urban living
- Protecting and reducing the pressure on greenfields
- Returning the problematic places and decayed areas to wellbeing condition according to economic, social, and environmental perspectives
- Preventing urban sprawl
- Keep the cities more compact and mixed-use
- Reuse and improvement of existing infrastructure

Barriers to SBR Programs

Although the benefits of SBR programs, which have discussed before, attract investors and public authorities to pay more attention to brownfield sites, there are some limits and barriers, which inject several difficulties and risk to the process of SBR programs.

The main components which are associated with all these barriers are budget, time, and skills (technical solutions), which can simply concluded that to overcome all

these problems the financial issues need to be solved (Gold, 2009). Because the process of SBR programs has many different steps, the financial issues are usually complicated which seems difficult in compare to normal developments. Furthermore un-contamination and clean-up process consume more time, and also all these additional steps can increase the cost; consume more time, and bringing risk to the program. Therefore, investors and developers need to be financially secured by some other stakeholders. In this regard the governmental solutions such as incentives and tax relief programs can be a huge aid to accelerate and support the SBR programs.

Another barrier to SBR programs is lack of comprehensive database of the brownfield sites such as their condition, and other issues associated with them (POST 117, 1998) in local governments and public authorities. Unclear databases or absence of them as well is the result of limited or even bad understanding of sustainable development. Still there are many governments and countries, which have no data on their brownfield sites, or sometimes not even clear action policies. Unfortunately existence of this issue can slow down or even stop the recognition, assessment, intervention, and other development opportunities on brownfield sites.

Always there is a question that asks what should be done after the clean-up process? Although the answer to this question in most of developed and developing countries are housing and residential areas, but there are some other alternative such as mixed-use development, recreational facilities, or new commercial area. To choose between these alternatives in-depth intervention on the project which sometimes it makes doubt on the target is needed. This doubt is another barrier to SBR programs, which in manner of democratic participation needs to have a clear common vision on the target.

Controlling and managing the environmental liabilities of SBR programs is the one of the main elements in SBR process. Accordingly, Gold (2009) noted that these environmental liabilities make risk and fear of liability for stakeholders, which are the one of the strongest barrier to SBR programs. Basically, stakeholders are who actually responsible and involve for controlling the process on the site, this means that who has responsibilities, has several liabilities. Then in these regards Gold (2009) stated, “it is important to understand that liability still remains a huge concern for constituents and is an immense barrier to redevelopment” (pp. 8)

The other barrier to SBR programs is that many brownfield sites have private owners, and many of them do not have any problem with leaving their property idle with its current condition. The main reason of this issue is that usually the property value is low and development cost is high, then it is not worth to reinvest on these properties. The other reason for this issue is that they may not have clear information and understanding of disadvantages of leaving brownfields as it is. This barrier sometimes caused bigger liability if the site has hazardous contamination and put the neighbours to the risky condition of health or environmental issues. (BCELI, n.d.)

To overcome all these barriers the SBR program need to have the right information, financial resource, creativity in its process, and democratic participation of all stakeholders, then SBR programs can successfully turn the problematic space to a vibrant and lively place. According to literature the general barriers to most of SBR programs are some or all the items, which listed below:

- Financial issues
- Lack of comprehensive database
- Doubt on the target (what kind of development should be applied?)
- Contamination issues which cause clean-up cost and considerations
- Environmental liability of SBR programs
- Owners who wish not to reinvest on their properties
- Limited or bad understanding of sustainable development concerns by all level of stakeholders
- Generally low value land and high development cost

3.3.3 Risk Assessments and Risk Management in Implementation Process of SBR Programs

Risk is a situation that humans are dealing with everyday. Anytime that anybody wants to cross a street, there is a risk of having accident by vehicles, therefore naturally people will look around to make sure there is no risk of accident and then carefully with estimating of speed of cars, speed of walking, and distances they cross the street. This familiar concept is what risk assessment and risk management are dealing with. In this manner when they evaluate the risk of having accident, they are actually doing the risk assessment and then when they estimating the speed and distance and start to crossing the street they are doing the risk management.

Also, it is good to know that there are two kinds of risks; voluntary risk and imposed risk (Swartjes, 2011). The examples are simple, smoking a cigarette which cause health problem is voluntary risk, but breathing the air pollution caused by traffic is an imposed risk which is not voluntary and the main aim of risk assessment and management is to reduce and control the degree of imposed risks. The focus of this

section is to review and explore the assessment and management of imposed risks in areas of financial issues, physical/environmental concerns, and human health.

Overview of Risk Assessment and Management

The evaluation and analysis of possible negative impacts on any case or project are called risk assessment, which help to draw rational, solid, and transparent decisions to examine, control and reduce it (Swartjes, 2011). Also, main concept behind the risk assessment is to estimate that the degree of risk is acceptable or not, which is an important factor of risk management. This process is aimed to make sure the probable profit is more than potential cost (Russ, 2002). Accordingly Swartjes (2011) noted that magnitude of problem cannot be seen in numbers, therefore it needs to estimate the scale of problem, which make the risk assessment an essential technique for start of any project. One of the widely accepted definitions of risk assessment is:

"The process of identifying and evaluating risks to human health, human safety and/or the environment from the actual or potential presence and/or use of specific pollutants" (NRTEE, 2003).

All the time there are some uncertainties in assessment process. Russ (2002) believes that because of limited knowledge that people have, and also not to be aware of all dimension of the case, there is a degree of uncertainty in risk assessment. For dealing with uncertainty Swartjes (2011) argued that choices are subjected to the type, purpose, and the possible political boundary of Risk Assessment, besides the balance between the safe side, realism, and pragmatism is an important factor. Since always the conditions of political boundaries shape the views of assessment, any risk

assessment report must clarify that which political boundaries are integrated in assessment process, and in critical reports the peer review or second opinions is essential (Swartjes, 2011).

Basically the purpose of risk assessment is to decoding the hidden risks within a project and transferring it to manageable situations. Similarly as Swartjes (2011) stated that the keyword in this process is the risk reduction, Bardos *et al.* (2011) believes that practical steps to reduce identified risks are shaping the risk management which lead to elimination or reduction of risk to an acceptable level. Long before these discussions Moughtin *et al.* (1999) identified two steps in risk management process, (1) having analysed risk, and (2) complex strategies that reduce the negative impacts.

As it was mentioned before, the areas of assessment are in financial issues, physical/environmental concerns, and human health/safety. Human health with no doubt is the most important issue in the risk assessment and management process. When it comes to question of what is the most important thing in the life, almost everybody will put good health as number one answer; therefore the human health is widely accepted as the major protection target. Besides according to environmental concerns Cornelis (2011) noted that the main target for ecological risk assessment is ecological health and this happen ideally at the level of whole ecosystem. Correspondingly the remediation technique is one of the recognized risk management tools for contaminated sites to protecting human health and ecosystems. Risk also contains in area of financial issues and physical environment. Financial risks are simply related to lose of money, and physical risks are related to loss or damage to goods and properties (Cornelis & Swartjes, 2011).

Dealing with Risks in SBR Programs

Here the focus of study is on brownfield sites with contamination and SBR programs. Basically each SBR program contains financial, environmental, and human health risk assessment, and nowadays each brownfield project start with expert risk assessment (Maczulak, 2009). Furthermore at the end of the process of risk assessment, the expert team will draw the remediation plan, which widely referred to risk management plan. As it was mentioned before risk assessment and management are the important part of decision making process of any SBR program which human risks are often the major driver in these processes (Ferber *et al.*, 2006), in this regard CABERNET suggest "*the risk based land management approach*" as environmental tools for preparation and regeneration of brownfields. However, it warns that unclear and weak risk assessment will result in increasing the cost for little benefit. Thereby the designers of SBR programs are likely to become involve with risk as part of process of the project (Russ, 2002).

In the case of SBR programs, Moughtin *et al.* (1999) identified two different natures of risks; the internal risks and the external risks, which are almost harder to deal, however if the risk can be identified, then the project manager has opportunity to reduce the impacts. Internal risks would be found in goal, plan, organization, and the method of the project, and also the external risks involve in market environment, supporting links, competition situations, and client itself. All these risks are in the category of imposed risks, which in the case of contaminated sites the protection target is on human health, food safety, groundwater, and the ecosystem.

According to Swartjes (2011) risk assessment and management process for contaminated sites has two possible ways. The first way is when the information and

data about specific site are available, then the investigation will be on the specific site and this is an actual risk assessment. This actual risk assessment or what Swartjes (2011) call site-specific risk assessment is the main possible way of these process, and lead the assessor to have better conclusion to manage the problem. The second possible way is when there is not enough available data about the site, and then the possible way is to analysing the soil quality standard, which has often called potential risk assessment. Regarding to this type of assessment the degree of uncertainty is higher and need more study or other opinions if the site or contamination is critical. Mostly in these cases strict remediation techniques as direct way of risk reduction are applied to eliminating the contamination sources.

Bardos *et al.* (2011) identified four main objectives of remediation techniques as the aim of risk management for contaminated sites. These four objectives are (1) to protect the environment and human safety/health, (2) enable redevelopment opportunities, (3) limiting and balancing the potential liabilities, and (4) in case of applying second time remediation project, repair or enhance the previous one.

Participation is The Key in Dealing with Risk

Risk and dealing with it is not just a technical practice, or it is not just something to be measured and have simple solution. Most often the risks of critical situations have many hidden dimensions that even when they are identified, probably still there is some other risks which nobody were aware of them at the time of assessment. Then for securing the process of assessment and management of risk it is important that different stakeholders actively be involve in the process. Accordingly Catney *et al.* (2007) noted that democratic and open processes in dealing with risk is an essential and make higher degree of social trust.

Trust in the process of dealing with risk is an important issue. Full participation and partnership of all stakeholders include public, private, and the community in a trustful manner empower the result of risk assessment and management, besides this will reduce the degree of uncertainty in these processes. Also combination of different opinions shapes the stronger form of protection for human health, financial issues, and physical/environmental concerns. Therefore according to this study democratic participation of level of stakeholders is the key to have a successful risk assessment and management.

3.4 An Overview on Impacts of SBR Programs

As it was discussed before, the impacts of SBR programs have three dimensions, which are physical/environmental, socio-economic, and economic dimension. In physical and environmental dimensions, focus is on reducing the pressure on Greenfields and protecting urban system from sprawl development. Also remediation and reclamation techniques, which is cleaning up the contaminated sites, will be a reduction factor of risks to public health, besides air and water quality will be improved. On the side of socio-economic dimensions, there are good impacts on the neighbourhood scale and sometimes even on district scale, as well as producing new jobs, which will result in high level of employment rate and investment. Furthermore, as beneficial impacts of economic dimension, new source of tax income for government is considerable and also it requires less public investment on infrastructure.

3.4.1 Physical/Environmental Impacts of SBR Programs

Public health with no doubt is an important issue, and also protecting public health is one of the main profits out of SBR programs which can be achieve through cleaning up the contaminated sites. However the main barrier to clean up is the cost of it and also the cost of preparation of the site. As an example the UK Council for Urban Economic Development (1999) found that the average clean-up cost for perceived contamination is around $15 per one square meter. Therefore the support from public sector is an essential catalyst to ease the program.

Another important impact in physical and environmental dimension is protecting the urban environment from sprawl development, and also to save rural and natural environment from rapid developments on Greenfields. It is clear that the population growth should accommodate somewhere, and if the existing urban environment does not have proper space, the growth will lead to occupying Greenfields for accommodation (Paull, 2008). NEMW[19] has estimated that each one square meter of brownfield which will turn back to effective use, protect 4.5 square meters of greenfields, this is the reason that SBR programs are making an opportunity for accommodating the population growth through offering new mixed use and compact residential environment.

These compact urban forms which are the result of SBR programs in compare to Greenfield development save around 40% of vehicular travel as it has shown in NEMW researches. This estimated amount of reduction in vehicular travel is

[19] The Northeast-Midwest Institute (NEMW) is a private nonprofit, nonpartisan research organization based in the US nation's capital. Their mission is to promote the economic vitality, the environmental quality, as well as regional equity for the 18 Northeastern and Midwestern states of US. For more information see http://nemw.org/

reducing the air pollution caused by traffic, and also save more energy, besides greenhouse gasses (GHG) will be reduced. This compact form of urban environment which is produce out of SBR programs are much more sustainable than Greenfield development, because in these programs they use existing land and infrastructure and returning deprived area to effective and vibrant places. As far as SBR programs produce more dense neighbourhoods, it seems that there is lower degree of run-off water and it is likely to improve water quality as another environmental aspect.

3.4.2 Socio-Economic Impacts of SBR Programs

Degree of employment rate is one of the measuring tools of a healthy community, which is associated with public and private investment. As much as this degree goes higher, the amount of investment in the area and also improvement in quality of life will increase. SBR programs create new job opportunities and attract investors to the area, besides it brings the public investment as the foundation of the program. For example, by 2008 EPA brownfield program invested $1.3 billion to the projects and it creates around 50,000 permanent jobs and brought another $11 billion new investment to the projects, besides a survey of US conference of mayors (2007) estimate that each SBR program creates approximately 140 new jobs per site.

All these numbers show the importance of public investment and the depth of socio-economic impacts of SBR programs, and then it became clear that public supports and grants are the essential instrument to attract private investment. According to NEMW case studies of brownfield programs, approximately each $1 of public investment will totally generate $8 of new investment; this $8 in some projects will even go to $20. That is why socio-economic impacts of SBR program will result in

regeneration and revitalization of whole neighbourhood or even district as well as increasing the value of properties.

Regeneration and revitalization of the neighbourhood improve the physical setting of urban environment, and also will maintain the social structure of the area. This will be resulted in a jump in the property value. A study by NEMW approximately shows that properties up to one kilometre radius from the site will gain around 15 per cent increase in their value, however in some cases of turning brownfields to park or mixed use, higher impacts will occurs, which even goes to more than 100 per cent. Also another benefit in socio-economic dimension is improvement in social structure of neighbourhood as a whole as well as an increase in the quality of user's profile. But then again it is important to know as Paull (2008) argued that SBR programs are not effective if the site is isolated which make no difference in environment.

3.4.3 Economic Impacts of SBR Programs

Increase in income tax, lower investment for infrastructures, and earn out of environment that was not functioning before, are the other key factors in SBR programs. These are the main benefits of economic impact to the area, in this regard Paull (2008) noted that on the tax side there are two scenarios which both works parallel to each other. The first one is direct generation of income tax from turning unproductive sites to effective land use, which make new source of income tax; the second one is related to the rise in the propertie's value in the area, which correspondingly increases the amount of existing income tax.

NEMW studies show that upon available information, public grants and investment will be paid back by normal tax system in five years or even less. For example base

on 2005 tax rate of Milwaukee County in USA, brownfield related public investments, which were around $5.7 million, have been paid back in less than three years.

Another important economic impact of SBR programs is lower investment in infrastructure; most of brownfields have infrastructure within the site, and it is beneficial for public sectors, which in most of cases, they do not need to invest for new infrastructure. Of course those old existing infrastructures need utilization and maintenance; however the amount of investment for this purpose is much lower than in greenfields. Although the amount of this cost saving is not certain, but in researches which have done by Centre For Neighbourhood Technology and NEMW, it shows that approximately it is around 10 times cheaper to reuse existing ones rather than new investment.

3.5 Sustainable Brownfield Regeneration Example Study

Two examples will be explored in this section, which demonstrates the process and impacts of transforming brownfield sites into beneficial use, besides they show how stakeholders challenged the problems of those sites. Examples are selected and adopted from successful case studies in literature. The selection of these examples is based on two criteria, which are sustainable brownfield regeneration program, and their scale. One of them is a huge brownfield site as a portion of urban environment in a city, which is considered as urban scale, and the other one is a brownfield site within a poor neighbourhood, which is reflected as building scale.

Also another reason for selecting these two examples is their location; the urban scale example located in Europe (United Kingdom), where most of huge brownfield

sites are located. The reason that these huge brownfields appeared in Europe was because of rapid changes in industry, population growth, and being at the centre of Second World War. Also most of these brownfield sites transformed to beneficial use at least one decade ago or more, and the long-term impacts and results of those programs can be perceived. However in the US, most of brownfield sites are in building scale, and the regeneration programs recently has been applied, therefore the short-term impacts and results of brownfield regeneration program can be evaluated.

The exploration in these examples gives some good lessons about their way of approach to achieving sustainable brownfield regeneration for their project's program, besides it demonstrates the strong concept of public-private participation in practice. Furthermore these example studies will evaluate the SBR program within these examples according to three dimensions, which are physical/environmental, socio-economic, and economic concerns.

3.5.1 Urban Scale Example Study

The review of this example will show how an urban scale brownfield site in hearth of a city, which is a problematic space, can be regenerated and transformed to a vibrant urban environment. London docklands, which were the biggest port in the world during 19th century, had faced a huge decline in 1950s. This was the result of environmental, social, and economic problems of London in post-WWII, and by 1970s because of changes in transport system, those areas was out-dated and they became one of the biggest brownfield sites throughout Europe which consisted of 22 square kilometres of vacant and abandoned buildings and lands (Figure 9).

Decline in these areas where located in inner city at eastern London, caused more than 10,000 jobs lose (LDDC, 1981-1998). In 1970s government started to think about this huge vacant and abandoned area and it takes decades to finalize a program for it. Although the rent prices were high and office spaces were limited, it was the first times in the centre of London they have faced this amount of vacant lands. In closer look at the problems of London Docklands, clearly it could be seen that the population and employment decline caused slum condition in the area, besides it was suffering from lack of shopping facilities, open space, recreational facilities, and public transport.

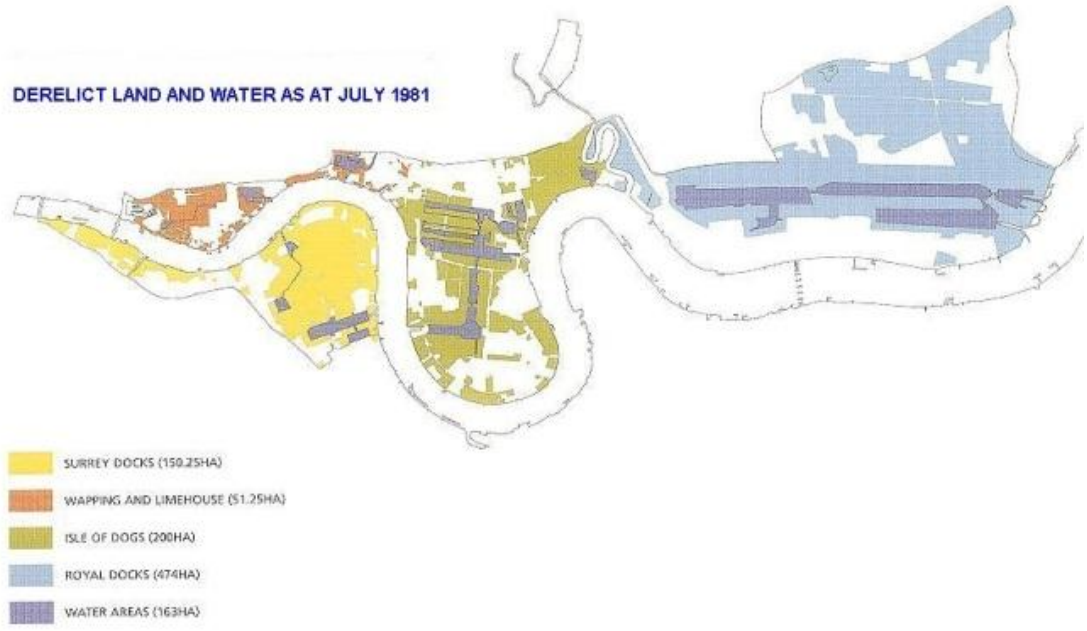

Figure 9: London Docklands as biggest brownfield in Europe with 22,000 square kilometers of derelict land (Source: Monograph archive of The LDDC History Pages, 1981-1998)

Therefore, in order to attract new investors and transforming that area to a better place, national government in 1982 took a significant role by offering incentives and supports to encourage private investment, besides the London Docklands Development Corporation (LDDC) has been formed for supervision of whole

program to regenerate the area (Towers, 2005). In this project other stakeholders were taking role as well, such as property developers (e.g. Canary Wharf), local housing association, conservation groups, and Newham council (Figure 10).

The main theme of this program was "Regeneration of a brownfield site to create a mixed and economically viable community" (Towers, 2005), a community which is balanced by means of social and economic concerns, besides the general objectives of this project was to attract new industries to the area, to increase the amount of office space and new high quality housing, to improve transportation system within the area and to the other parts of London, and finally to revitalize the area.

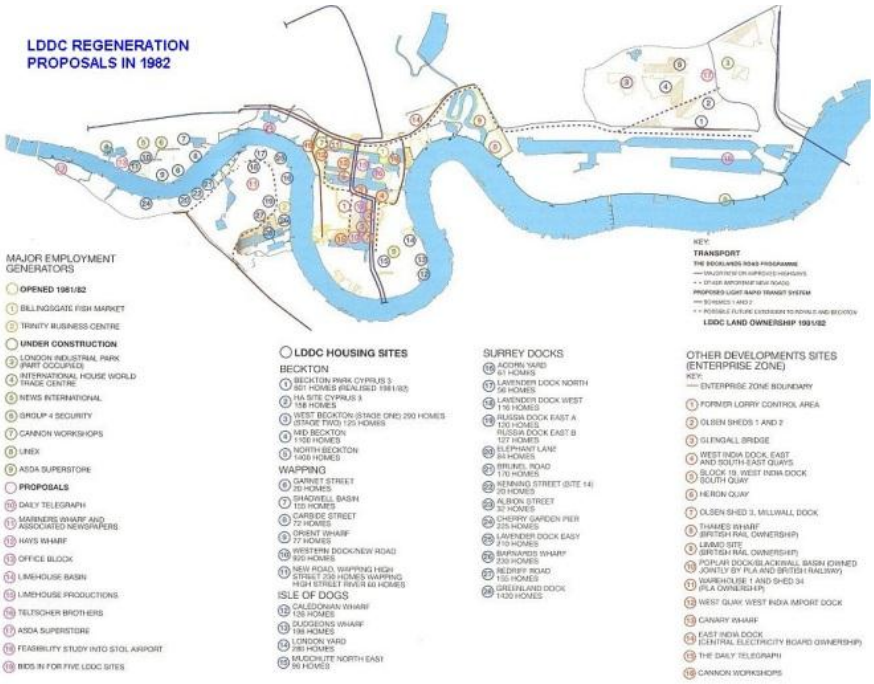

Figure 10: LDDC Regeneration Proposals in 1982 (Source: Monograph archive of The LDDC History Pages, 1981-1998)

The impacts and the result of the project are categorized in three categories, physical/environmental, socio-economic, and economic impacts (Table 4). The highlights of physical/environmental regeneration are summarized as attention to

pedestrian friendly street design with provided paths for cyclers through the dock edges, providing new open spaces (Figure 11) such as water based Ecology Park, and planting around 200,000 trees, besides old docks have been transformed to marine (Figure 12). Moreover, huge amount of office spaces developed and old warehouses have been transformed to offices and luxury apartments. These actions were significant improvement of London docklands by means of physical/environmental impacts of brownfield regeneration program (LDDC, 1981-1998).

Figure 11: Shadwell Basin 1985 (left), Shadwell Basin 1998 (right) (Source: Monograph archive of The LDDC History Pages, 1981-1998)

Figure 12: Limehouse Basin, 1983 (left), Limehouse Basin, 1998 (right) (Source: Monograph archive of The LDDC History Pages, 1981-1998)

In socio-economic dimension of the regeneration program, £10 million for improvement of council and housing association, and £100 million for health, education, and job training have been dedicated and spent to regenerate the area for commercial and residential use. As the result 22,000 new accommodation places, which around 80% were used by private owners and around 20% rented, have been built, besides new shopping centres (Figure 13), many shops, restaurants, pubs, cafes, sailing and water sport centres have taken place in the area (LDDC, 1981-1998). As

the results were successful, many young well educated people moved in the area and eventually as the impact of socio-economic dimension of regeneration program the social structure and user profile of the London docklands have been improved (Figure 14).

Figure 13: Surrey Docks - early 1980s (left), Surrey Quays Shopping Centre 1996 (right) (Source: Monograph archive of The LDDC History Pages, 1981-1998)

Figure 14: Acorn Walk, Surrey Docks, before refurbishment (left) and after (right) (Source: Monograph archive of The LDDC History Pages, 1981-1998)

Economic impacts of London docklands regeneration program highlighted by £7.7 billion private investment and 2,700 new businesses trading (Figure 15). As a result, unemployment rate had fallen into 7.4% and public transport by light railway in 1987 has got its strong affect in the area (LDDC, 1981-1998). Also former royal docks have been transformed to a city airport for short distance air travels, which made direct connection of London docklands to all over the Europe. Therefore through great improvement of accessibility of the docklands, financial and high-tech firms, TV studios, and newspapers have been attracted to take place in the area (Figure 16).

Figure 15: West India Docks, looking west, 1982 (left), Canary Wharf and the Isle of Dogs, 1997(right) (Source: Monograph archive of The LDDC History Pages, 1981-1998)

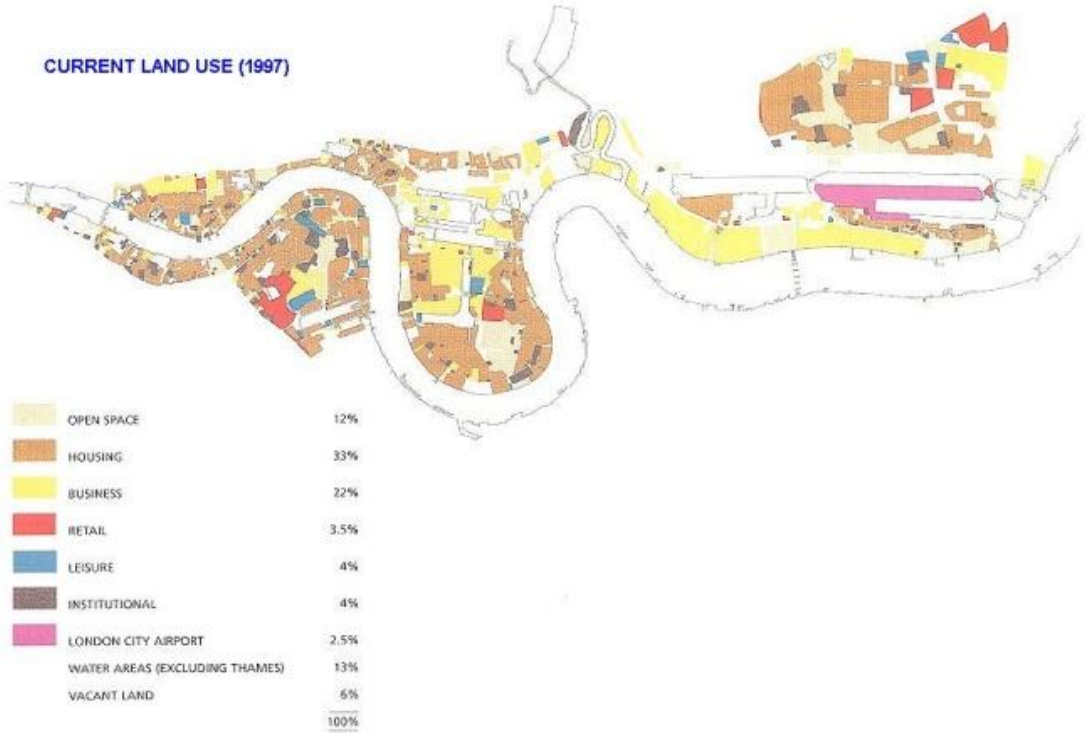

Figure 16: Allocated Land-use to London Docklands in 1997 (Source: Monograph archive of The LDDC History Pages, 1981-1998)

This example achieved a high standard of urban design principles through the full participation of all stakeholders; moreover the incentives and investment from public sectors eased the process, which resulted in improvement of the area by means of physical/environmental, socio-economic, and economic aspects.

Table 4: SBR Program's Profile of London Docklands

Project Name		London Docklands
Location		London, United Kingdom, Europe
Background		- 1696 Howland Great Dock - 1802 Georgian docks - 1855 Victorian Docks - 1921 addition of The King George V - WWII bombed with more than 2500 bombs - 1950's Decline - 1970's Officially known as Brownfield - 1980's & 90s Regeneration Program - Today a mixed-use vibrant environment
Land use	**Former Use**	Industrial/warehouses/transportation
	Current Use	Mixed-Use
Problems		- Out-dated docks for new transportation - Population and employment decline, which became slum condition - Poor accessibility to the city - Lack of public facilities, open spaces, and community centre
Stakeholders		- The London Docklands Development Corporation (L.D.D.C) - National Government - Property Developers

		- Local Housing Association - Conservation Groups - Newham Council
Aims and Objectives		Regenerate the whole area and provide mixed-use urban environment to create a balanced community by means of social and economic concerns
Brownfield Regeneration	**Physical/ Environmental**	- Pedestrian friendly street design - Providing new open spaces - Planting trees - Transforming old docks and warehouses to attractive place (e.g. old docks transformed to marine)
	Socio-Economic	- 22,000 new accommodation places - Public facilities such as new shopping centre, many shops, restaurant, pub, cafes, sailing and water sport centre - Over £100 million public investment
	Economic	- Former royal docks have been transformed to a city airport - Public transport by light railway within the area and toward the city - Placement of financial and high-tech firms such as TV studios, newspapers, and etc. (e.g. guardian newspaper)

Impacts and Results	- Improvement in social structure and user profile of the area (e.g. many young well educated people moved in) - £7.7 billion private investment - 2,700 new businesses trading - Unemployment rate had fallen to 7.4% - Old warehouses have been transformed to offices and luxury apartments - Program has realized as a great level of urban design standards.

3.5.2 Building Scale Example Study

Exploration of this example will shows how a non-profit organization has dealt with a contaminated brownfield site in building scale. This brownfield site has a great history in steel manufacturing industry, which established in 1882 (Figure 17). The location of the site is in Providence city in Rhode Island where it was one of the first cities that had been established in the United States in 1636. Steel fabrication facilities expanded by development of two story building with around 2,000 square meter of land occupation in 1902, and during the next 30 years it expanded to another 10,000 square meter of land for development of an office building and ornamental ironwork workshops. By the beginning of 21st century, like many other factories in USA, this steel fabrication facility was forced to close because it was no longer environmentally and financially reasonable (Hollander, Kirkwood, & Gold, 2010). However because of the history of the site, it took place in National Register

in Historic Places (NRHP) in 2005. Then in 2007, a non-profit organization with the name of Steel Yard purchased the site.

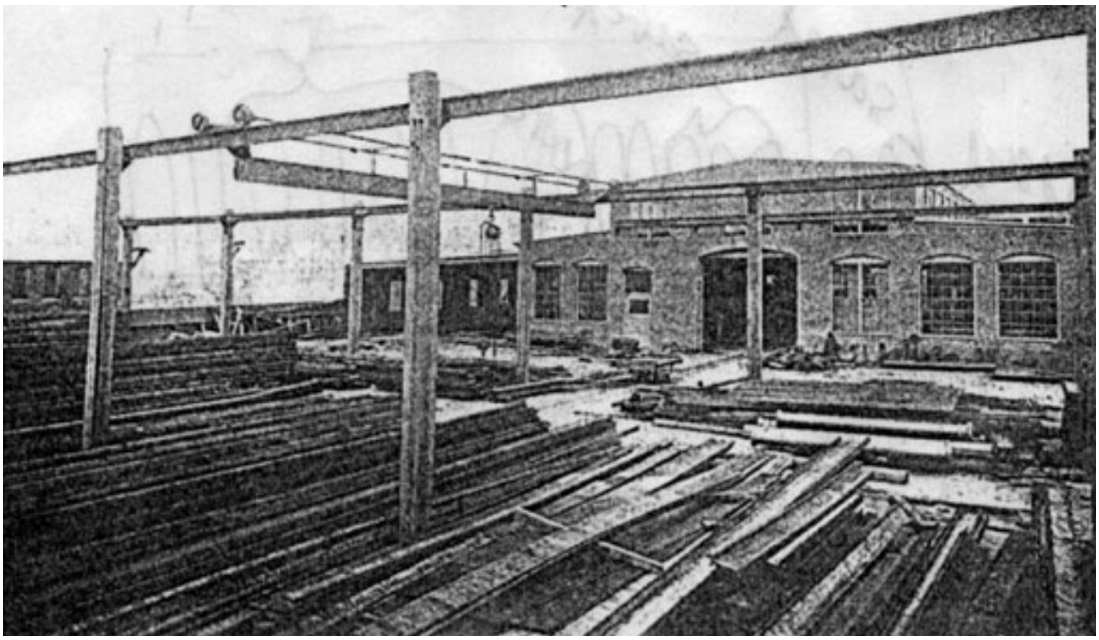

Figure 17: An old photo of Providence Steel and Iron company (Source: Portfolio of Klopfer Martin Design Group, http://www.klopfermartin.com)

This site, which most often referred as steel yard, is located in Valley district (Figure 18), where it was an industrial centre in Providence. Economic decline in this district resulted in around 250 vacant and/or abandoned factories, while some of these brownfields have been regenerated and redeveloped to commercial and residential function, many of them remained abandoned (Cameron, 2011). Moreover the social structure and inhabitant profile of the neighbourhood around steel yard was one of the poorest social structures in Providence. Therefore in this community, in which most of the people are below the level of poverty, it was difficult to reach community participation, and because of soil contamination within the site, an extraordinary amount of investment was expected (Hollander, Kirkwood, & Gold, 2010). In this regard, except steel yard non-profit organization and professional companies who

hired by them, environmental protection agency of United States (EPA), Coastal Resources Management Council (CRMC), and Department of Environmental Management (DEM) were important stakeholders in the project.

Figure 18: Steel Yard Location Map, Valley district, Providence, Rhode Island
(Source: Google Map, http://maps.google.com)

The project was developed with the aim of development of identical and flexible space. Where the brownfield site has a significant history in industry, a community-based non-profit system has been formed to promote educational issues related to industrial arts, which brings changes to the area. The focus of this brownfield project (Figure 19) was regenerating the different type of industrial practice by using industrial art to achieve development in community and revitalize the urban environment of the area, which gives a chance to develop a distinctive resource for local community (Hollander, Kirkwood, & Gold, 2010). For these purposes, the regeneration of existing structure, providing the public landscape, and operating the best possible sustainable practices, are essential.

Figure 19: Steel Yard with Brownfield Status (Source: Portfolio of Klopfer Martin Design Group, http://www.klopfermartin.com)

Similar to the previous example, the dimensions of this regeneration program were defined within three categories (Table 5). According to contamination of the site, the strategy for physical/environmental regeneration of this example is significant. They did not want to take out the contaminated soil and put it in somewhere else, which they believed it is not sustainable to transfer contamination from a site to another (Cameron, 2011). Therefore Department of Environmental Management used remediation techniques for treatment of the soil and then covered it by 60 centimetre clean soil, pavements, and buildings (e.g. an amphitheatre and raised lawn have been built by contaminated soil on top of covered site) which technically they call this method as capping technique (Figure 20 & 21). However the small amount of soils, which had high concentrated contamination, removed and disposed in licenced facilities (Hollander, Kirkwood, & Gold, 2010).

Figure 20: Steel Yard Remediation Project in progress 2009 (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

Although they kept toxic soil on site, for controlling the runoff lest it penetrates to the sewer system or nearby river, natural filtering system such as permeable surfaces, rain gardens, bioswales, and etc. for storm water has been proposed to handle most runoffs before it reach out the site (Cameron, 2011). Therefore the regeneration program for this brownfield site became significant in environmental sustainability. The development plan of this project consists of active and passive open spaces, outdoor work areas, parking, landscaped sculpture park, open-air stage, and pedestrian/vehicle circulation arrangements (Ford, 2007).

Figure 21: Steel Yard Remediation Project completed by 2010 (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

In regards to socio-economic dimension of this SBR program, the lands and buildings regenerated to function for community organizations and industrial art centre with its growing population of artists in neighbourhood (Hollander, Kirkwood, & Gold, 2010). Therefore a public space is created which provides functional spaces

for daytime activities (Figure 22) such as artist studios, art markets, art and cultural festivals, educational programs, and community meetings. Besides at nights there are some night activities (Figure 23), which take place in that public space such as place for movie nights, hang out space for relaxation, and venues for music and dance (SteelYard, 2010). Besides the buildings of steel fabrication facilities have been regenerated and transformed to industrial art facilities and education centre (Figure 24) where classes and workshops are located. The general topics of industrial art activities in this complex are welding, ceramics, jewellery, glass casting, blacksmithing, and the foundry arts workshops (Mission & History of Steel Yard).

Figure 22: Activities at Steel Yard (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

Figure 23: Night Time Activities at Steel Yard (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

Although the project was based on non-profit organization, steel yard organization has lunched around 90 contracts in regards to public projects to make street furniture, which was one of the most financially successful economic dimensions of this SBR program (Cameron, 2011). Their profits were not limited to benefits of non-profit status in regard to loans and grants such as $400,000 grants from EPA, $199,000 grants from Economic Development Corporation, and many other loans from national government, but also they have achieved a range of in-kind contributions and participation which helped to cover many of their costs (Hollander, Kirkwood, & Gold, 2010).

Figure 24: Steel Yard Workshops (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

Through looking to overall result of this SBR program (Figure 25), it will be shown that steel yard provided a unique urban environment and social resource for its community, furthermore this project acted as a catalyst in the area to provide an opportunity for value reconsideration of industrial heritages. This project has attracted many artists and developers to the area that resulted in profits of local community in micro scale and as macro scale the city of Providence (Cameron, 2011).

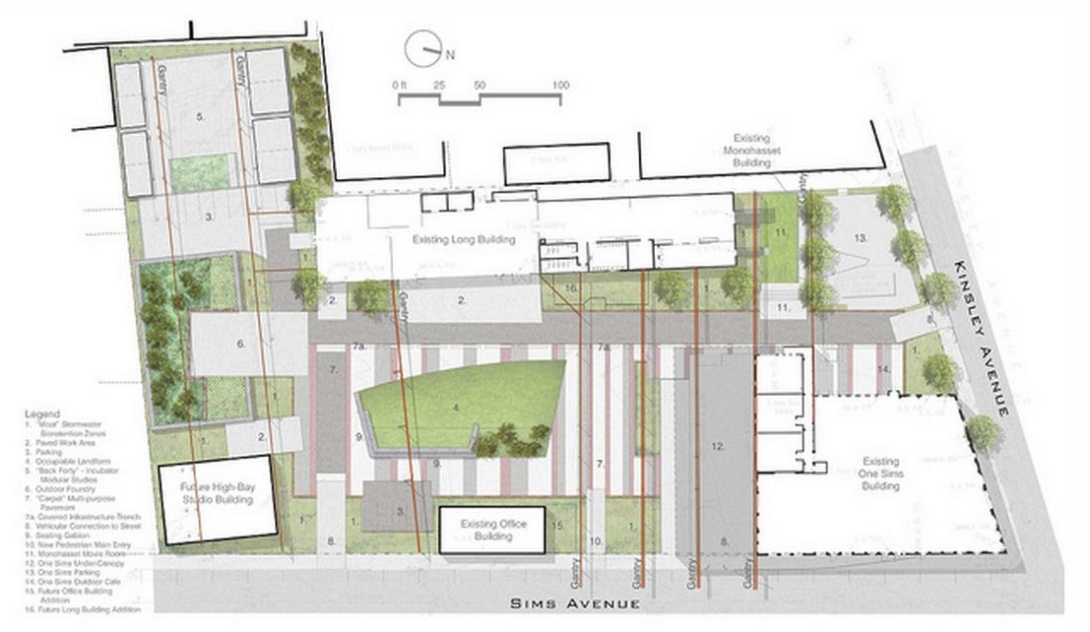

Figure 25: Site Plan of The Steel Yard (Source: Steel Yard Flickr Photo Stream, http://www.flickr.com/photos/thesteelyard)

Table 5: SBR Profile of the Steel Yard

Project Name	The Steel Yard
Location	Providence, Rhode Island, USA
Background	- 1882, Providence Steel and Iron Company established in Providence - 1902 to 1930s property expansion of factory - 2001, Steel fabrication facility closed and became officially a brownfield site - 2005, Site placed on National Register of Historic Places - 2007, The Steel Yard non-profit organization has bought the site and site being regenerated

Land use	**Former Use**	Industrial (Steel Fabrication Facilities and Manufacturing)
	Current Use	Industrial Art Education Centre
Problems		- Soil Contamination - Traditionally Poor Neighbourhood - Many vacant and abandoned properties surrounded the site - Lack of attraction of new investors - Extraordinary budget needed for cleaning up the site
Stakeholders		- Woonasquatucket Valley Community Build (aka The Steel Yard) - Local government state agencies - Rhode Island Department of Environmental Management (DEM) - Coastal Resources Management Council - US Environmental Protection Agency (EPA) Narragansett Bay Commission (NBC) for water storm control - Professional Private Companies (klopher martin design group for landscape design, e. a. engineering, science, technology Inc. for environmental design, morris beacon design company for implementation project, and etc.)
Aims and Objectives		Sustainably regenerating a brownfield site

		with significant history in industry to bring changes to the area and to develop an identical and flexible space through community-based non-profit system, which promotes educational issues related to industrial arts.
Brownfield Regeneration	**Physical/ Environmental**	- Soil remediation techniques (un-contamination and capping the soil and in case of high contamination, removal and disposal the contaminated soil) - Controlling and keeping away the runoffs from sewer systems and nearby river through natural filtering systems - Creating active and passive open spaces, outdoor work areas, parking, landscaped sculpture park, open-air stage, and pedestrian/vehicle circulation arrangements
	Socio-Economic	- Providing space for community activities to support the community - Creation of educational spaces (e.g. welding, ceramics, jewellery, glass casting, blacksmithing, and the foundry arts workshops and classes) - Providing public spaces for both daytime and night activities

	Economic	- Achieving more than $700,000 grants and loans - Provides an opportunity to contribute in public space projects (e.g. street furniture projects)
Impacts and Results		- Provides a unique urban environment - Social resource to community - Value increase of the area - Light-up for consideration of other industrial heritage - Attraction for artists and investors to the area - Improvement in social structure of neighbourhoods nearby the sites

3.6 Summary and Conclusion: Conceptual Model for Process of SBR Program

One of the accepted solutions for turning deprived urban areas to lively, vibrant, and functional space is laid in the combination of urban regeneration and sustainable development, which widely called sustainable brownfield regeneration (SBR). Although the main theme for the issue of sustainability is "securing the future", recently there are some discussions about the way of sustainability which says it is not cleared that which element should be sustain. Is it the regeneration process, planning process, or building itself? Moreover one may say that everything has its own beginning and end, so how should it sustain? And more clearly there is question

that what should be sustained? According to these questions on of the best answer is from Nathanail (2011), which said that sustainability is the journey not destination. By means of the general discussion, sustainable brownfield regeneration is about connection between technical issues and socio-economic concerns to gives a new life to those dead lands and properties. Besides, these regeneration programs will reduce the pressure on Greenfield and prevent the urban sprawl to achieve more compact way of urban form.

This chapter reviewed SBR program as a comprehensive tool to solve brownfield issues. Accordingly initial critical elements of SBR program have been discussed, which are the most awareness in the beginning of SBR program and as a whole will shape the journey and destination of it. These elements are (1) Actor's Network, (2) Benefits and Barriers to SBR, and (3) Risk Assessment and Risk Management, which help together to identify the realistic dimensions of the projects, defining the role of stakeholders, managing the partnership, and also recognition and handling the potential risks.

Towards the initial critical elements of SBR program, this chapter demonstrated the impacts of sustainable brownfield regeneration programs, which result in improvement of quality of life and enhancing urban environment. These impacts are categorized in three categories to make more clear understanding of dimensions out of SBR programs by means of physical/environmental, socio-economic, and economic concerns.

Physical/Environmental dimension of SBR programs has focused on reducing the pressure on Greenfield and prevent urban sprawl to have better and more compact

form of urban environment. Moreover cleaning up techniques is for treating the contaminated sites to secure safety and public health issues within those brownfields, besides by cleaning up the site, air and water quality will be improved. In the findings of both discussed examples, it can be seen that many public, open, and green spaces have been provided, the quality of urban settings has been improved, and contaminations within the site have been treated, to promote more sustainable urban environment.

Socio-economic dimension of SBR program has its focus on improving the quality of life, and provides an appropriate service to community. In this dimension the unemployment rate will be reduced and new job opportunities will show up. In example of Docklands, it can be seen that the program resulted in more than 2,700 businesses trade and consequently in many job opportunities. On the other hand, community centres, commercial and entertainment facilities will provide to serve as a social resource which will secure the quality of educational, social, and user's profile and reduce the crime within the regenerated neighbourhood. In this regard, the example of steel yard project gave a good clue of what might happened if a contaminated site is transformed to a community centre and function as an artistic educational space with some public spaces, which has resulted to become a vibrant urban space.

Economic dimension of SBR programs generally are about the rewards of the programs by means of profits, tax incomes, and new investments. Brownfield sites, which usually have installed infrastructures within the site, will lower the cost of public sectors investments, and in compare to greenfield investment it is a huge steps forward in process by means of time and money. In both examples the existence of

infrastructure within the sites has eased the process. Another side of economic profit is the new source of tax income from places where had idle status which is a great profit for local and national government, plus throughout the regeneration program the property value will be increased, therefore it will cause increase in existing amount of income tax. These incomes and profits give more confidence to public sector for investment in those projects and act as catalyst to attract private investors by means of supports and incentives.

Based on literature through the review on sustainable brownfield regeneration, this chapter as a whole has drawn a framework (Figure 26) for the evaluation and analysis of sites with brownfield status, and it shows the importance of public-private partnership in the process of SBR programs. This framework will be consisting of three dimensions, which has discussed and referred before as the dimensions of SBR programs. Although all these dimensions should be considered in SBR programs, but the importance and order of them are varies from case to case. For example in the case of Steel Yard the strong focus was on physical/environmental dimension, and then the socio-economic one, but although the cost of remediation and regeneration was high, the economic impacts of this regeneration project was not the issue, and the main expected rewards was laid in environmental and social concerns.

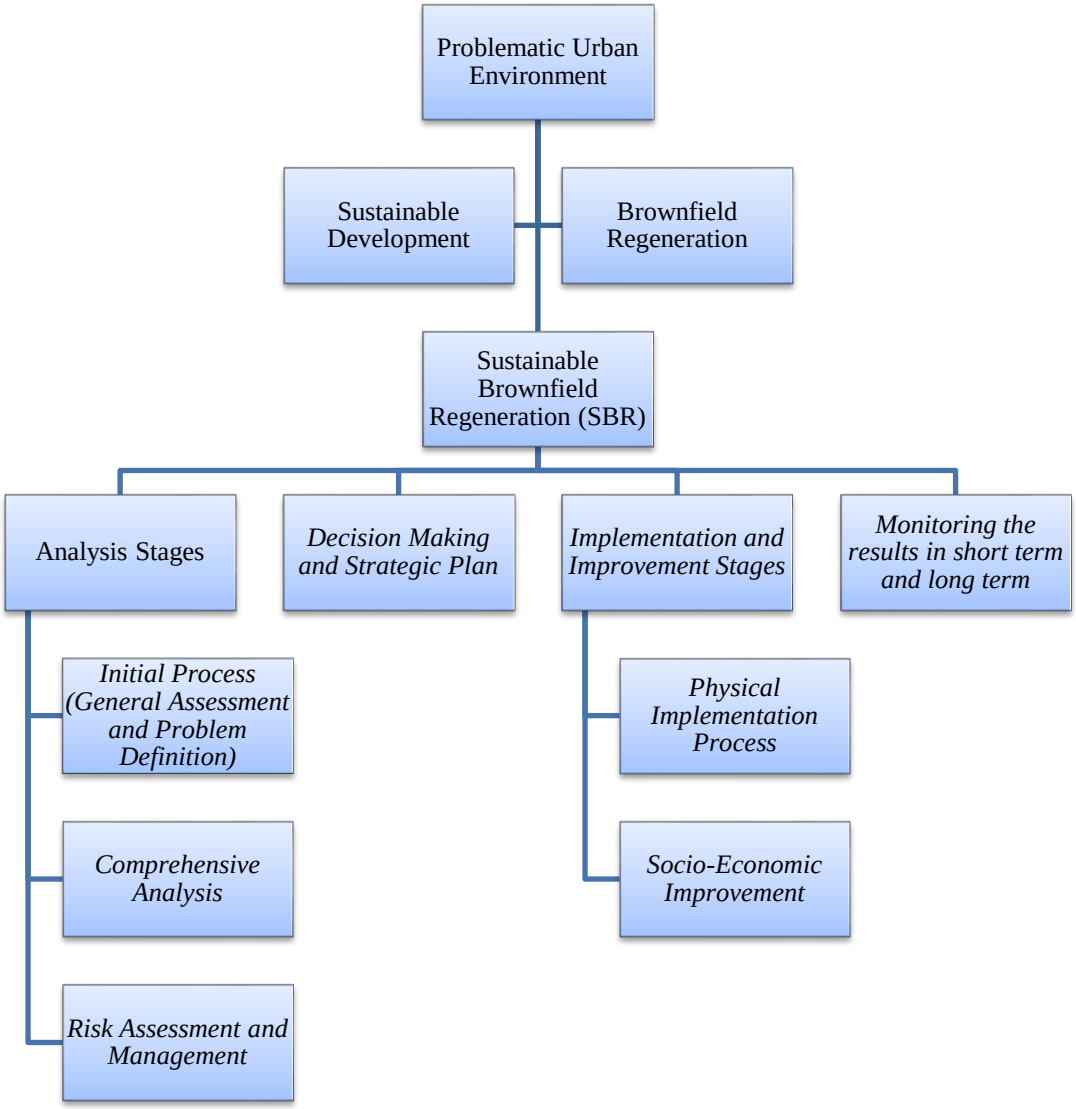

Figure 26: Framework for the evaluation and analysis of sites with brownfield status

According to the issues that have been discussed in this research, a guideline as a product of theoretical framework for process for SBR program has been produced, which is, consists of seven stages. This guideline is designed to show how complex and comprehensive is the SBR program and it is just a conceptual model, in actual projects the real framework should be more expandable and detailed (Table 6).

Table 6: Conceptual Model for Process of SBR Program

Process of SBR Program		
Stage 1	*Initial Process (General Assessment and Problem Definition)*	**Initial Site Survey:** - Physical/Environmental Observation and Literature Analysis (Study of existing documents) - Socio-Economic Survey (Interviews, questionnaires, etc.)
		Recognition of Stakeholders and arrangement of multi-disciplinary team for further stages
		Identification of theme of general problems
		Conceptual Framework out of initial analysis for SBR Program to emphasize positive and negative points
Stage 2	*Comprehensive Analysis*	**Physical/Environmental Analysis:** - Determination of Contamination and its levels (Soil, Water, Air, etc.) - Assessment of site physical condition - Determination of physical obsolescence of buildings within the site (façade, structure, etc.) - Spatial Analysis of the site and its surroundings - Determination of existence and obsolescence of infrastructure within the site - Natural Environment Analysis
		Socio-Economic Analysis: - Assessment of area's Social Structure - Assessment of community partnership - Assessment of political views for applied policies - Recognition of stakeholders and level assessment of public-private partnership - Assessment of users satisfaction level
		Economic Analysis: - Determination of incentives and founding availability

		- Evaluation and calculation of existing income tax and approximate future income tax - Identifying the missing elements for private investment - Assessment of existing strategic economic plans and their results
		Barriers and Possible benefit to SBR program: - Analysis and determination of physical barrier to the area - Analysis and determination of social conflicts and barriers - Analysis and determination of economic barriers - Analysis and determination of political and policy related barriers - Calculation and determination of approximate possible future profits in all dimensions
		Comprehensive SWOT analysis out of multidisciplinary workshops
Stage 3	*Risk Assessment and Management*	Determination the threats to the program and existing situation
		Determination the level of uncertainty in the process
		Producing a multi-disciplinary approach and plans to manage the certain risks and potential risks
		At least include a peer review to the final results
Stage 4	*Decision Making and Strategic Plan*	Variety of workshop with stakeholders to summarize and synthesis the analysis
		Produce a strong vision for the program
		Draw a flexible, expandable, and detail strategic plan to be overviewed by stakeholders in decision making workshops
		Development a detail mission and objective plan to be a comprehensive and clear check list of what to do

Stage 5	*Physical Implementation Process*	In case of contamination, remediation techniques should apply to remove and reduce the risk of toxics and chemical contaminations on the site
		Reclamation techniques should apply where the site has a physical condition that make it difficult or impossible for further development to turn it back to beneficial use
		Redevelopment Techniques should apply where it can creates new landscape, buildings and infrastructure
Stage 6	*Socio-Economic Improvement*	Social or Community Regeneration should apply to improve the structure of society
		Physical Regeneration should apply where a function is failed or expired and another function should take its place
Stage 7	*Monitoring the results in short term and long term*	**Short Term Result:** - Between 1 to 5 years (Produce a brief reports to record the results)
		Frequent Monitoring: - Assessment of all the situations approximately each 5 years (Produce a comprehensive report to analyses and evaluate the result, and try to find a solution for possible mistakes/ failures or problems)
		Long Term Result: - Assessing the situations after approximately 30 to 50 years (To learn from successful practices or mistakes, and start to think about new strategic regeneration plans)

Based on this framework, next chapter will now implement the stage one on the case study of this research: periphery area of Nicosia buffer zone.

Chapter 4

BROWNFIELD REGENERATION AS A VALUABLE SOLUTION FOR URBAN DECAYS: INITIAL ANALYSIS OF BROWNFIELD'S CHALLENGE IN CASE OF NORTHERN PART OF NICOSIA

4.1 Introduction: Brownfields of Nicosia

In areas that are subjected to urban decays, urban obsolescence gradually changes the urban settings and one of the reasons of this problem is existence of brownfields. These vacant and/or abandoned properties are eye sore and not just new investment will not take place, the existing businesses will face crises in those areas. Moreover, the social structure of the area will change and progressively all these problems put hands together to form a slum condition. On the other hand without any doubt, option of sustainable brownfield regeneration is one of the most accepted tools in sustainable development issue, which is a complex solution for those problems, as has been discovered in previous chapters.

Aim of this chapter is to put all previously discussed issues together to make an initial analysis on brownfield sites in northern part of Nicosia, which is the last divided city in Europe. This division is result of conflict in 1974 between two communities of Turkish and Greek Cypriots within the island. The existence of the border or by other mean, the UN buffer zone which horizontally divided the whole island into two parts, and particularly the division of the city of Nicosia, caused

urban decays with many dimensions at peripheral of the buffer zone. The focus of this study will be limited to the peripheral of northern part of Nicosia buffer zone.

This study will examine and evaluate the characteristic of these areas in a holistic approach. This holistic analysis will take the whole area as a mixed-use environment, with variety of users, and will try to decode and decontextualize the problems regarding to brownfield issues. This case study consists of industrial, commercial, and residential properties. In most of the literature and actual practices the most common brownfield sites are industrial, and then commercial ones are in second place, the residential properties have become vacant and abandoned due to the result of special events, such as political/ethnical/religious conflicts, earthquake, war, and etc. The special issue about this case study is existence of the residential properties within the area, and these unique cases became brownfield as the impacts of buffer zone or by other mean, the dead area, which are now functioning as a barrier between two communities.

As it was discussed in previous chapter, the process of SBR program consists of seven steps, which each step is essential and foundation of another one. These seven steps are the conceptual model, to be a guideline for further SBR programs. One of the most important stages is the first one, because it produces a general assessment and defines the problems (Table 7). This research tries to adopt the case of Nicosia in the first stage to emphasise the theme of general problems related to brownfield issues.

Table 7: Stage one of Conceptual Model for Process of SBR Program

Process of SBR Program		
Stage 1	*Initial Process (General Assessment and Problem Definition)*	**Initial Site Survey:** - Physical/Environmental Observation and Literature Analysis - Socio-Economic Survey (Interviews, questionnaires, etc.)
		Recognition of Stakeholders and arrangement of multi-disciplinary team for further stages
		Identification of theme of general problems
		Conceptual Framework out of initial analysis for SBR Program to emphasize positive and negative points

4.1.1 Nicosia, Last Divided City in Europe

Nicosia is a city where its history goes back to the early Bronze Age (3000 B.C.) and Roman period. In literatures, Wilbrand, Count of Oldenburg, who visited Cyprus in 1211, makes the early references to Nicosia. From 9th century A.D. to 20th century many dynasties and kingdoms used to rule the island, such as the Byzantines, Lusignans, Venetians, Ottomans, and British governors (Gunnis, 1973). In all these periods the city of Nicosia was served as the capital of Cyprus, and even today the city is serving as the last divided capital in Europe, which is the capital for both Turkish and Greek Cypriots communities. (Timeline of Cyprus, 2011)

Finally after British period (1878-1960) in 1960 the people of Cyprus formed and established the Republic of Cyprus, however by the agreements between United Kingdom, Turkey, and Greece, two base areas have been reserved for Britain which are still in use and active (Figure 27). The life of new republic was so short, which it

last only less than 14 years. Political conflict between Turkey and Greece in influential of new republic, and also the ethnical conflict between the two communities of Turkish and Greek Cypriots conclude another political conflict in 1974. Turkey intervened to the island as the guarantor for safety of Turkish Cypriots. Result of the conflict was the dividing of the island into two parts, with an establishment of a border by United Nation. Turkish Cypriots moved to the northern part of the island and Greek Cypriots to the southern part. The impact of this disaster also showed up in the city of Nicosia as well, which leads to division of the city into two parts (Cyprus country profile, 2011).

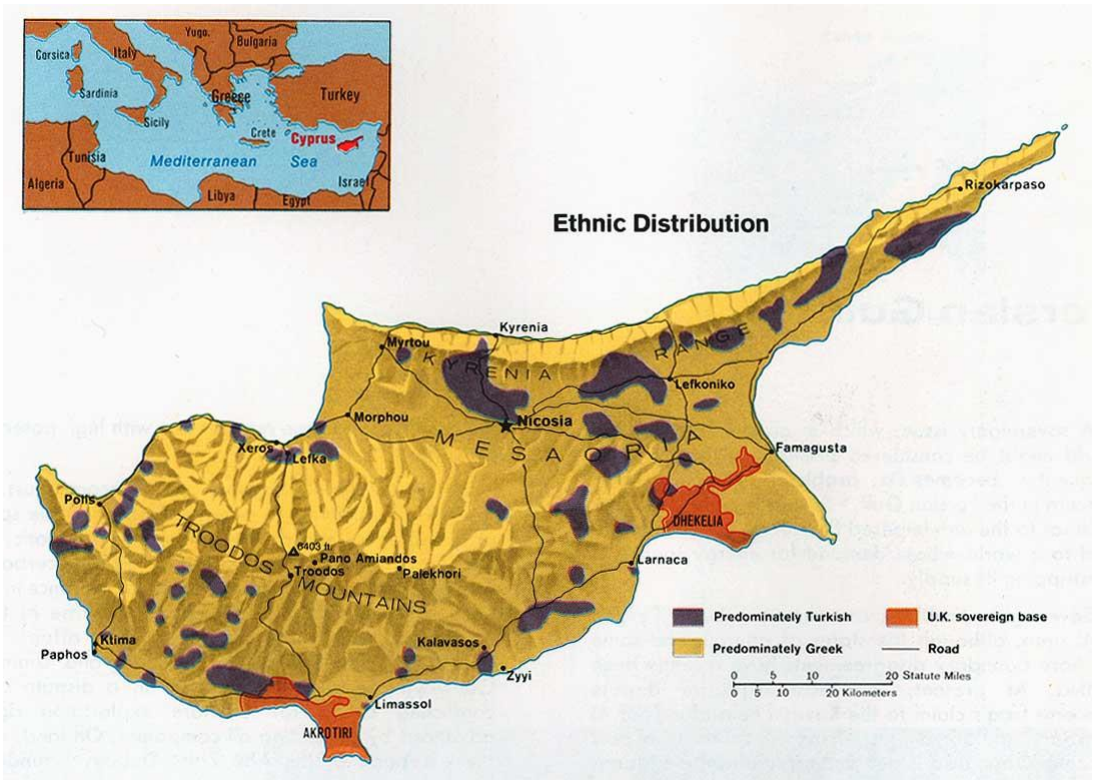

Figure 27: Map of Cyprus according to ethnic distribution in 1973 (Source: Library of Texas University, URL: http://www.lib.utexas.edu/maps/europe/cyprus_ethnic_1973.jpg)

Since 1974, south part of the island where Greek Cypriots moved to remained as Republic of Cyprus; however until 1983 the northern part was self administrated area

(Figure 28). In 1983, the Turkish Cypriot community in northern part of the island formed and established a new republic, which has called Turkish Republic of North Cyprus (TRNC). In other hands Republic of Cyprus in southern part has been recognized in the world as the main legal government of the island, however because of the political conflicts, except Turkey, none of the countries in the world recognized the TRNC (Timeline of Cyprus, 2011). Although the TRNC faced many problems regarding to the unrecognized government, the northern part became one of the attractive tourist destinations in Mediterranean region, and many known and qualified universities opened there, which made the northern part as one of the high quality educational destination as well. Nowadays United Nations (UN) put many effort to find a solution for both communities to unite the island, however from many countries in Europe there are flights to TRNC via Turkey, and not officially, but widely the TRNC is known in the world.

Figure 28: Cyprus map from CIA World Factbook, after 1974 (Source: CIA Fact Book, URL: https://www.cia.gov/library/publications/the-world-factbook/maps/maptemplate_cy.html)

4.1.2 UN Buffer Zone of Cyprus and Urban Decays Which Caused by UN Buffer Zone in Nicosia

The border, which divided the country, consists of a buffer zone that established by UN to function as a physical barrier between the two communities. Agreeing the importance of buffer zone itself, there is another important factor about the buffer zone, which has shown in Alpar (2008) studies. In her studies it has noted that after southern part of the island have been placed to the European Union (EU), the buffer zone and northern Nicosia became one of the edges of EU, and Nicosia buffer zone transformed to the EU border. Therefore the existence of vacant and abandoned properties at peripheral of EU makes more sensitive discussions about brownfield conditions. Furthermore what is perceived in buffer zone is like that the time is stopped since 1970's and all elements within the buffer zone such as houses, shops, cars, and etc. remain as how Cypriots' life style was in 1970's.

Right now the buffer zone itself has a function which is the country border, but if any time in future the conflict of Cyprus will be solve the buffer zone will not have any other function and it will turn to a huge amount of brownfield. According to this research the UN buffer zone is categorized into three parts according to where the buffer zone is located (Figure 29). The three parts of buffer zone are explained here:

A. The part which divide the cities/settlements; these sections of buffer zone are located within the cities, and a portion of cities where many commercial, residential, and industrial functions were located, have become vacant and abandoned (e.g. Nicosia Buffer Zone, Maras Neighbourhood in Famagusta).

B. The part which divide the greenfields, now is no man land and is a huge undeveloped land where crossing horizontally all over the country.

C. The part which is completely covered by previously functional land/buildings or facilities and now they are vacant and abandoned because of characteristic of border itself, these properties are not within the cities and they are located in suburbs or rural areas (e.g. Cyprus International Airport).

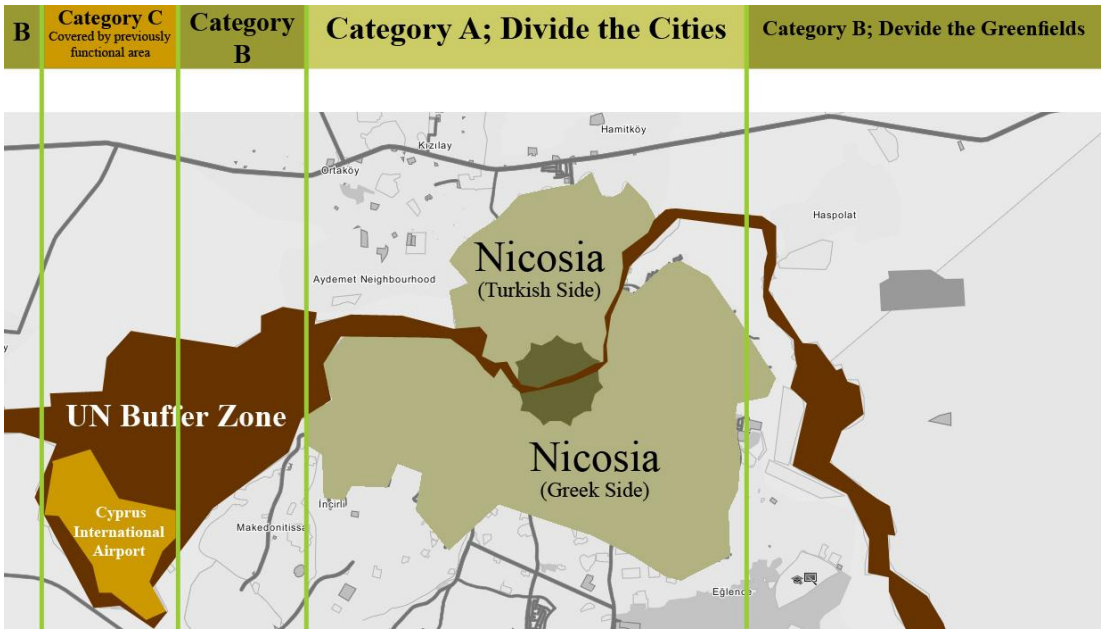

Figure 29: Categories of UN Buffer Zone According to its Location

The main difference in these categories is in the locations of the buffer zone, for example although both category A and C are a built up area, the difference between them is that the category A located within the city and category C located at suburbs or totally out of the city.

As a matter of fact, the buffer zone divided the city of Nicosia into two parts, and although before the event of 1974, the historic walled city of Nicosia was the centre of city, it turned to the edge of the city as well as the other central neighbourhoods. In the northern part of Nicosia the properties where Greeks used to live, became vacant and abandoned, and because of population transfer it started to be used by Turkish people[20]. The threat of another possible conflict, the huge vacant and abandoned area within the buffer zone, existence of army in the area, and existent of physical and mental border resulted in population crisis of original inhabitant. Besides for many years because of its strategic location, the government did not put any effective urban investment into the area. (Cyprus country profile, 2011)

All these situations caused urban decays in peripheral of Nicosia buffer zone. The strong curtain feeling of the border and the shadow of another divided city in Europe which reminds the feelings of berlin's wall and Cold War changed the social structure of the area. The neighbourhoods where used to be a vibrant urban space, turned down to a poor neighbourhood, which progressively caused the slum condition. Although after establishment of TRNC many efforts has been taken place, but except the outer layout and few properties, most of them remains in poor condition. It is important to know that the physical barrier was not the only reason for urban decays of peripheral of buffer zone and other older part of the city. Accordingly other several reasons were involved in that condition such as negative political and international situation, economical problems, big number of immigrants with low user's profile, and many other issues that have discussed in further sections of this study.

[20] Both Turkish Cypriots who were refugee from the southern part and Turkish immigrants from Turkey.

Existence of the barrier in middle of the city transferred most of economic activities toward the northern part of the city, and stayed away from the buffer zone. Many commercial and industrial buildings were shut downed in last 30 years, and left a vacant and abandoned area within the city at the peripheral of buffer zone, as well as many residential properties. The division showed its impacts on urban structure and formed a negative socio-economic setting within the area. (Timeline of Cyprus, 2011)

4.1.3 Brownfield Sites in Peripheral of Nicosia Buffer Zone

In peripheral of Nicosia buffer zone there is many previously developed lands, which are vacant, derelict, and abandoned. Although in land use policies of TRNC, there are no rules for brownfields, according to this study, these properties are subjected to brownfield status. In this regard there are three regions of brownfields next to Nicosia buffer zone in northern part, which surrounded the historical Walled City. On the other hand, although in the Walled City there are many sites with brownfield's characteristic, but because the Walled City is a historic place, then those sites are considered as historic urban quarters and they cannot have the status of brownfield.

Accordingly if the Walled City which is divided into two parts by a narrow boarder will be considered as a historic layer next to the buffer zone, then it can be summarized that at the three sides of it in the actual city of Nicosia, there are three regions with brownfield characteristic (Figure 30). In this study, these regions have been marked with brownfield status according to the accepted definition of brownfield by this research. Within these regions there are many previously developed lands (PDL), which are vacant and/or abandoned, and also according to

the classification of brownfield sites which has discussed in chapter two; many sites have the characteristic of partially occupied lands. These sites have one or combination of the elements of partially occupied lands which are (1) not currently fully in use, (2) land or building currently in use and allocated by different land use in local plan, and (3) land or building currently in use with redevelopment potentials. Two of these regions have the residential land use and located at sides (east & west) of the walled city and the other one is a mixed-use area consists of commercial, industrial, and residential area, which is located on top (north) of the walled city (Figure 31).

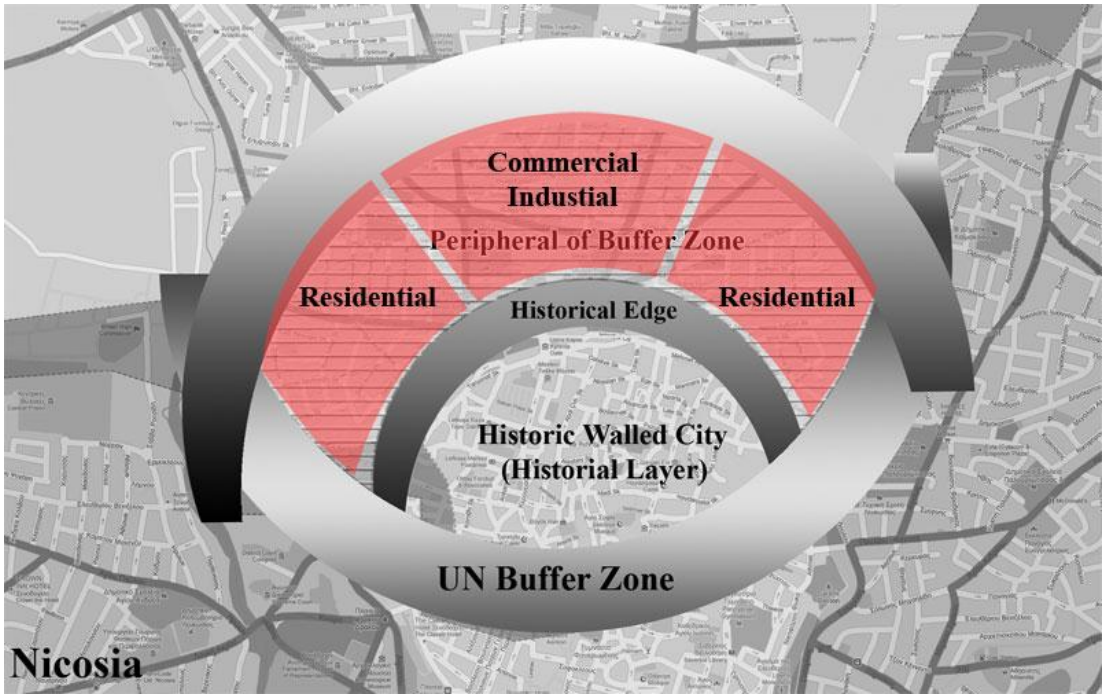

Figure 30: Walled City and 3 region of brownfield

These three areas have been suffering from an urban decline because of that huge vacant and abandoned area (Buffer Zone) which crossed the city and gradually by the time, they have lost their original users, and became vacant and abandoned. Although some restoration and conservation project were applied on a number of those

properties, but still many of them remains empty with no good condition, and as a whole is seems to be far from achieving sustainability concerns in the area.

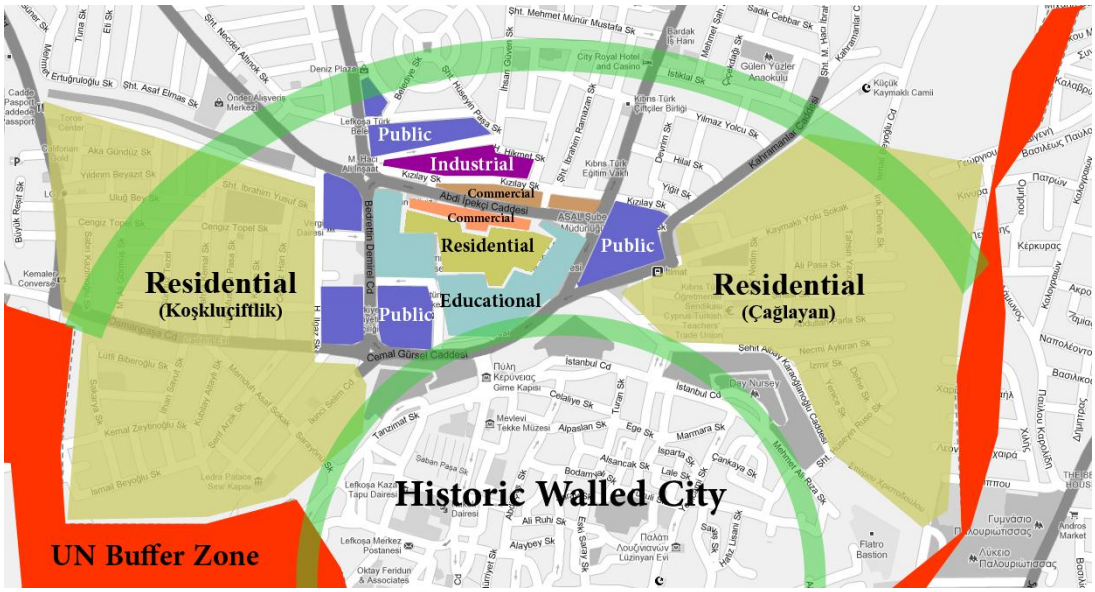

Figure 31: Study Areas, Peripheral of Nicosia Buffer Zone

With no doubt there are variety of barriers to achieve sustainable development in these areas, such as lack of professional updated methods, absence of sufficient policies regarding to sustainable development, variety of visions between local government and professionals, poor attention to social sustainability, and of course the existence of physical and psychological border. All these limitation shaped an unsustainable scheme for these areas.

Accordingly in this study the characteristic of these areas will be examined and evaluated in a holistic approach. This holistic analysis as a part of the first stage of the SBR framework will take the whole area as a mixed used environment, with variety of users, and will try to decode and decontextualize the problems regarding to brownfield issues.

4.2 Macro Scale Review of Brownfields in Peripheral of Buffer Zone

Today, the urban structure of the city of Nicosia consist of three parts, (a) the historic walled city, (b) the inner part of the city, and (c) the newly developed areas in suburbs which has been attached progressively to the city. On the other hand, the shape of buffer zone, which is the dividing element in the city, formed the southern edge of the Nicosia in northern part (Figure 32). The two-dimensional physical shape of Nicosia buffer zone appears as an arc, which holds the northern part (Figure 33). At the pick of the arc, the historical walled city taken place and mirror of the arc covered the peripheral of buffer zone.

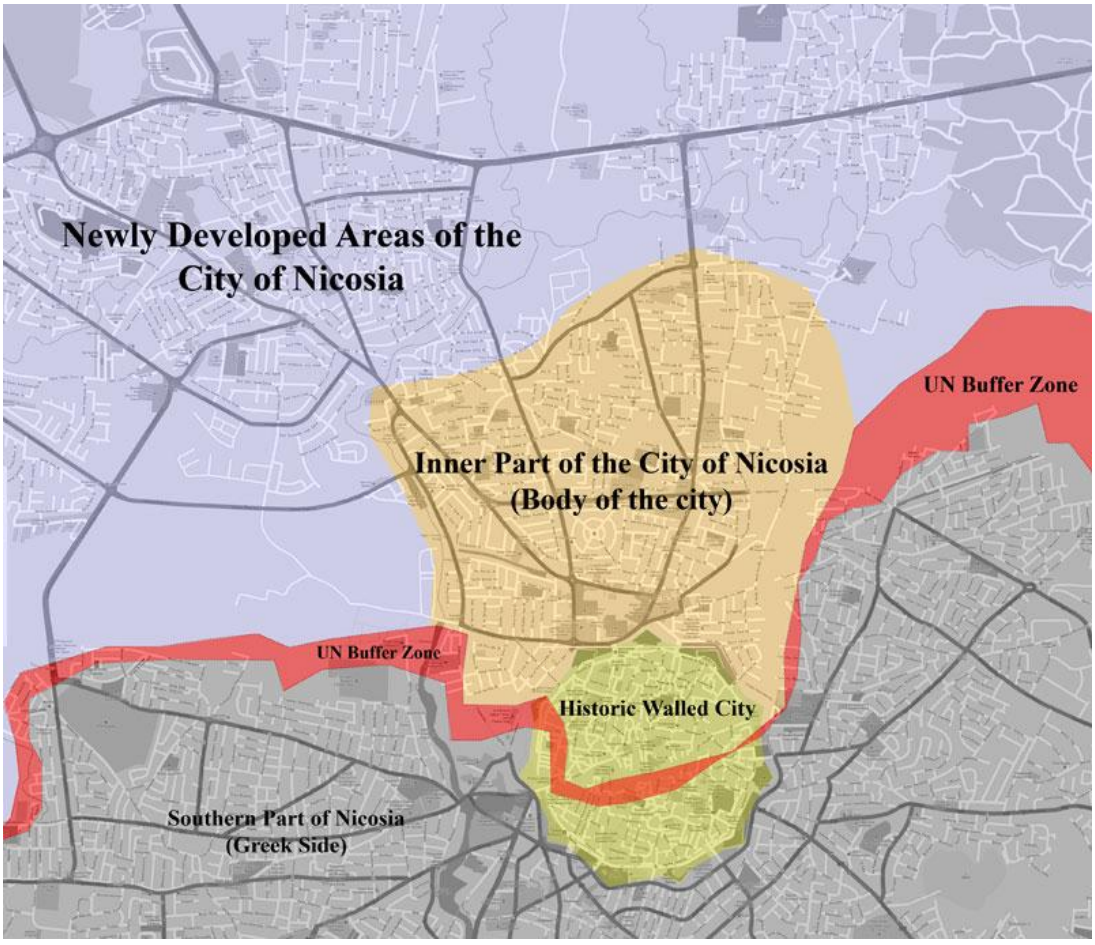

Figure 32: Urban Structure of City of Nicosia

Both arcs together can be perceived as a ring, which has enclosed the declined area; the outer part of the ring is the buffer zone, and the inner ring in other side is the study area, which is subjected to brownfield status. As it discussed before the buffer zone has been categorized into three categories, therefore in this scenario, the buffer zone located in the category A. This section of buffer zone is located within the cities, where many commercial, residential, and industrial functions were located become vacant and abandoned. Progressively according to these situations, the peripheral areas of buffer zone which consists of mixed land use include residential, commercial, industrial, governmental, and public facilities have been faced the serious declines in urban environment (Figure 34).

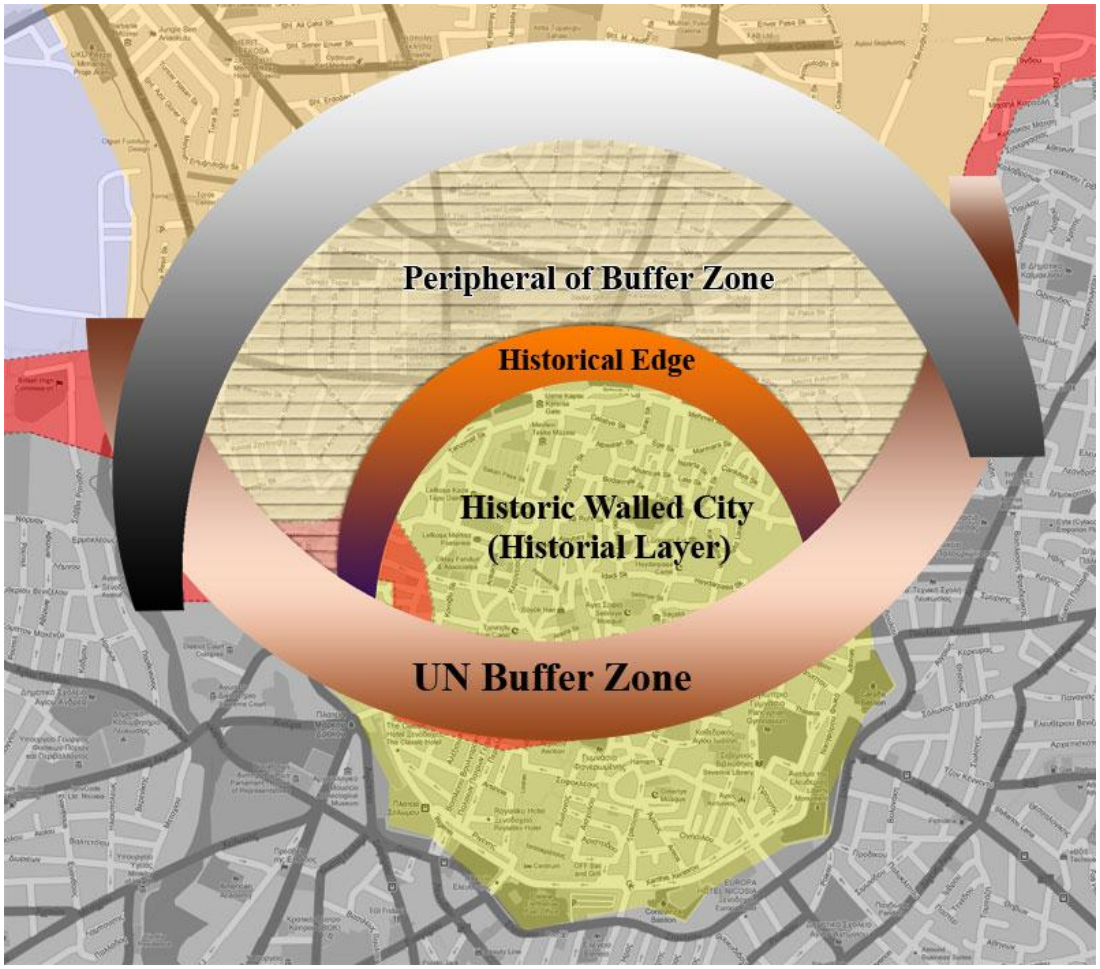

Figure 33: Inner Ring of Brownfield in Peripheral of Nicosia Buffer Zone

Impacts of buffer zone have been affected this inner ring and have shown up in many ways such as in functional, infrastructure, and transportation systems of the city. Not just brownfield sites within the area, also most of properties in the area as a whole need a comprehensive regeneration plan. In regard to finding a solution, Alpar (2008) suggested that a holistic top down decision with combination of bottom up decision system, which is partnership of community, could resulted in more sustainable outcomes.

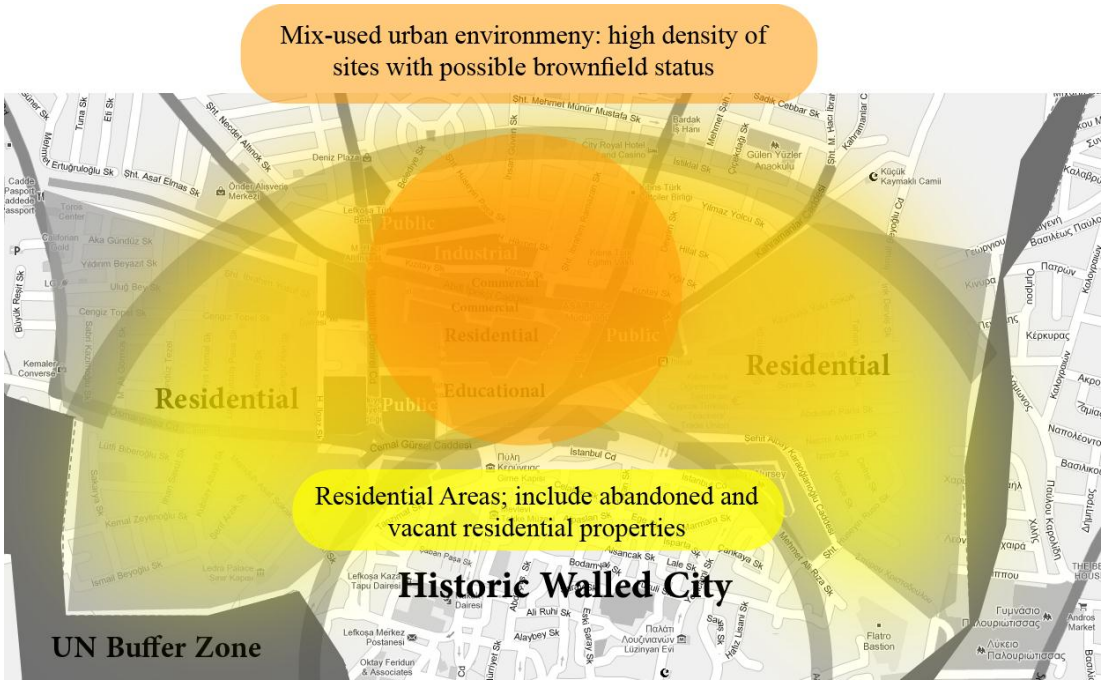

Figure 34: Brownfields in Study Area

Although many efforts have been taken place for redevelopment of the area, such as Nicosia Master Plan (NMP) and United Nation Development Program (UNDP), the main focus of all these programs were on protection of historic and cultural heritage. These efforts achieved some good results such as NMP by winning the Aga Khan

Award in 2007, which restored and regenerated some areas, however it fails in social dimension, due to lack of participation of property owners who are waiting for political settlement (Hadjri, 2008).

4.3 Methodology of Examination and Analysis of Selected Brownfield Sites (Case Study)

4.3.1 Framework of Examination and Analysis of Study Area

Case studies, which are related to Brownfield sites, are defined in a framework that is formed throughout three dimensions; these three dimensions are physical/environmental, socio-economic, and economic. Each dimension has its own indicators, which all together formulate a framework for beginning of brownfield regeneration program. Also the outcome of this framework produces another framework for beginning of a holistic strategic plan. As it has been studied in example studies, in each dimension there are some indicators, which act as the checklist for brownfield site analysis and evaluations. According to the findings in example studies, these indicators are listed here:

- Physical/Environmental Dimension Examination
    - To find out about existence of any kind of contamination within the site
    - To find out about level of property obsolescence and damages
    - To find out about natural and environmental capacity of the area
    - To find out about stakeholders related to environmental protection issues
- Socio-Economic Dimension Examination

    - To find out about level of human satisfaction of existing situation
    - To find out about does community wills to participate or not
    - To find out about existing social structure and user profile in the area
    - To find out about rate of employment in the area
    - To find of about the existence of community support and public-private partnership
- Economic Dimension Examination
    - To estimate existing tax income
    - To find out about existing infrastructure
    - To estimate future possible job opportunities and new source of tax income
    - To find out about existence of governmental incentives

To be aware of variety in reflections of dimensions and indicators is an essential. For example in the case of Nicosia, regeneration of residential areas will not increasing the rate of tax, therefore the indicator of tax income will not be the consideration. As a result, this research will use dimensions and indicators according to the characteristic of the area.

For the purpose of this study, an initial site survey has been carried out in regards to all dimensions. This initial site survey is towards the first stage of SBR program guideline, which has been offered in previous chapter. Beside exploration in existing documents and researches related to the Nicosia for finding out its physical characteristics, the questionnaires, in-depth interviews with locals and governmental authorities, decodes many problems of the area. Moreover the observations and physical evaluations of the sites, in combination with qualitative and quantitative

data drew a framework to assess the problems and give the better understanding of existing situation.

4.3.2 Methodology of Data Collection, Data Analysis, and Evaluations

Data collection for the areas with brownfield status consists of three stages; the first initial stage is about collecting general information from physical, environmental, social, and economic issues within the area. This initial stage is a short survey, which provide essential data and information for the comprehensive site analysis. Subsequently the comprehensive site analysis consists of comprehensive data collection and analysis, which shape the main decisions about the area. Second stage in data collection is that comprehensive data collection, which is also the second stage of SBR program. The third stage is the data collection related to risks to the program, project, and the area, to provide the necessary data and information for risk assessment and management process, which is also the third stage in SBR program.

In this research the methodology for the data collection has been based on the first stage, which is the initial site survey. This initial site survey holds two types of investigations; physical/environmental observations, area study and qualitative/quantitative surveys.

The qualitative and quantitative surveys have been carried out to find out how people consider the existing situation, and know their opinions about urban issues in general and in particular brownfield and regeneration related issues. In these regards a questionnaire has been prepared, and has been conducted on approximately 50 Turkish Cypriots who live or work in the study area. These questionnaires produced quantitative data about their level of satisfaction, percentage of their willingness for

positive changes in urban environment and their participation. Parallel to the questionnaires, a qualitative survey has been carried out to understand their points of view, in this regards many in-depth interviews has been done with locals who used to live and work in the area for a long time.

On the other hand, this survey needed to collect the information and opinions from official authorities to compare with the opinions from community, and evaluate the situation according to opinions of both sides. However because of time limitation of this study, only one of the authorities has been selected out of responsible authorities such as municipality, department of city planning, parliament, ministry of interior, department of environmental office, and ministry of tourism and environment. Therefore because in most of the cases, which is related to urban environment, the municipality is the operational body of the system, the selected official authority was the municipality. In this regard some in-depth interviews with personnel at project department of municipality has been done and it is completed with an interview with the deputy town clerk of Nicosia. Parallel to these interviews few questionnaires has been answered by Turkish Cypriots whom originally are from the city of Nicosia.

According to the quantitative and qualitative data which have been collected during the initial site survey, and pie charts which show the percentages of different opinions, a table of positive and negative points (Table 9) has been produced to combines all data together and categorize the result according to positive and negative issues to the area. Emphasising and grouping the positive and negative issues helped the study to decode and de-contextualize the problem, and make clearer understanding of existing situation of the city in regard to urban environment and brownfield issues.

4.4 Initial Stage: Findings For The Periphery Area of Nicosia Buffer Zone

Based on the study of the existing documents about the physical characteristics of the case area, it can be said that the selected study area has variety of land use; previously industrial activities and accordingly vacant industrial buildings are located at the heart of the area, which surrounded with vacant commercial buildings and warehouses (Figure 35). Existence of some functional daily activities such as governmental offices (parliament, ministry buildings, and Turkish embassy), public high school and historic walled city brought some daily life to the area. However these activities are not enough to change the social structure of the area and did not help the improvement of urban settings. On the other hand, the residential areas (e.g. Caglayan neighbourhood[21]), which are one of the oldest neighbourhoods in Nicosia, are suffering from abandoned properties and lack of sense of belonging form owners, users, and public authorities (Figure 36).

[21] Caglayan neighborhood used to be a rich environment, and mainly with the high profile users, steel some villas with yellow stone façade can be seen there, however the overall condition of those buildings and whole neighborhood is in decline.

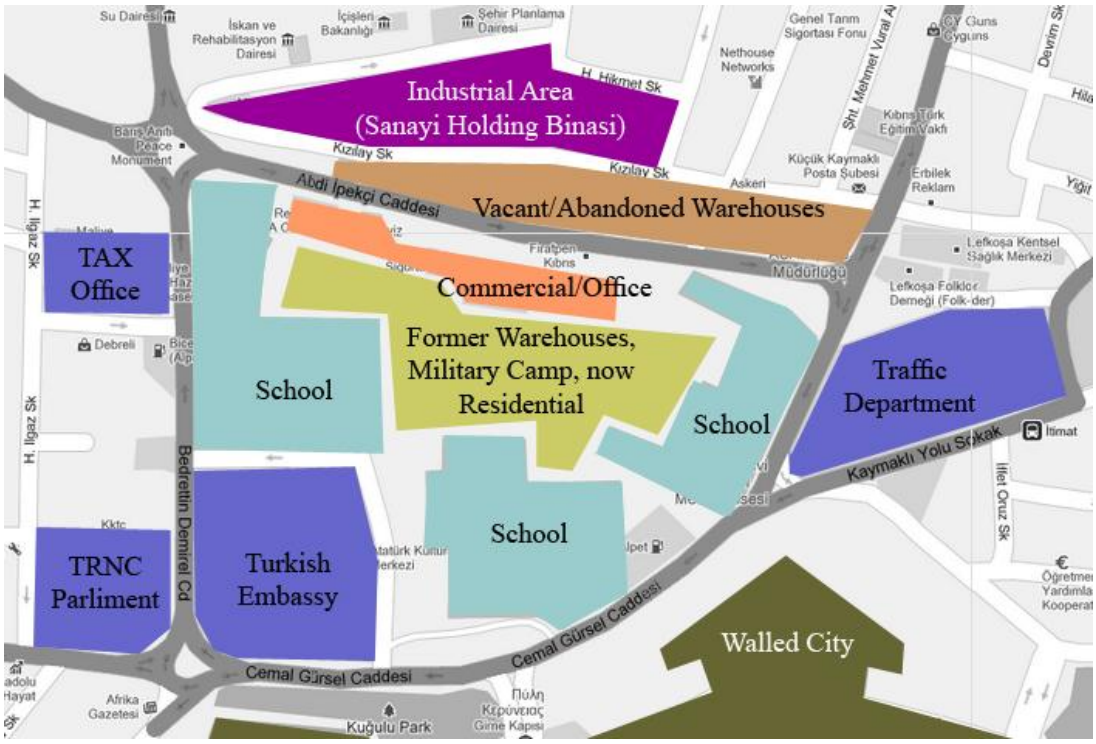

Figure 35: Study Areas, Mix-used Environment

Figure 36: Vacant and Abandoned Houses in Caglayan Neighborhood

To realize the sole of challenge a site survey has been done with Turkish Cypriots community who lives or works in that area. The initial site survey formed throughout three dimensions, which are physical/environmental, socio-economic, and economic (Table 8).

Table 8: Initial Site Survey (Area Profile)

Initial Site Survey (Area Profile)	
Location	Peripheral of Nicosia Buffer Zone, Turkish side of Nicosia (North), Turkish Republic of Northern Cyprus, Eastern Mediterranean Region
Background	- 3000 B.C. first inhabitants - From 9th to 20th century A.D. Byzantines, Lusignans, Venetians, Ottomans, and British governors rules and developed the city - 1878-1960 British period - 1960 establishment of republic of Cyprus, and Nicosia remained as capital city - 1974 social/political conflict, Turkey intervened to the island as the guarantor for safety of Turkish Cypriots - 1974 division of Cyprus and Nicosia by UN Buffer Zone - 1983 establishment of Turkish Republic of Northern Cyprus and north part of Nicosia again became the capital - 1974-2011 urban decays in peripheral of northern Nicosia buffer zone, changes in social structure, big amount of abandoned properties by original owners, new development on greenfields toward the north of the city, appearance of brownfields in peripheral of Nicosia buffer zone

Land Use	Former Use	Residential, Commercial, Industrial, Governmental	
	Current Use	If not abandoned or vacant mainly residential, governmental, and military use	
Problems		Physical/Environmental	- Physical barrier within the city - Existence of huge vacant and abandoned area (Buffer Zone) within the city - Possibility of toxic and chemical contamination within the area and there is no statics and analysis about that - Absence of Policies and regulation about brownfields and contaminated sites - Attempt and invest on restoration and finally gentrification rather than regeneration - Old and unutilized infrastructure - Poor urban setting condition - Lack of green spaces, landscape, and public space - Investment for new

		development in greenfield rather than regeneration of brownfields
	Socio-Economic	- Physical barrier between the two communities - The area have lost their original users - Absence of sufficient policies regarding to sustainable development - Poor attention to social sustainability - Poor satisfaction level of inhabitants - Lack of public facility and community centre - Low population of locals - Poor educational background - Lack of sense of belonging, community partnership, and public-private partnership - Top down decision system - Central government concerns more economical issues rather than social ones

		- Central government doesn't believe in regeneration, and focused on new developments
	Economic	- Public sector does not act as catalyst for regeneration programs - Low interest in private investment - There is no incentives for regenerations - Lack of feasible financial strategic plan - Lack of management for economic and strategic development
Brownfield Issue	Brownfield Status	In peripheral of Nicosia buffer zone there is many previously developed lands (PDL), which are vacant, derelict, and abandoned. Although in land use policies of TRNC, there are no rules for brownfields, however according to this study, these properties are subjected to brownfield status (Figure 37).
	Brownfield Characteristic	These sites have one or combination of the elements of "partially occupied lands" which are (1) not currently

		fully in use, (2) land or building currently in use and allocated by different land use in local plan, and (3) land or building currently in use with redevelopment potentials.
Related Stakeholders	Physical environment issues	- Ministry of interior - Parliament - City planning department - Municipality
	Environmental issues	- Environmental office department - Ministry of tourism and environment
	Community support and social issues	- Working and social security department - NGOs - Associations
	Economic issues	- Central government - Department of economy

Figure 37: Sites with possible brownfield status at the centre of study area

4.4.1 Physical/Environmental Dimension

During the study it was realized that there is a level of contamination in whole neighbourhood, and there is no statics and analysis about that. The industrial building (Sanayi Holding Binası) has been vacant for many years and municipality does not have any authority and rights[22] about that building (Figure 38). This building which was performing industrial activities, for sure has been contaminated the soils and water base, however there is no action about this and rather than applying brownfield regeneration program, which leads to un-contamination and regeneration, the government decided to demolish the building and built the new one.

[22] Before municipality of Nicosia built its new building, municipality asked for that industrial building to regenerate and change it for use of the new municipality building, however they never succeed in their request and they built a new building somewhere else.

Figure 38: Industrial Building

In challenge between demolition and regeneration option a questionnaire shows that more than 50% of the people who live in the area were strongly agreed to regenerate that building and any buildings with same situation rather than demolition option (Figure 39). Towards resident's opinion, also people who work in municipality were strongly agree with the regeneration. In this regard, deputy town clerk of Nicosia noted everything in that area are suffering from lack of a holistic strategic plan and for sure the partial planning and fragmented decisions will not help any of these problems.

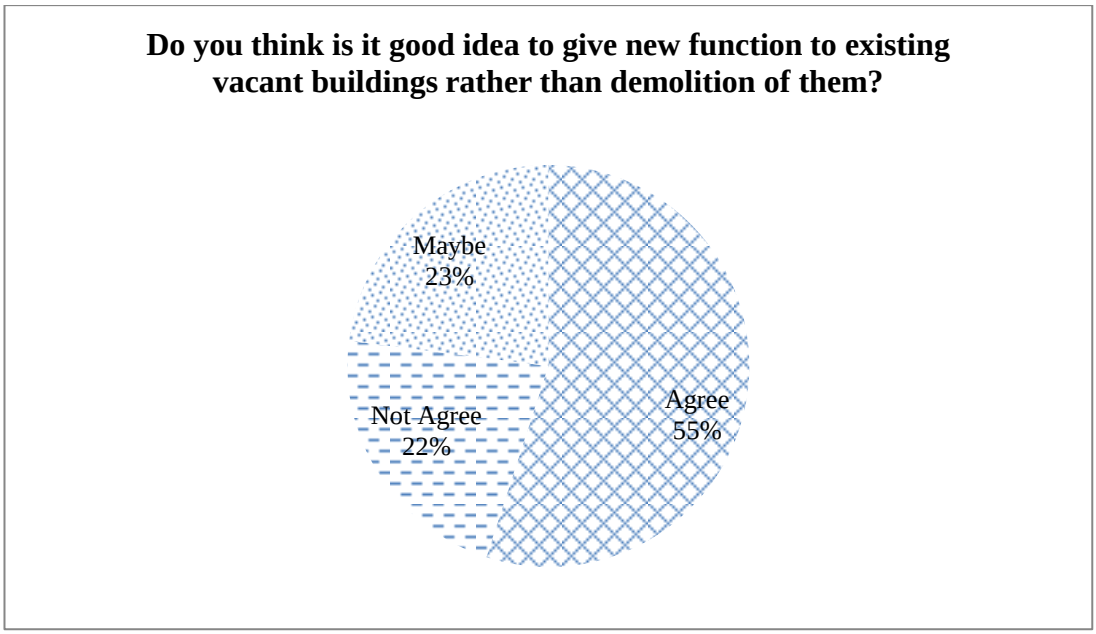

Figure 39: Regeneration Option rather than redevelopment

The bigger disaster was about another neighbourhood just in front of that industrial zone, the neighbourhood has a long history, it was a graveyard and then it turned to industrial warehouses and British soldiers' camp, and then the function has changed to UN camp. In 1964 Turkish Cypriots[23] who forced to leave their properties, moved to this neighbourhood and some other refugees and immigrants moved there after 1974. This area was never un-contaminated (graveyard, military camp, copper warehouses), and people live in the warehouses, where now transformed to residential area, however the physical condition is more look like a slum neighbourhoods (Figure 40).

[23] The verbal story from an old man who actually moved there in 1964 and still living there in poor condition.

Figure 40: Warehouses, which were transformed to residential

In center of study area there is two sides, the main street and the back street side where most of properties are located. Thanks to Nicosia Master Plan, the main street side is improved and somehow it is gentle by means of physical environment; however the back street side is suffering from serious urban declines.

In those back street areas (Figure 41) there is no utilized infrastructure (e.g. street lights, proper roads, pedestrian, and etc.), rain water runoffs in the road during the winter time, garbage and waste materials are everywhere. Unfortunately as a matter of fact, in governmental departments and municipality there is no policy and regulation regarding to brownfield issues, and more sadly nobody knew about it, from top to down level, include professionals and decision makers were unfamiliar with the term “Brownfield”. Accordingly, since there is no policy, then nobody knows about the risks of brownfields and the benefits of regenerating them,

moreover it is a policy disaster that there is no action about that. This is the foundation of problems regarding to SBR program in TRNC.

Figure 41: back street areas

Also physical existence of UN buffer zone and military area in nearby all civil functions in study area are affecting the physical environment of the area. The shadow of restricted areas prevents any further efficient development in nearby sites.

4.4.2 Socio-Economic Dimension

The people who live and work in the industrial, commercials (e.g. vacant warehouses) (Figure 42), and residential areas (e.g. Caglayan neighborhood and residential nearby industrial zone) do not have any sense of belonging to the area and as what perceived there, it resembles refugee camps rather than urban environments. There are just some conservation projects about historical heritages, which act as a gentrification scenario, and there is no actual regeneration. Most importantly people lost their believe in government for any further changes, therefore there is a high level of user's un-satisfaction (Figure 43).

Figure 42: Vacant Warehouses

In series of interviews at Nicosia municipality many thoughts and believes has been demonstrated the professional opinions about the area. In this regard, an architect from project department believes that many components should get together to succeed the regeneration program, and especially in the case of brownfield sites it needs specific knowledge and policies that are not exist in TRNC. He believes what they are doing is only the restoration program, and because it fails in social aspects, it will be only a gentrification. In the city-planning department there is a progress to produce a new master plan, but unfortunately as he mentioned there is no specific consideration about brownfield issues.

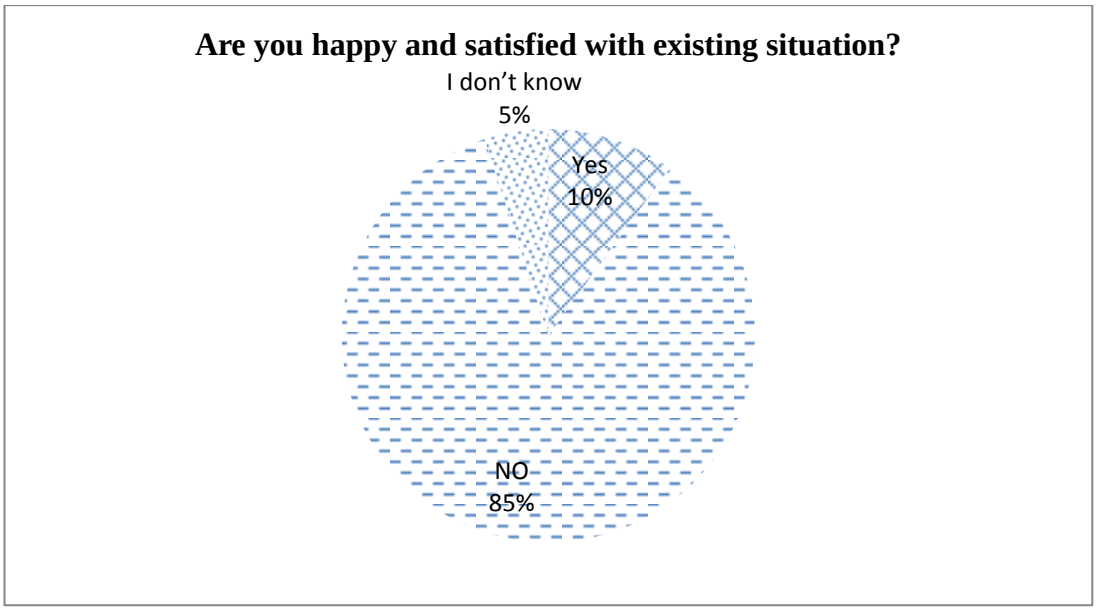

Figure 43: Level of user satisfaction of people who live and work in peripheral of Nicosia buffer zone

Although most of people are not satisfied with existing situations and they do not believe the local government will share the decisions with community (Figure 44), but then again more than half the people who answered the questionnaire have the willing to participate with any future regeneration programs (Figure 45). This willingness is an opportunity for further development plans.

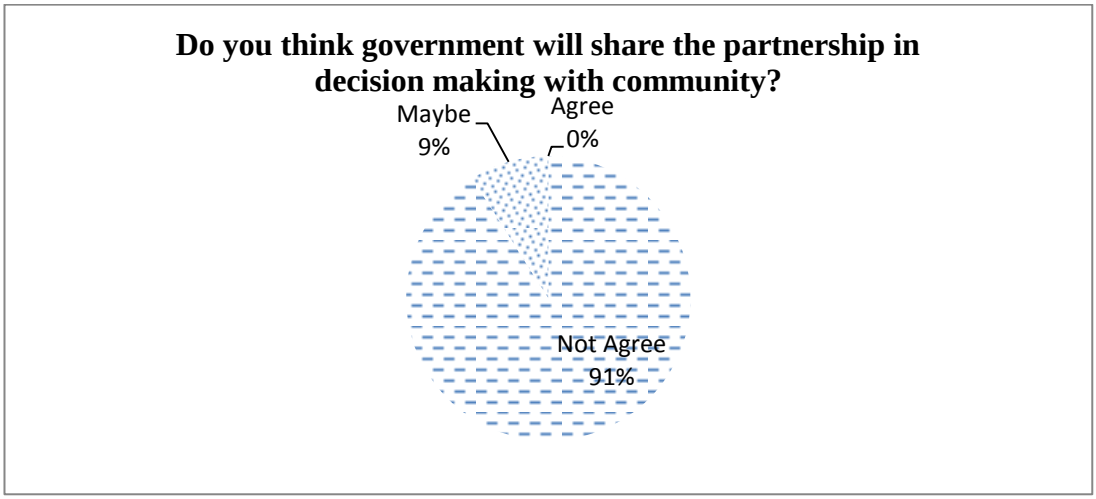

Figure 44: Community Partnership with government

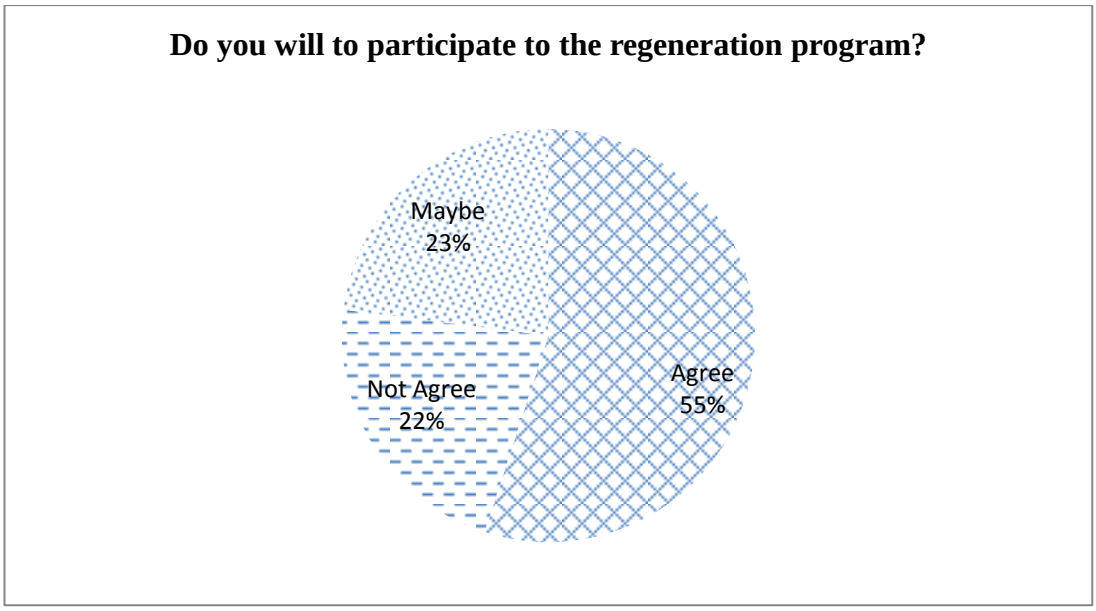

Figure 45: Community Partnerships to Regeneration Program

Opinions about participation of community in regeneration programs have two sides; people within the community wish to participate and open a new page of healthy urban environment and in other side government and in particular the municipality believes that there is no community to partnership. Accordingly deputy town clerk noted that the community in Nicosia changes a lot and people are behaving privately and not like a community. It is because of many changes in texture of community during less than a century. Each week the municipality has a council meeting for public, to let them share their opinions, but as the long term results, these discussions will not affect the decision processes, and it is a top down decision system. Deputy town clerk sharply defends this situation by referring to lack of existence of permanent community, and then he raised this question that "when we don't have a permanent community how can expect the community shares the ideas and be a part of the projects?"

Although there is no regulations regarding to brownfield regeneration, and both sides of community and government lost their beliefs in partnership, but municipality still believes that the problem can be solve by partnership with private sectors with economically feasible strategic plans. This Public-Private Partnership (PPP) idea can open new chapter in governmental decisions and leads it to the community partnership.

According to the in-depth interviews, it is perceived that there is not much partnership between these actors. In this regards municipality believes that everything will come to the political issues, and since politic is the part of holistic approach, there is an essential needs for a holistic strategic plan. Therefore, if a holistic strategic planning happens, then it can be expected the partnership of all stakeholders, and particularly the community, which leads the project to succeed. Also, uncertainty about political situation will produce uncertainty in public, private, and community decisions.

4.4.3 Economic Dimension

Unfortunately, there are no defined incentives or grants for propose of regeneration plans or SBR program, therefore mostly it is too costly for private sectors to handle these types of programs in their development plans. In this regards private investors are not interested in those areas and the investment will goes to greenfields rather than brownfields, therefore more pressure will be on natural environment. The main source of this situation is lack of feasible financial strategic plan for brownfield regeneration, which means there is no holistic management for economic and strategic development. Also, as the start point of economic analysis to produce initial analysis for SBR program, the opinion of community is an essential.

According to the questionnaire survey, which has collected the data from community about their opinion related to economic issues, most of the people in community were agreed that the regeneration programs bring new job opportunities and new investment to the area (Figure 46 & 47) and if the government provides some grants and incentives as a catalyst the private sector and community have the willing of partnership. Therefore if the area is regenerated they might not be complaining for any possible future new tax systems and more tax payments (Figure 48).

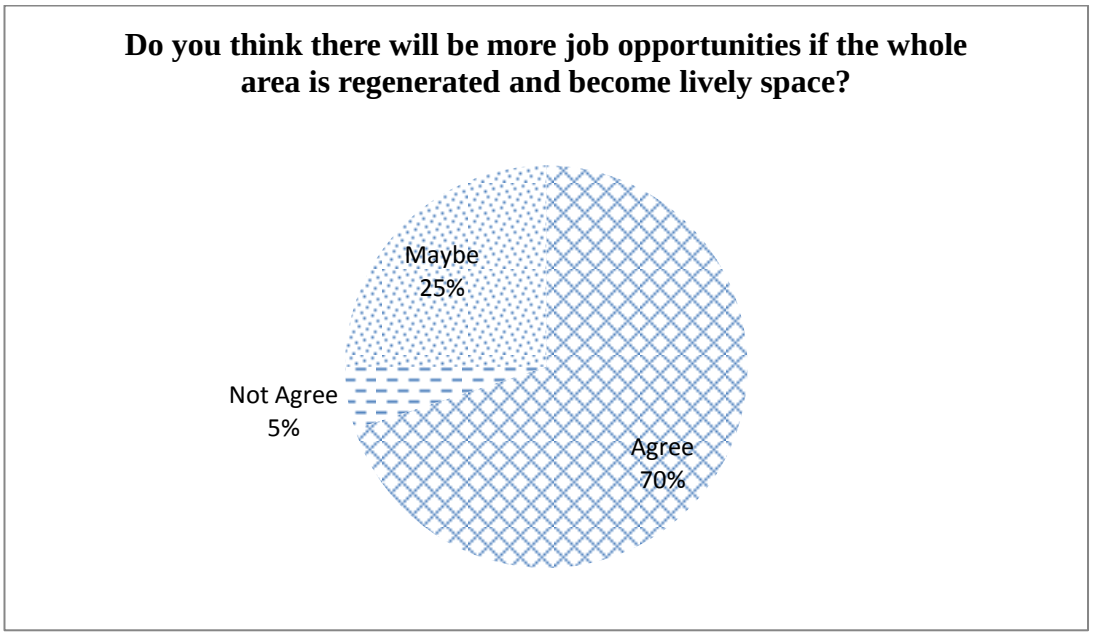

Figure 46: Job Opportunity Opinions

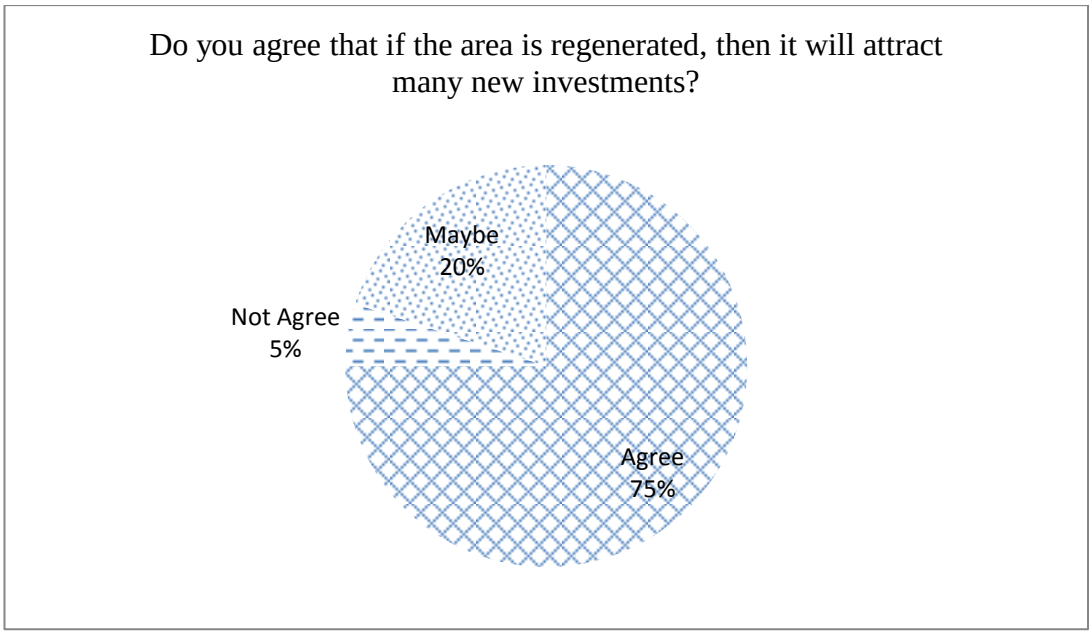

Figure 47: Opinions about Investment Opportunities

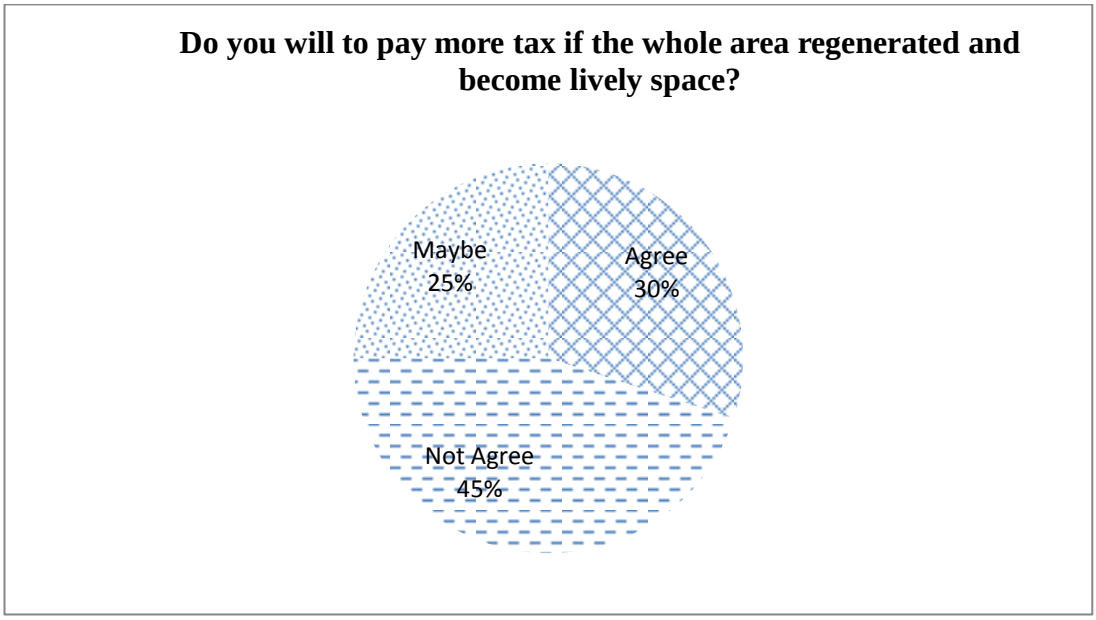

Figure 48: Opinions about Tax Payments

4.4.4 Stakeholders

According to the findings of this research, the existing stakeholders are mainly from public sector. Stakeholders in regards to brownfield issue have been categorized into four categories. In physical environment this is the top down decision system, which

start from ministry of interior, parliament, city planning department, and municipality, and these are the main actors in this category. For environmental issues there is an environmental office department, and ministry of tourism and environment, which are the main stakeholders. For community support and social issues, working and social security department, NGOs, and associations are the main stakeholders. Finally, for economic issues the government and department of economy are the main actors.

4.5 Evaluation of The Initial Stage Findings

In order to provide a better understanding of existing situation, and according to initial qualitative and quantitative data analysis, for future decisions and holistic plans, this research categorized the positive and negative issues related to the study area and demonstrated in a table with the three dimensions and their indicators to emphasize the positive and negative points in the study area (Table 9).

Table 9: Positive and Negative Issues of Study Area

Positive and Negative Issues of Study Area (according to initial qualitative and quantitative data analysis)			
Dimensions		***Positive***	***Negative***
Physical/ Environmental Dimension	*Contamination*	- UNDP Resources - Being at the peripheral of European Union and opportunity to request for technical support	- Absence of Skills and Expertise for un-contamination - Absence of Policies and regulation about brownfields and contaminated sites - No statics about the level of contamination - Needs for in-depth studies and intervention project plans
	Physical obsolescence	- The overall structures of the buildings are suitable for regeneration - These buildings and sites have the opportunity to transform to another function in terms of their location and history	- Existence of abandoned properties - Applying restoration and finally gentrification rather than regeneration - Lack of utilized infrastructure
	Spatial issues	- Location at inner part of the city - Existence of functional public buildings and facilities - Existence of historic walled city - Being at the EU border - Sites with development opportunities	- Poor urban setting condition which look like a slum neighborhood - Existence of UN buffer zone - Existence of Military areas

	Environmental and Natural Issues	- Low air pollution	- Possible contamination within soils and water based - Lack of green spaces - Lack of landscapes
Socio-Economic Dimension	*Social Structure*	- Who works and lives in those areas wishes for changes and better quality of life	- High level of users' un-satisfaction - Low income people - Low population of original owners - Low level of educational background - Lack of permanent community - Lack of sense of belonging
	Partnership	- People wills to participate with any possible future regeneration program	- Top down decision system - People lost their believes in government - Government does not share the decisions with the community - Lack of community partnership - Lack of public-private partnership - Lack of partnership with public stakeholders
	Political and Governmental Issue	- People in municipality are mainly Cypriots who has the wills and political opinions for making better quality of life - Experience of political and	- Municipality does not have enough power for main decisions of city - Central government concerns more economical issues rather than social ones

		professional partnership between Turkish and Greek Cypriot (NMP) - People in municipality are aware of most of the existing situations	- Central government doesn't believe in regeneration, and focused on new developments - No guideline for previously developed lands (PDL) - Lack of holistic strategic plan - Uncertainty about political situations and settlements
Economic Dimension	*Public Incentives*	- Grants and incentive programs has been applied for restoring historic heritages - Existence of infrastructure within the area - Since the government gave the incentives to revitalize the historic heritage and have got the positive result, then there is chance for incentives for regenerations - Incensement in tax income	- Public sector does not act as catalyst for regeneration programs - There is no incentives for regenerations - Lack of feasible financial strategic plan - Lack of management for economic and strategic development
	Private Investment	- Municipality believes the solution is laid in private approaches - High level of profit after regeneration	- Investment for new development in greenfield rather than regeneration of brownfields - Low interest in investment into those areas

Findings out of the data evaluations and initial site survey are categorized according to the positive and negative issues. It examines the area's strengths and weaknesses,

which identified the opportunities for further improvements and threats where needed to be controlled and managed.

4.5.1 Positive Issues

The study area is located in heart of the inner part of the city and there are many public buildings and facilities in that area, which are giving the impression of daily life activities. Also the existence of historic walled city and tourists who come to see the historical heritages is a great advantage to the area. On other hand, the overall structure of most of buildings is suitable for restoration and then regeneration. Moreover, as an environmental advantages the area has a good air quality.

Another positive point of the area is that the people who works in municipality are mainly Turkish Cypriots who experienced and seen the advantage of cooperation with other society (Greek Cypriots) throughout NMP, and they have a strong willing for improving the quality of life of people who lives in their community. Also existence of infrastructure within the area is an economic advantage for government, which they do not need to invest for new ones.

Throughout de-contextualization of existing situation within the site, the study shows some opportunities for further developments, which also should be considered as positive issues. These opportunities are the access to the UNDP resources, being at the peripheral of European Union, which provide the possible request for technical support, have chance to find a solution for contamination problem, and also because of historical and strategically location there are many optional new functions for regenerating the abandoned properties, and then development opportunities in vacant lands.

On the other hand, people who work and live in those areas are willingly participating in any possible future regeneration program and they wish for changes for better quality of life. Also another good signal of opportunities is that professionals who work in municipality are aware of most of the existing situations. Moreover since the government gave the incentives to revitalize and protect the historic heritage and have got the positive results, then there is chance for possible incentives for future regeneration programs, which increase the tax income for the government. Another positive point of study area is that municipality believes the solution is laid in private approaches, which sound like high profit for privet sectors throughout participation and investment.

4.5.2 Negative Issues

Throughout the analysis and evaluation of the study area it has shown that there are some risks and threats existed there, which need to be controlled and managed. The best solution for these problems is placed on a clear and professional risk assessment and management process. The level of awareness is an important factor regarding to the risks. One of the main threats to the studied site is absence of policies and regulation about brownfields and contaminated sites and no existence of statics and surveys about the level of contamination. On the other hand, existence of abandoned properties which has the ownership problem, poor urban setting which look like a slum neighborhood, and possible contamination within soils and water bases produce the physical and environmental threats to the area.

Another negative issue is producing the high risk for the community and social aspects; these risks, which have long-term effects, can end up with another social disaster. High level of users' un-satisfaction, top-down governmental decision

system, no more community believe in government and government does not share the decisions with the community are the main social negative issues. Correspondingly, because of political situations, municipality does not have enough power to make the main decisions of city and in other hands central government concerns more economical issues rather than social ones and also they do not believe in regeneration, which make them focused and invest on new developments. Since public sector does not act as catalyst for brownfield regeneration programs, then private sectors invest for new developments in greenfields. Furthermore the most important negative point is the absence of guideline for previously developed lands (PDL), which are vacant and/or abandoned now.

As general negative issues in study area there is lack of many things such as lack of skills and knowledge for un-contamination techniques, lack of utilized infrastructures, lack of green spaces and landscapes, lack of permanent community, lack of sense of belonging, lack of community partnership, public-private partnership, partnership of public stakeholders, lack of holistic strategic plan, lack of incentives and grants, lack of feasible financial and economic plans, and lack of management for economic and strategic development. These missing elements draw a scheme of what does not exist.

However, there is existence of some other elements, which are the reason for other negative issues in study area such as UN buffer zone, military bases, uncertainty about political situations and settlements, and gentrifications rather than regeneration. Moreover low level of some other issues such as people's income, local's population, educational background, and low interest of investment from private and public sector make the negative points of the study area more dominant.

For finding a solution for these negative issues, an intervention and in-depth studies are essential need.

4.6 Summary and Conclusion

This chapter analysed the peripheral of buffer zone where located at inner part of Nicosia by means of physical/environmental, socio-economic, and economic dimension. These analyses were based on existing situation of the city in regards to urban declines, vacant and abandoned properties, and in more complex way the brownfields issue. Nicosia is the last divided city in Europe which is the result of conflict between two communities who live in the island and in 1974 a spatial border which formed after Turkey's intervention separate the community and the lands.

Since 1974 the island is divided into two parts, Greek Cypriots moved to the southern part and Turkish Cypriots to the northern part. The Greek side became an EU member and considerable amount of help and support from EU improved the urban settings of southern cities, however the Turkish side has extremely slow improvements because of lack of international recognition and many other political conflict which ends with many urban declines.

Existence of physical barrier and the dead area, which referred to UN buffer zone, put a huge impression to the urban areas at peripheral of border within the island. These impacts affected the social structure, physical environment, and economics of those areas. These urban crises were shown up with the vacant and abandoned properties widely referred to brownfield issue. Unfortunately because the issue of brownfield was a new concern within the island, there is no existing policy and regulation about it. All abandoned and vacant properties with possible contamination

have been leftover in poor urban environment, which many immigrants and refugees moved there. The area that ones used to be a vibrant urban environment has turned to a neighbourhood where look likes a refugee camp or slum.

In this regard, this research studied these areas to assess and analyse the existing situation and recognize the source of problems to handle the initial stage of SBR program. For this aim, after all initial site surveys and data collections, the study categorized the positive and negative issues related to the study area, which developed a table according to the three dimensions of study and their indicators. This table has been developed to emphasis and decode the problems towards brownfield issues throughout identifying all dimensions of positive and negative issues in study area.

Analytic outcome of the positive and negative table showed that the existence of the historical walled city and other public building act as strong positive points to the area. Except the physical location of the site and possible access to UNDP and EU resources, another positive points in study area laid on social and community beliefs. Most of the Turkish Cypriots has the willing for participation in any future changes, which improve their quality of life. This is a big opportunity for governors and decision makers to find a solution for these urban problems.

However, there are many negative issues, which are forming the future threats. Unsustainability in social texture of the community, lack of improvement in urban environment, lack of knowledge and action about brownfield issues and contaminations, lack of partnership between public, private and community, and lack

of public support and uncertainty about political situation are the main negative issues in study area.

Accordingly, as the strong negative issues, there are many risks and threats to the area, which are placed in three regions; these are policy, social, and governmental issues. There is no policy and regulation about brownfield issues, contamination, and sustainable urban regeneration, also the ownership problems and abandoned properties worsen the situation. Community is unsatisfied with the existing situation and the government does not partnership in any aspect with the community, which is a solid top down decision system.

Chapter 5

SUMMARY AND CONCLUSION

This study has reviewed the history and most up-to-date policies and discussions about brownfield issues. Reviewing the history of why and how this situation acquired, shows as a well-known fact that brownfields are the footprints of industrial movements and began their appearance after the events of Second World War. Basically brownfield sites defined as previously developed land, which is abandoned, derelict, vacant, or partially occupied. Besides, these lands may have some kind of contamination. The term brownfield is defined in policies and laws, and from one country to another country, and sometimes within a country there is some difference in the definition. Overall accepted definition of brownfield, which is offered by this study, is based on European definition (CABERNET) with additional consideration to British and American ones.

According to this study "Brownfield Sites" is defined as previously developed land which are real (estate) properties and may occupied by a permanent structure in both built-up and rural locations. These sites have been affected by former uses of the site or surrounding lands. Brownfield sites are generally abandoned, derelict, idled or underused, and may have real or perceived contamination problems, where require intervention to bring them back to beneficial use. One of the accepted solutions for turning these deprived areas to lively, vibrant, and functional space is laid in the combination of urban regeneration and sustainable development, which widely called sustainable brownfield regeneration (SBR).

Sustainable brownfield regeneration is about connection between technical issues and socio-economic concerns to gives a new life to those dead lands and properties. Besides, these regeneration programs will reduce the pressure on Greenfield and prevent the urban sprawl to achieve more compact way of urban form. Awareness of the realistic dimensions of the projects is an essential, which throughout defining the role of stakeholders and managing the partnership, and also recognition and handling the potential risks, more realistic and sufficient results are expected.

With no doubt sustainable brownfield regeneration (SBR) programs should result in improvement of quality of life and enhancing urban environments. Physical/Environmental dimension of SBR programs has focused on reducing the pressure on Greenfield and prevent urban sprawl to have better and more compact form of urban environment. Moreover, cleaning up techniques is for treating the contaminated sites to secure safety and public health issues within those brownfields; besides, by cleaning up the site, air and water quality will be improved.

Socio-economic dimension of SBR program has its focus on improving the quality of life, and provides an appropriate service to community. In this dimension the unemployment rate will be reduced and new job opportunities will show up. Throughout the socio-economic dimension of SBR, the community centres, and commercial/entertainment facilities will be provided to serve as a social resource. These social resources will secure the quality of educational and social issues, and also will improve user's profile, besides it will reduce the level of poverty and crime within the regenerated neighbourhood.

Economic dimensions of SBR programs generally are about the rewards of the programs by means of profits, tax incomes, and new investments. Brownfield sites, which usually have installed infrastructures within the site, will lower the cost of public sectors investments, and in compare to greenfield investment it is a huge steps forward in process by means of time and money. Another side of economic profit is the new source of tax income from places where had idle status which is a great profit for local and national government, plus throughout the regeneration program the property value will be increased, therefore it will cause increase in existing amount of income tax. These incomes and profits give more confidence to public sector for investment in those projects and act as catalyst to attract private investors by means of supports and incentives.

Base on theoretical framework and discussed issues, this study offered a guideline for process of SBR program (Figure 49). This guideline, which acts as a conceptual model for SBR program, consists of seven stages, which are in sequence, and each of them is essential for the next step. Accordingly, this study has been adopted the case of peripheral of Nicosia buffer zone to the first stage of the guideline, which is the initial stage of analysis to provide a general assessment and defining the general problems of the study area.

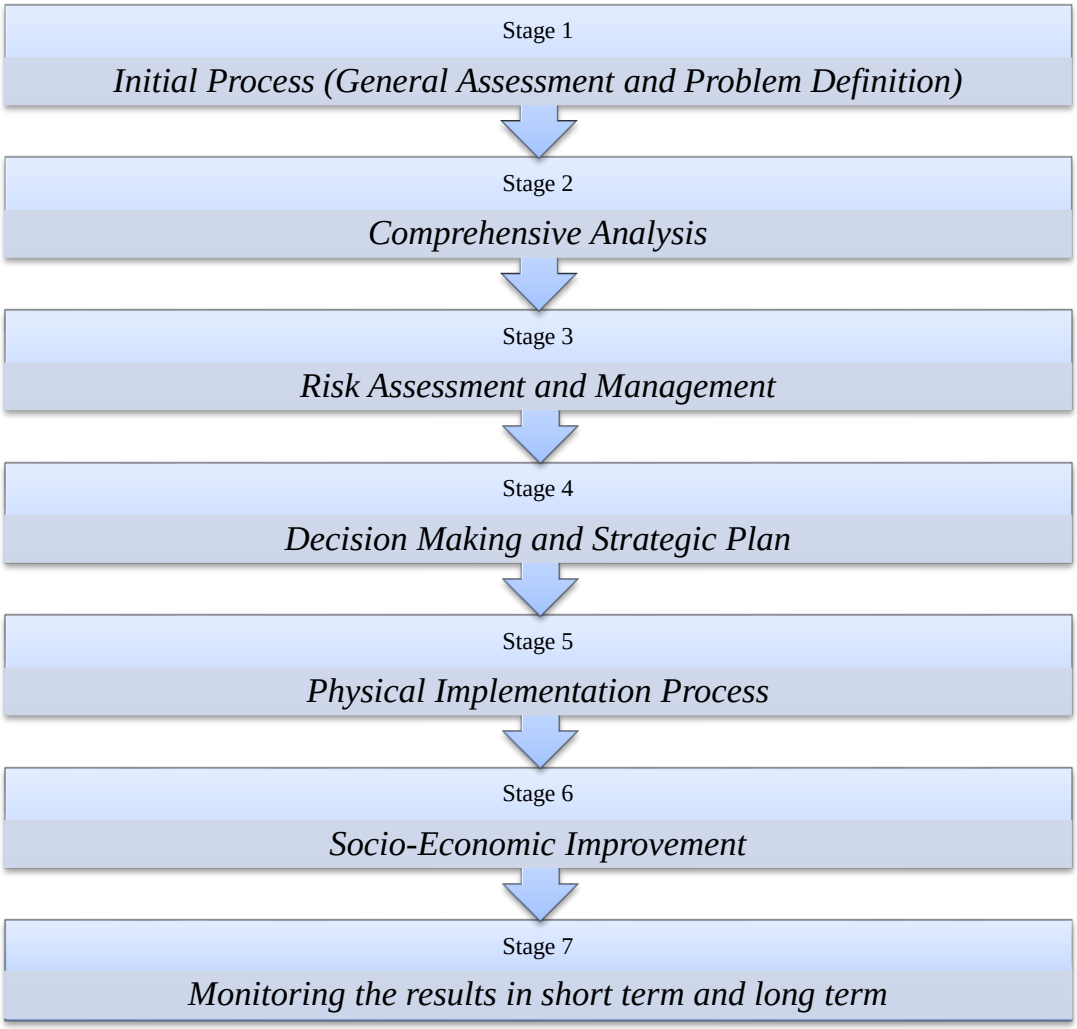

Figure 49: Guideline for process of SBR program, which acts as a conceptual model for SBR program

The first initial stage of the guideline analysed the existing situation of peripheral of Nicosia buffer zone to decode and de-contextualize the problems in regard to brownfield issue. Initial site surveys and analysis have been carried out through inner part of the Nicosia by means of physical/environmental, socio-economic, and economic dimension. After the initial data collections, qualitative and quantitative analyses evaluated the existing situation of the city in regards to urban declines, vacant and abandoned properties, and in more complex way the brownfields issue.

Accordingly the main contrasted nearby area, which had almost the same problems, is the southern part of Nicosia, however as a result of the EU membership of the Greek side, urban settings in general and brownfield issues in particular have been improved throughout helps and support from EU. But the Turkish side has extremely slow improvements because of lack of international recognition, in-community and many other political conflicts, which have ends with many urban declines.

Existence of physical barrier and the dead area, which has referred to UN buffer zone, set a huge pressure to the urban areas in general and in particular to peripheral of border within the island. These impacts affected the social structure, physical environment, and economics of those areas. These urban crises were shown up with the vacant and abandoned properties have been addressed as urban declines that referred to brownfield site. Unfortunately, because the issue of brownfield was a new concern within the island, there is no existing policy and regulation about it. All abandoned and vacant properties with possible contamination have been leftover in poor urban environment, which many immigrants and refugees moved there. The area that once used to be a vibrant urban environment has turned into a neighbourhood where look like a refugee camp or slum.

Although there are some positive points within the study area, the negative issues lead the area to the serious risky situation. Contamination within the sites, which never evaluated, can cause the long-term health problems for the community, and affect the natural and environmental system in the area. On the other hand people are extremely unhappy about the existing situation and lost their belief to the government, and uncertainty about political situation adds more pressure to the situation. Also, the government does not share the partnership and this solo mentality

in decision making system, which referred to the top down decision system, will produce the high risk of urban disasters for future of the city and in particular the brownfield issues.

In general overview, what are needed for the study area are, improvement in state policies, transformation of abandoned and vacant properties to the functional form, transformation of military areas within the city to some other public functions which leads to contribution of those facilities and properties in city life, and enhancing the community partnership which are essential to improve the quality of life in Nicosia.

Nowadays the main development issue in Cyprus has focused on greenfields and these sprawl development will have long term negative impacts to the urban environment of the island. If this situation continues with the existing condition, approximately in next 30 years, the solution for all these problems become so expensive by means of money, time, and effort. According to these situations the main outcome of this study should be considered as a serious warning for future of the island in general and in particular the city of Nicosia.

All these discussions are beneficial for improving the quality of life of those who actually live and work in the island in general and particularly in the city of Nicosia. If the responsible authorities take these discussions as a warning about the existing situation and consider them reasonably, plus consideration to the conceptual model of SBR program, then it is likely to see the days of vital, vibrant and lively urban environment in the cities of TRNC and specifically in the city of Nicosia.

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APPENDICES

Appendix A: Sustainable Brownfield Regeneration Questionnaire

After the conflict of 1974 the northern part of Nicosia went to an urban decline, particularly the peripheral area of Nicosia buffer zone suffering from physical/environmental, socio-economic, and economic crisis. One of the world wide accepted solutions for this crisis is urban regeneration. Accordingly many buildings and properties are vacant and abandoned, and to bring new life to them without demolition and new construction the regeneration is an essential which make these areas vibrant and increase the quality of life. Then by considering these issues please answer these questions.

#	Question	Strongly Disagree	Not Really	Maybe	It is ok	Strongly Agree
1	Do you think is it good idea to gives new function to existing vacant buildings rather than demolition of them?					
2	Do you will to participate to the regeneration program?					
3	Do you know think government will share the partnership in decision making with community?					
4	Are you happy and satisfied with existing situation?					
5	Do you will to pay more tax if the whole area regenerated and become lively space?					

6	Do you think there will be more job opportunities if the whole area regenerated and become lively space?					
7	Do you agree that if the area regenerated, then it will attract many new investments?					
8	Do you think if government provides incentives, the community and especially you have the will to participate in regeneration program?					
9	How old are you?					
10	What is your original nationality?					
11	How many years are you living in Cyprus?					
12	How much is your annual income?					
13	What is your level of education?					
14	Are you the original owner before 1974?					
15	Do you have any comment or opinion about these areas?					

Appendix B: Main Questions in Qualitative Survey Interview With Official Authorities

1- Do you know what brownfield site or regeneration means?

2- Do you know the profits of brownfield regeneration?

3- Are there any governmental incentives for this issue?

4- Does government partnership with community? If yes how? If no why?

5- Do you know the advantage of existing infrastructure?

6- What was the previous function of …… site? Does it deal with any kind of contamination?

7- Who are the related stakeholders in these categories?

A. Physical

B. Environmental

C. Social

D. Economic

8- What is government vision for these areas?

9- Do you know about huge amount of new tax income, new job opportunities, and investment attraction throughout regeneration programs? If yes how?