ARCHITECTURAL AND URBAN SUSTAINABLE DEVELOPMENTS APPROACHES FOR CEMETERIES IN THE CITY: BAGHDAD HISTORICAL CEMETERIES - CASE STUDY

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Abstract

Due to the increasing urban growth in Baghdad, cemeteries, which were generally outside the urban fabric, have become part of the urban centre of this city. Some of these cemeteries are abandoned, whereas, in others, the demand for burial space has risen owing to the increasing number of deaths resulting from armed conflict and instability. This has led to disorganised planning and overburdening of the cemetery facilities. In addition, these urban cemeteries are considered as a part of socially expelled sectors, which negatively affects their surrounding environment and the prices of real estate in their vicinity. The aim of the research is to explore approaches to transform cemeteries into influential sectors in the city within the framework of sustainable development, based on previous studies and international experiences. A comprehensive theoretical framework was built, and then classified the cemeteries in the city of Baghdad, in order to determine historical cemeteries as a case study to include three cemeteries ((Sheikh Omar Al-Suhrawardi Cemetery, Royal Cemetery, and Baghdad's North Gate Cemetery)). Develop scenarios for developing and making them influential sectors through both cemetery tourism and environmental cemeteries, based on the specificity of their history and location. The research reached to formulate a hybrid scenario in accordance with the specificity of these cemeteries, which are characterized by historical values in addition to the location that extends within the city center.

Keywords: Baghdad, Cemeteries, Historical cemetery, Sustainable development approaches.

1. Introduction

Cemeteries have existed for thousands of years in various civilisations as symbols of traditions that have been followed Earlier, cemeteries were built on the outskirts of the urban fabric and in environmentally appropriate areas, based on the religious and ideological requirements of each civilisation [1]. However, with the growth and expansion of cities, historical cemeteries have become intertwined with or are located adjacent to populated areas [2].

Abandoned (inactive) urban cemeteries are considered to be neglected places within the main areas of a city. The proximity of these places to active urban areas distorts the physical systems of cities, thereby disrupting the social security system and creating chaos; moreover, it causes inconsistencies in urban landscapes [3]. Therefore, authorities are considering removing them from the city centre and proposing alternative sites for them outside the city limits [4, 5] as part of a process that seeks to make death progressively invisible [2], whereas urban cemeteries could serve many purposes in addition to their original role of serving as burial sites without posing risks to public health [6].

For example, they could serve as tourist attractions and symbols of history [7] with religious symbolic, philosophical, and artistic significance [8, 9]. Moreover, they could be considered for their biodiversity functions [10, 11], as green spaces that could be potentially attractive areas for recreation [12, 13], which are primary components in the master plans of cities [14].

One of the most prominent modern cemeteries is the San Cataldo Cemetery in Modena, Italy, designed by Aldo Rossi. The design of this cemetery reflects a unique concept: the cemetery serves as an architectural and urban monument, in addition to performing its ecological function.

This paper motivated to explore the possibility of depending sustainable development approaches for urban cemeteries in Baghdad, based on their classification, planning and design characteristics, to become influential sectors in the city. In order to address one of the problems that the city is currently facing (like most cities in Iraq) in terms of the presence of cemeteries within its urban fabric, most of them are negatively affect its urban and social environment. The paper will adopt a descriptive analytical approach according to the following sequential steps:

- Building a theoretical framework that includes the most important themes and indicators concerning the approaches of sustainable development for cemeteries, in a way that enhances their relationship with their cities, by reviewing the most important literature related to this topic.

- A description of the state of the cemeteries in Baghdad in general and the historical cemeteries in them in particular, to investigate the possibility of developing them according to a set of scenarios extracted from the theoretical framework.

2. Development Approaches for Cemeteries.

Studies that investigate the relationship between cemeteries and the city consider different aspects and perspectives when it comes to urban development strategies. Rastandeh and Ansari [3], explained the importance of considering cemeteries as general green areas that should be planned and designed through cooperation between various specialists. They explained the importance of considering the

peculiarities of the landscapes of cemeteries and their relationships with the environment. Old cemeteries must be protected along with new ones, as they are essential for achieving sustainability and enhancing greenery in cities.

Dow and Wyche [15] highlighted the importance of using historical cemeteries as a resource for urban design because of the history and memories associated with them. These cemeteries represent national historical records of people, and thus, they provide an opportunity to link people with the past emotionally, culturally, and spiritually. The aforementioned study indicated that cemeteries can be developed as landmarks for culture and learning, discussing "Oakland Cemetery" in Atlanta, Georgia, US, as an example. The Cemetery possesses distinct historical components and houses the remains of prominent personalities, civil war soldiers, and public graves from different periods; this makes it similar to a historical museum. Further, by adopting global positioning system (GPS) and geographic information system (GIS) technologies, the cemetery enables visitors to find the locations of graves and use complementary elements and architectural or monument symbols at the cemetery to provide a social environment that achieves stronger emotional ties with the place.

Uslu et al. [14] focused on eco-cemeteries. In environmental cemeteries, graves are indicated by metal sheets, and the locations of graves are determined using identifying metals. The main purpose of environmental graves is to reduce the negative effects on groundwater, natural plants, and animals in the burial area, and to use biological decomposition materials more quickly to reduce the environmental footprint of the individual. Environmental graves encourage the protection of landscapes, animals, and plants. The aforementioned authors cited the first ecological cemetery in the United States - Ramsey Creek Cemetery - stablished in 1998, in addition to another environmental cemetery, namely Spring Vale Cemetery, Lafayette. Thus, their study suggests the need to equip large urban cemeteries with kiosks that serve as geographic information centres for the location of graves. Data at such kiosks contain the identity of the deceased, date of death, location of the grave, and shortest access path for the burial function to be an essential part of the identity of the site.

Gusman and Vargas [7] indicated the importance of preserving and rehabilitating cemeteries as unique architectural and urban landmarks and as the largest civil historical monuments commemorating citizens. They proposed a living open-air museum that includes graves and memorial buildings of rich artistic value. Their study suggested adding a memory museum to cemeteries; the museum would include written documents to enable the visitors to understand the structure and symbols of the cemetery, encourage field visits, and help visitors identify the characteristics of the urban scene of each cemetery and what distinguishes it from other cemeteries based on the religious beliefs and customary practices of each region.

Afla and Reza [6] proposed a sustainable design approach to overcome urban problems in Malaysia; they state that a liveable city must take care of both the living and the dead and must attempt to develop cemeteries within urban areas and transform them into public green areas that contribute to the elimination of thermal islands. Further, they suggested creating open spaces in cemeteries to increase the operational capacity of cities by installing renewable energy plants that use photovoltaic devices and air turbines and installing facilities for rainwater harvesting. They propose adopting cemeteries as part of the social infrastructure

after increasing community awareness and presenting a set of sustainable planning and design considerations for cemeteries inside the city. These include linking cemeteries to their context, besides listing them as part of the city's green networks; opening their doors for public use by converting their lands to permit public ownership; reorganising their space without disrupting marital rites and burial practices; enacting laws and legislations to prevent building structures on graves; and urging citizens to use simple structures, to promote diversity in the designs of graves compared to older graves that use large tombstones and solid materials.

Rossi [16] reported a contemporary trend of investing in cemeteries based on the concept of cemeterial tourism, whereby visitors are educated about the importance of the historical and spiritual aspects of the cemetery while its funerary value is also preserved. Using Macromedia Dream-Weaver (Adobe) and similar programmes to create archive documents digitally to create an interactive database that contains features and pictures of graves to achieve promotional goals that can help improve the infrastructure of cemeteries and support their development.

Eveleth proposed a set of mechanisms to allow cemeteries to adopt new technologies such as audio and visual effects to educate visitors about historical evidence and facts, with the possibility of adding real sounds of people who have been buried (these audio clips would be recorded before their death) and using phonograms for visitors to leave messages and audio stories. The aforementioned study also indicated the possibility of recycling old graves by adopting a policy to rent them instead of owning them to address the accumulation and overcrowding of graves, which often leads to overtaking of separation distances and impedes movement [17].

De Lacy [18] explained the importance of preserving the vegetation cover of cemeteries and their rich biological diversity to ensure balance in the local climate; this plays an important role in most Islamic cemeteries as they include blocks of shaded trees based on the belief that the trees pray for the dead. Cemeteries are attractive sites that all citizens can access and use for everyday purposes, such as picnics [19]. Others also see cemeteries as recreational or heritage sites in the urban fabric [20].

Bhatt [21] defined a natural cemetery, or a green burial or natural burial, as a new approach in cemetery planning. This approach supports environmental transformation that occurs in the ecological cycle, with the idea of quickly returning bodies to nature (natural recycling). These cemeteries suggest new approaches to minimise the amount of wood, steel, or other materials used to make coffins and prevent environmental pollution from the chemical treatments applied to the body before burial. Burial in natural cemeteries is performed in a cardboard box, wicker, or only the shroud. Furthermore, no signs are placed on the graves; instead, they are identified using GIS or using trees as markers for the graves.

The impact of natural burial on the provision of ecosystem services in urban cemeteries in England that are owned and operated by local authorities has been examined [11]. The article examines the case of three cemeteries, each offering a different interpretation of a natural burial. The third is a new cemetery the design and layout of which combined a natural burial with traditional burial.

Clayden et al. [11] revealed the transformational effect of natural burial on the traditional cemetery towards richer habitats and spatially complex landscapes with their own distinct identity. Additionally, they found that, within the UK, natural burial increases the burial capacity of urban cemeteries by using space that is

unsuitable for traditional burial. Natural burial is thus redefining both established and contemporary cemeteries. Moreover, the underpinning ethos of natural burial could enable a rethink concerning the maintenance of urban open spaces beyond the cemetery walls.

Cemeteries and cities are interwoven, and according to historical data, the social functions of cemeteries have been essential in the formation and development of early cities. Cemeteries consist of some of the oldest and largest green and open spaces in the urban landscape, and as such, are vital elements of the urban infrastructure system. Based on a 78-feature analysis of modern European cemeteries, a list of pro-environmental solutions is recommended by Dlugozima and Kosiacka-Beck [22], including those related to the context, burial space, architecture, other spatial elements, and the vegetation of modern cemeteries. The solutions are then used in developing a concept for a multifunctional eco-cemetery in Poland that includes permeable surfaces, green parking spaces, solar lighting, and economic facilities for waste management.

Literature pointed to the importance of developing cemeteries and their relationship with the city in accordance with a sustainable approach that focuses on advancing its design and planning, taking into account the various and diverse environmental, social-cultural and even economic aspects. They also pointed to adopting new technologies in the burial process, considering the preservation of spiritual privacy, legal and religious laws.

3. Theoretical Framework

The theoretical framework describes two main approaches for the sustainable development of cemeteries as follows,

- **Eco-cemeteries:** These cemeteries contribute to reducing the ecological footprint of the individuals, adopting compact forms, and addressing environmental climate issues. as explained further in Table 1

Table 1. Eco-cemeteries approach.

Main Themes	Indicators
Minimizing the ecological footprint of an individual	• Supporting the environmental transformation that occurs in the ecological cycle during burial
	• Reducing the amount of wood and steel used in making coffins and replacing them with environmentally friendly materials such as cardboard or wicker
	• Preventing the use of chemical treatments for dead bodies before burial
The adoption of tombs of compact forms	• High density of graves
	• Recycling of graves (according to Islamic law)
	• Avoid using massive structures to demarcate the graves
	• Avoid using excessive embellishment
Addressing climate issues	• Increase the vegetation cover and reduce the thermal island phenomenon
	• Take advantage of the extended areas to adopt renewable energies (sun and wind energy as well as collect rainwater)

- **Cemetery tourism:** Cemeteries serve as cultural and recreational attractions because the historical and heritage value of the graves allows cemeteries to become an open-air museum because the extended areas act as open green spaces, as explained further in Table 2.

Table 2. Cemeteries Tourism approach

Main Themes	Indicators
Cultural Open Museums	
Employ advanced technology	- The use of sound and visual effects near the graves, which brings back to mind the specificity of these historical eras
	- Use of remote sensing techniques; GIS and GPS devices to locate places inside the cemetery
	- Create an interactive (and portable) digital database containing descriptions of cemeteries, photos, and documents
Complementary additions	- Memory Museum Building: including written documents
	- Dramatic monuments associated with the privacy of each cemetery
Recreational Green Open Spaces	
Preserving and enhancing	- The existing biological diversity
	- The existing vegetation
Infrastructure improvement	- Improving the physical components such as lighting poles, seating benches and others to suit the new use
	- Improving public facilities to serve visitors, such as various service booths

4. Case study: historical cemeteries in Baghdad

Cemetery architecture forms important parts (sectors) in the majority of Iraqi cities with their various types, either those that represent the architecture of holy shrines as in the holy cities of Najaf, Karbala and Samarra, the architecture of historical cemeteries, or the architecture of public cemeteries scattered in all Iraqi cities. With reference to historical sources, and field visits, and based on the theoretical framework, cemeteries in the city of Baghdad were classified (as shown in Table 3 and Fig. 1.)

Figure 1 shows the classification of cemeteries before and after the urban expansion outside the walls.

Historical cemeteries have been elected to the applied study in the research because they are located within the center of the city of Baghdad, and they do not receive appropriate development for their contextual value. The tombs of shrines witness a particular interest in their religious position. In contrast, the rest of the tombs suffer from severe neglect, and their detrimental impact is evident in their urban context despite the importance of their geographic location within the city. these cemeteries arose outside the boundaries of urban fabric near the walls. They were characterized by irregularity of the burial. The domes and the lighthouse

always distinguish the shrine of the clergy and the guardians buried there, and the tombs over time became known as the Sheikh buried there [24, 25].

Table 3. Classification of cemeteries in the city of Baghdad.

| General Cemetery	Historical Cemeteries	Shrines and holy Tombs
Cemetery of The Jewish Community "Jewish Cemetery"	The Cemetery of Sheikh Maarouf Al-Karkhi / Also Known as The Chonizian Cemetery or The Cemetery of Bab Al-Deir	Quraish Cemeteries The Shrines of Imams Musa Bin Jaafar Al-Kadhim and Mohammad Al-Jawad
Armenian Cemetery in Rusafa.	Sheikh Shihab Al-Din Omar Al-Suhrawardi cemetery"	Khizran cemeteries The Cemetry of Imam Abu Hanifa Al-Nu'man
The Cemetery of Karkh in the district of Abu Ghraib	Al-Ghazali cemetery (cemetery of Bab Al-Azj), named after the jurist Ahmed Al-Ghazali	
	The Ottoman Cemetery/ Turkish soldiers Cemetery.	
	Baghdad's North Gate, Locally known as the "English Cemetery"	
	Royal Cemetery Including the remains of the ex-Iraqi royal family	
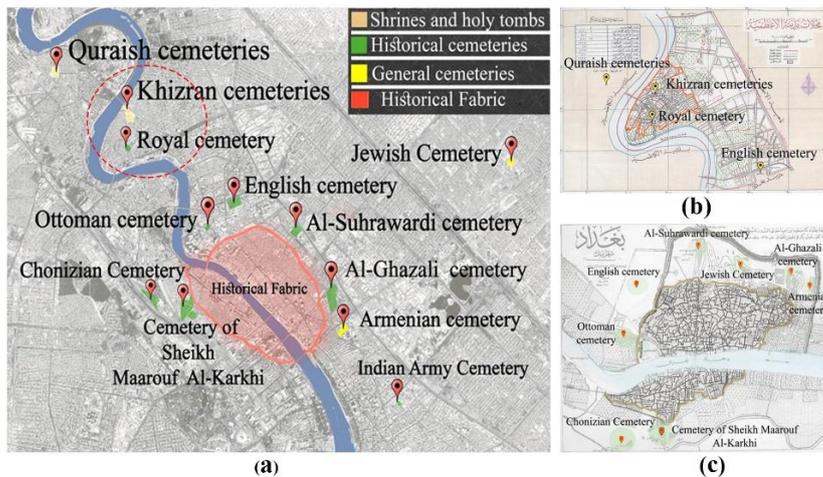
Fig. 1. Baghdad cemeteries in 1917 [23]. (a)The location of the cemeteries in the city of Baghdad، after the urban expansion outside the historical fabric, (b) The location of the Khizran cemeteries within the historical boundaries, (c) The cemeteries outside the wall of the historical urban fabric.

Three different models of historical cemeteries were chosen due to their different planning characteristics and their potential for investment in the sustainable development of the city, to be models adopted in Baghdad and all Iraqi cities.

Older cemeteries in Baghdad, which were historically located outside the urban parts of the town, have become part of the urban fabric because of the expansion and horizontal spread of the city. These cemeteries include those with religious figures buried therein, which gives them religious and historical importance. Moreover, there are cemeteries where British, German, or Turkish soldiers are buried, which are now abandoned walled spaces, seldom used or visited except on national days. There is currently no plan to develop either these cemeteries or those with shrines (Quraysh cemeteries) in Al-Adhamiyah and Al-Kadhimiyah as influential sectors. Figures 1 shows the locations of the historical cemeteries in Baghdad and their relationship to the city in 1917 [1, 24- 26].

4.1. Measurement method and tools

The information required for the case study was collected using the following methods:

i. Data, images, and maps of cemeteries and the surrounding urban fabric were collected through reviews of the existing documentation obtained from the relevant authorities and departments (Baghdad Municipality).

ii. Field surveys and access procedures included a direct visit to the cemeteries. Field surveys were conducted during two trips to each cemetery, on 25 and 27 December 2020. The theoretical framework variables were measured, and several images were captured.

iii. Data processing was conducted through a descriptive analysis of cemeteries using information obtained from surveys and field interviews in addition to plans and images; the collected data were analysed within the limits of the theoretical framework presented, as in *appendix A.*, The results of the analysis were then evaluated.

4.2. Description of selected cemeteries

The description includes a brief history of the emergence of each cemetery and its planning and design characteristics. Thus, each cemetery was evaluated to determine the development approach based on the indicators of the theoretical framework.

4.3. Sheikh Omar Al-Suhrawardi cemetery/Al-Wardiya cemetery

This cemetery is located on the side of Rusafa, near the Dhafariya (Wastani) Gate. This gate was on the Eastern Wall of Baghdad, within a distinct urban context owing to the presence of several universities and its proximity to the historical centre of Baghdad. Besides, the historical axis of the middle gate passes through the cemetery. The cemetery is connected to two of the most important historical monuments in the city of Baghdad, which are the (Wastani) Gate and its historical axis, Fig. 2(a). The cemetery was named after Sheikh Omar Al-Suhrawardi Al-Sufi, who died in 1234 AD and was buried there. His grave has been restored several times because of its importance, but the cemetery has not been restored [27], and in 1902, a section of it was rebuilt. The distinguished lighthouse with coloured and *Kashani* stone was added, which is one of the most prominent features of the cemetery and one of the main landmarks of the city of Baghdad [24].

The cemetery was divided into two parts after building the Muhammad al-Qasim expressway (1976-1983), with one part near the historical gate and another

part near the tomb of Al-Suhrawardi, Figs. 2(b) and (c). Burials continue to be performed in the latter part, owing to its location within the city centre and accessibility. However, this cemetery suffers from poor planning because of the accumulation of tombs and the limited burial space, and the axis of movement is only along the historical axis, without which movement takes place inside the cemetery over graves. Moreover, it lacks services and infrastructure associated with functional use, suffers from poor security and safety requirements, and lacks interest in both formal and ecological characteristics, Fig. 2(d).
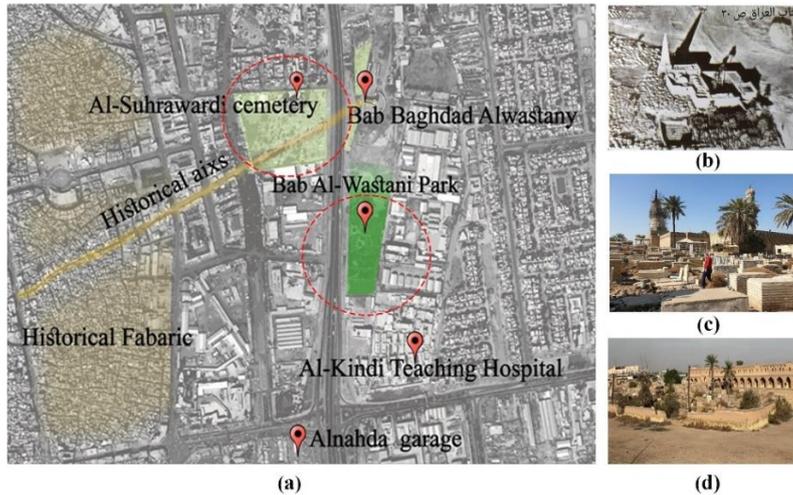

Fig. 2. The relationship of Sheikh Omar al-Suhrawardi cemetery to the urban context. (a) The cemetery location/ [28], (b) The cemetery size in 1943 [29], (c) and (d) The current situation (Source: Field survey on 25/12/2020).

4.4. Royal cemetery

This cemetery contains the remains of the former Iraqi royal family and is located in the Al-Adhamiya area within a mixed urban fabric. A part of this fabric is residential, educational, and commercial, in addition to being associated with the historical part of Adhamiya and Al-khaizuran cemetery (Abbasid cemetery), (as shown in Fig. 3(a).

The Royal Cemetery was part of the Al-Bayt Religious University (currently the Iraqi University) and was designed by English architect James Mollison Wilson. However, the university plan was not completed, except for the religious college building that was opened on 15 March 1924 [30].

The university included a monument at the end of the central axis in its design, which was later redesigned by British architect J.B. Cooper between 1934 and 1937 to be a cemetery that includes a tomb for the king and a number of his family members [31, 32]. The monument represents a distinct model of modern Iraqi architecture and is currently considered one of the essential heritage features of modernity in Iraq [33]. The site of the Royal Cemetery, which was designed to be an important monument on the university site, is characterised by its subsequent importance in structuring the urban fabric around it. While it maintains most of the

appropriate planning and design standards, some design features have not been updated to suit the latest requirements in terms of security, safety, and ecological characteristics, Fig. 3(b).
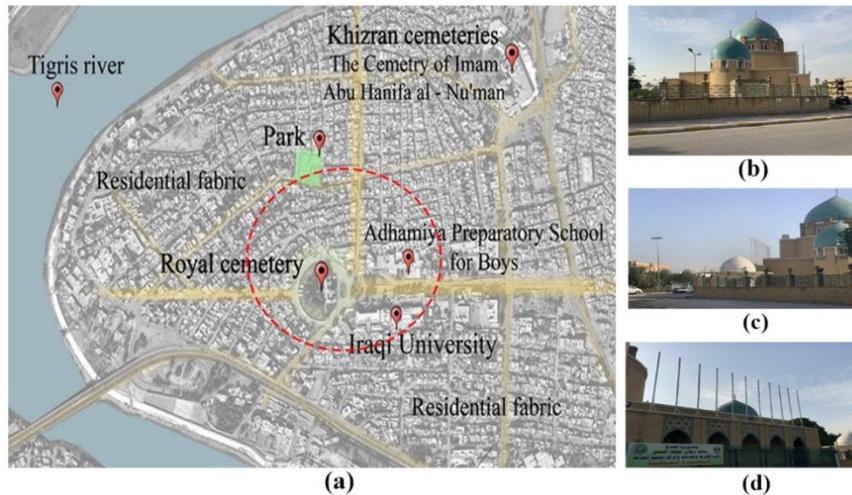

**Fig. 3. Royal Cemetery in Baghdad. (a) The cemetery location [20],
(b) to (d) the architecture of the royal tomb/(Source: Field survey on 25/12/2020)**

4.5. 4Baghdad's north Gate (English) cemetery

The cemetery is located in a distinctive neighbourhood in Baghdad. It is surrounded by several academic sites that include universities and colleges, in addition to the Al-Waziriya neighbourhood, which is one of the unique residential areas as shown in Fig. 4(a). This cemetery dates to World War I. It is considered historical evidence of a specific period that documented events of war, destruction, and occupation in Iraq. It includes the remains of Lt. Gen. Sir Stanley Maude, commander of the British forces that occupied Baghdad on 11 March 1917, who later died from cholera. It also contains the remains of 7,185 men of the British Empire and its allies with some Arab accomplices of the army. These men were killed during the War and the subsequent 1920 revolution against the mandate that was imposed after the collapse of the Ottoman Empire [34-36].

There are also some stones that indicate the presence of graves of some Turkish soldiers. The cemetery is divided into two parts around the central entrance axis. The left side includes the tombs. The right side is an open space where military parades were organised. The cemetery contains panels that indicate the graves. This cemetery was arranged in an orderly manner at the end of the 1970s. However, since the 1990s, it has been neglected, despite the presence of a sign on the door of the cemetery indicating that it is under rehabilitation. Though this cemetery achieves some of the necessary planning aspects, it lacks the appropriate spatial relationships in terms of movement paths and the lack of infrastructure associated with the visitors' demands. The design aspects lack the requirements of security, safety, and attention to ecological characteristics, as shown in Figs. 4(b) to (d).
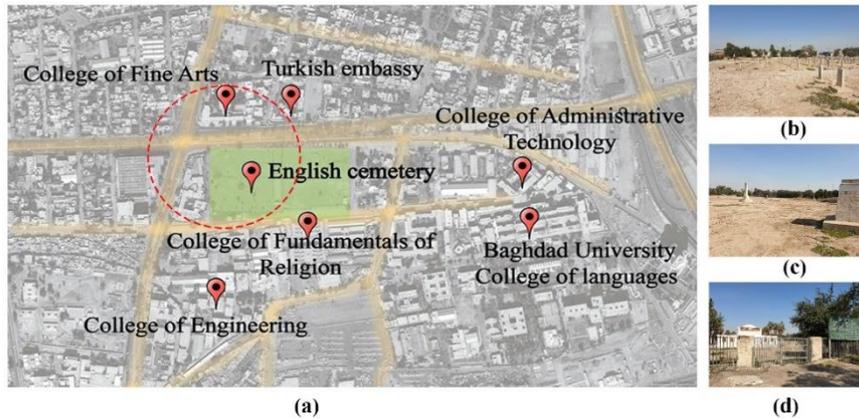
Fig. 4. Baghdad's North Gate (English) cemetery. (a)The cemetery and its relationship to the urban context (Source: Google Earth), (b) to (d) the cemetery current situation (Source: field survey on 27/12/2020).

5. Results and Discussion

Currently, all three cemeteries suffer from neglect and regression even though their sites overlap with the urban fabric of the city. Despite the decline, there are many development opportunities in these cemeteries. Some strengths of these cemeteries are the presence of distinctive architectural elements, such as the lighthouse in Sheikh Omar's cemetery and the presence of areas that can be afforested. Moreover, these cemeteries are still present in the collective memory of the citizens, and therefore, they can be modified as museums narrating historical accounts, according to the scenarios below:

i.   Adopting the cemetery as a site for cemetery tourism for both cultural as open-air museums and environmental recreational after improving the planning aspects therein, enhancing the design characteristics, adopting both technology and complementary additions as well as enhancing and preserving biological diversity and vegetation cover, and improving the infrastructure to serve visitors.

ii. Adopting environmental cemeteries that are related and addressing climate problems with the development of planning and design aspects therein.

iii. Adopting a hybrid approach that combines both cemetery tourism (environmental, cultural and recreational) and environmental cemeteries, in order to achieve integration between the cultural and environmental aspects, especially with regard to addressing climate problems in terms of reducing heat islands and adopting renewable energies.

The analysis data present possible development opportunities for eco-cemeteries or tourism cemeteries (see Appendix A). To emphasise a commitment to adhere to the necessary planning and design principles and improve service infrastructure.

Both Sheikh Omar Al-Suhrawardi Cemetery and the North Gate Cemetery can be developed by a hybrid approach, as it can be adopted in the first within the cultural cemetery tourism for the distinctive lighthouse, in addition to enhancing the environmental features through the introduction of vegetation cover and investing the extended area to sustain solar energy. For the North Gate Cemetery it is possible to adopt cultural cemetery tourism by using sound and visual effects to tell stories

of war and to establish a building as a memorial museum, in addition to enhancing environmental features by expanding green spaces and using solar energy.

The Royal Cemetery can be developed as a site for cemetery tourism by constructing a building for housing the memorial museum. This building can narrate the royal biography of the royal family, primarily because the domed monuments characterise the cemetery. Further, it can be used as an open public space in the city of Baghdad, owing to its historical and contextual value, supporting the campus of the University of Ahl Al-Bayt.

6. Conclusions

This research dealt with the cemeteries that have become part of city centres due to urban expansion and spread, and the lack of clear perceptions to deal with them due to humanitarian considerations on the one hand, and the deficiencies in studies and decisions on the other hand. Through a review of the literature, this study showed the importance of integrating existing urban cemeteries within the fabric of the city and considering them part of the daily experience in life, and also identified different directions for investing in cemeteries in city centres within the concept of sustainable development. This can be done according to their classification, historical and contextual value, urban potential, and their location, while taking into account legislative and social controls.

Furthermore, three scenarios have been formulated/developed for the investment of historical cemeteries and making them active sectors within the sustainable development of cities in general, and in the city of Baghdad in particular, according to the specificity of the cemetery's history and its location in the city's fabric, and whether the burial in it is continuous or stopped.

The practical study of the three elected historical cemeteries, which form abended areas where burials have stopped and are surrounded by walls in the city center, has shown the possibility of adopting a hybrid approach that combines cultural cemetery tourism and environmental cemeteries in two of them because of the historical value that is linked to the memory of the community and the extension of its areas. When the possibility of adopting the cemetery tourism approach (cultural and recreational) emerged in the royal cemetery, which is characterized by its historical value linked to the memory of the community and a specific area within the surrounding urban fabric. This illustrates the importance of taking into account the specificity of the case for each cemetery when determining the scenario to be worked under to achieve sustainable development.

The idea of developing these cemeteries may require the definition of their importance and increasing societal awareness regarding the necessity of integrating them with the spatial and temporal context of cities and considering them as areas for activities that do not conflict with their legal and social sanctities. In addition, the urban decisions and regulations issued by the specialized official authorities should promote investment therein in an appropriate manner.

This paper represents the first attempt to deal with the development of cemeteries in Iraqi cities in general, and in the city of Baghdad in particular, by presenting the possibility of developing them as influential and active sectors within their urban fabric in a sustainable approach. This research may be an incentive to conduct more research dealing with this topic, so some future studies. Investing the previous

knowledge presented in this research may help to develop other historical cemeteries in Iraqi cities, for example, the Wadi al-Salam cemetery in the city of Najaf.

Finally, the research recommends conducting detailed studies on the possibility of sustainable development of historical cemeteries by adopting urban measurements in order to link them with the surrounding urban fabric.

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Appendix A
**Sustainable development approaches
for historical cemeteries in Baghdad**

Main and secondary themes	indicators		Cemetery of Shaikh	Royal	English
Eco-cemeteries					
Minimising the ecological footprint of an individual	Supporting the environmental transformation that occurs in the ecological cycle during burial		●		
	Reducing the amount of wood and steel used in making coffins and replacing them with environmentally friendly materials such as cardboard or wicker		●		
	Preventing the use of chemical treatments for dead bodies before burial		●		
Using tombs with compact forms	High density of graves		●		
	Recycling of graves (according to Islamic law)		●		
	Avoid using massive structures to demarcate the graves		●		
	Avoid using excessive embellishment		●		
Addressing climate issues	Increase the vegetation cover and reduce the thermal island phenomenon		●	●	●
	Take advantage of the extended areas to adopt renewable energies (sun and wind energy as well as collect rainwater)		●		●
Indicator verification values			**9**	**1**	**4**
Cemetery tourism					
Cultural/Open museums	Employ advanced technology	The use of sound and visual effects near the graves recreates the specificity of these eras		●	●
		Use of remote sensing techniques, GIS, and GPS devices to locate places.			●
		Create an interactive digital database containing descriptions of cemeteries, photos and documents, they can be portable		●	●
	Complementary additions	Memory museum building: including written documents		●	●
		Dramatic monuments associated with the privacy of each cemetery	●	●	●
Recreational/ Green open spaces	Preserving and enhancing the existing biological diversity and vegetation		●	●	●
	Infrastructure improvement	Improving the physical components such as lighting poles, seating benches and others to suit the new use.	●	●	●
		Improving public facilities, such as various service booths	●	●	●
Indicator verification values			4	8	9